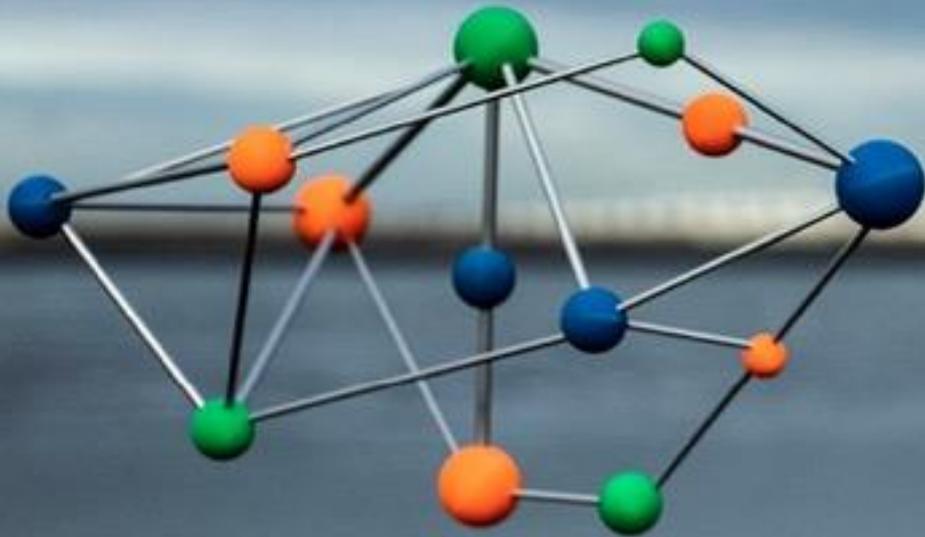


Climate Risk Scenario Modelling

Public equity sector deep dive

Feb 2022



Climate Scenario Analysis

Phase 2 - “What ifs”

What if... OPERF divested from its liquid-market fossil fuel investments (or any other sector)? What is the interplay between risk and return from that?

What if... we looked at the equity (listed and private) book through a deeper sector/geography revenue attribution lens? Does that give a different view and insight into implementation?





Background, scope and approach

We approached the “what if...” exercise from the perspective of developing insights for potential changes OPERF could explore.

Model:

- Both “what ifs” agreed with the team leverage the deterministic, sector-level modelling Ortec Finance (OF) has developed for public equities

Data:

- OF was provided with anonymized public equity data to allow mapping to our modelled region/sector grid. Proxies were agreed with the OPERF team
- OF also used PE and Real asset allocations summaries provided as part of the main project to inform the private assets assessment

Scope:

- OF has used its latest “Jun21” model, rather than the “Dec20” model for this work. It allows us to leverage better insights on more sectors and to differentiate the physical risk impact between different sectors (which was not included in the “Dec20” model).

Approach:

- Using the data provided, we have run our detailed sector/region model
 - 18 sectors
 - 28 regions
 - 504 time series, per scenario
- The purpose of this report is to cut through the immense detail and deliver the key insights.

Next steps:

- We had envisioned the output of this work as feeding into some of the “next steps” noted at the end of the main climate scenario presentation report.

Equity divestment
from fossil-fuel
exposed holding



Overview of fossil-fuel exposures | 4.4% of public equity holding

Fossil-fuel exposures = Coal | Oil and gas | Fossil-based Utilities

To give meaningful insights, we adjusted the utilities data you provided to better reflect the likely underlying profile of fuel-type exposure

- ClimateMAPS is set up to consider key economic activities that are crucial for the understanding of climate risk. The mapping exercise included some compromises, such as the mapping of utility companies to a single GICS sector.
 - However, it is likely that for a diversified portfolio the activities of electric utility companies will be spread over a few of the MAPS sector-activities.
- We adjusted the mapping as follows:
 - “Fossil-based utilities” and “Fossil-based utilities: Nuclear” were summed together
 - We then re-spread the allocation to the two sectors across: “Fossil-based utilities”, “Nuclear”, “Wind & Solar” and “Other low carbon electricity”
 - Which was based on country-level statistics on the energy generation mix for the countries covered.
- The net result is below
 - Combining Coal (0.1%), oil and gas (2.5%) and fossil-fuel utilities (1.4%) = 4.4%:

	Fossil-based utilities	Nuclear	Wind & Solar	Other low carbon electricity	Total
Aggregate	1.03%	1.51%	0.04%	0.04%	2.63%
Aggregate post adjustment	1.36%	0.38%	0.39%	0.49%	2.63%

Impact of replacing fossil-fuel with a “climate aligned benchmark”

Per scenario, what happens to expected returns if we replace all fossil-fuel holdings with a “Paris-Aligned” fund

Annual expected return delta (cumulative, annualized)	Horizon (yrs)		
	5	10	20
Fossil-based equity			
PO	-11.4%	-8.4%	-5.2%
PD	-16.5%	-10.9%	-6.4%
FT	-0.1%	-0.3%	-1.1%
Paris-aligned			
PO	-0.3%	-0.2%	-0.2%
PD	-2.0%	-0.9%	-0.6%
FT	-0.2%	-0.6%	-2.2%

The table below shows the equity portfolio impact (relative to baseline) to 5, 10 and 20 year expected returns, which results from switching the 4.4% fossil-based public equity to an investible Paris-Aligned fund. The significant negative impacts in the PD and PO scenarios are driven by the market pricing-in future transition impacts in the scenarios during those time windows.

Scenario equity portfolio-level relative impact of 4.4% switch	5	10	20
PD	0.71%	0.47%	0.27%
PO	0.41%	0.33%	0.20%
FT	0.00%	-0.01%	-0.05%

Engagement and implementation note:

Fossil-fuel entities are arguably both part of the “source” of the climate issue and part of the solution. They also potentially lose out disproportionately in the transition.

However, some investors we have worked with have investigated the impacts of divesting fossil-based utilities in a worst case of them failing to respond to engagement/reducing emissions – in order to support the portfolio NZ commitment.

The impact to low-carbon benchmarks in the Failed Transition scenario, relative to “grey” benchmarks is zero by construction as this scenario focuses on physical risk exclusively.

⇒ [A low-carbon fund is not designed to mitigate physical risks.](#)

[Using low-carbon benchmarks is not a silver bullet.](#) Although these benchmarks are better positioned to address systemic transition risks by having less exposure to high-emitters/stranded assets, the construction of the benchmark can introduce other biases (by the benchmark provider)

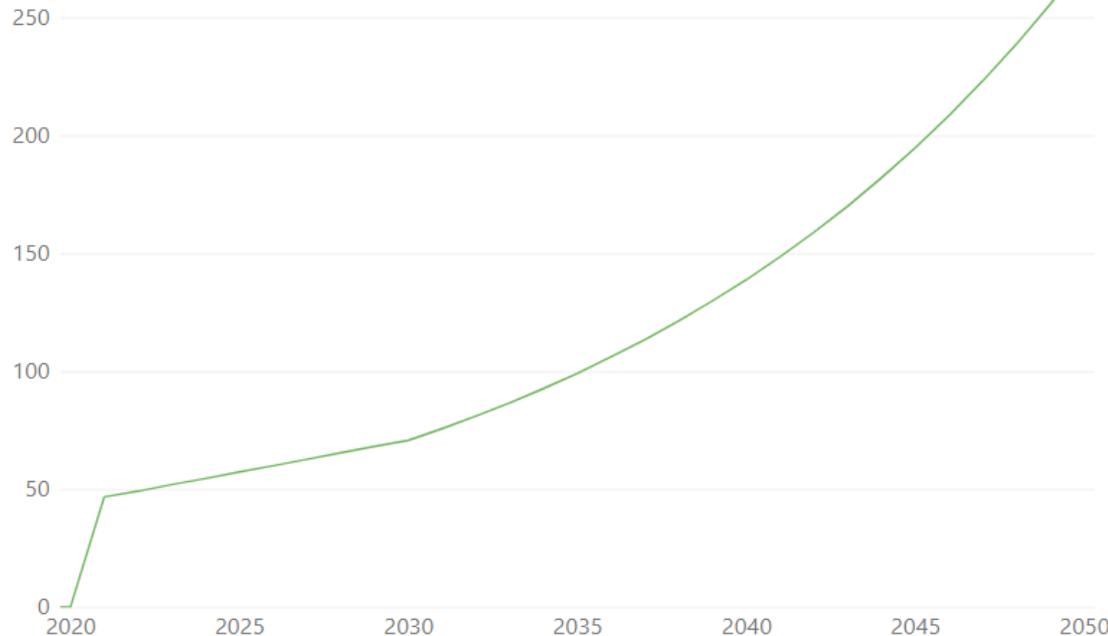
⇒ These biases can negatively impact the actual performance of the BM due to other factors.

Insights on timing of climate-transition relative to (hypothetical) utilities shifting fuel types

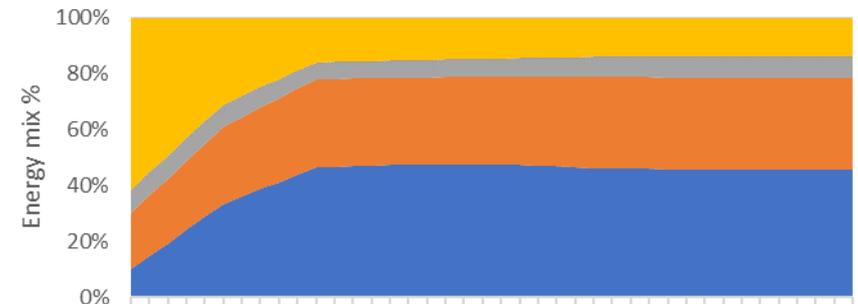
If energy utilities fail to rapidly invest in scaling low-carbon energy, pricing-in of transition policy could materially impact valuations

In a Paris-aligned, orderly transition, typified by the GLOBAL carbon price curve below we consider two US, diversified power companies. GradualCo will transition its energy mix at the pace required for the US energy mix to meet Paris goals. On the other hand, RadicalCo will ramp up much faster (perhaps through M&A) to reduce fossil mix to 16% with 5 years.

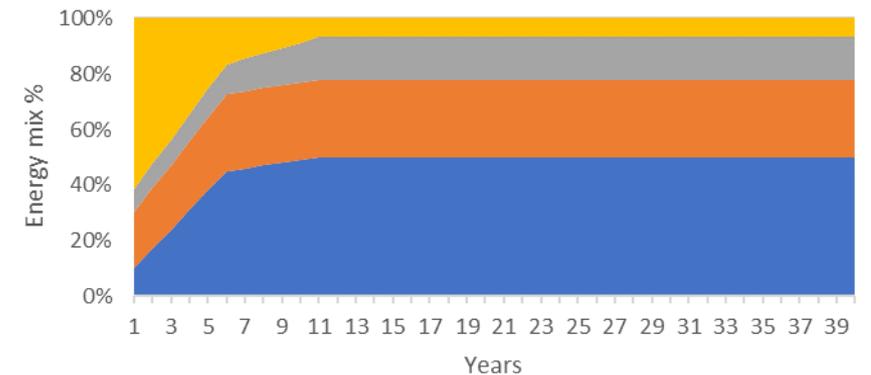
Carbon Price (2021\$/tonne CO2)-Paris Pathways-World



GradualCo shifting energy mix in line with MAPS Paris pathway



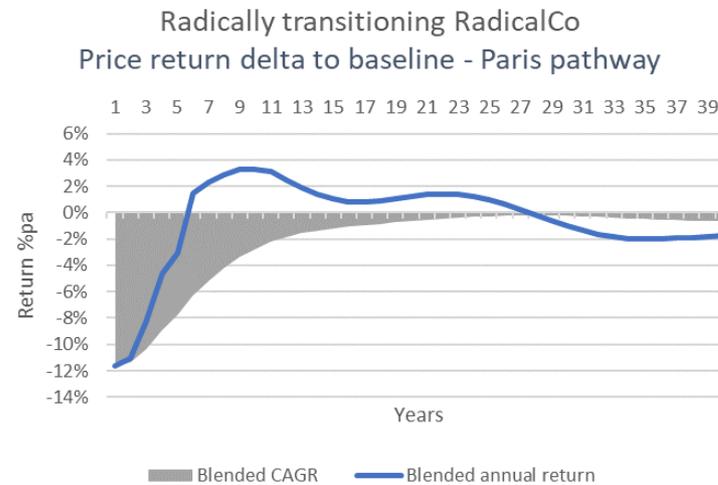
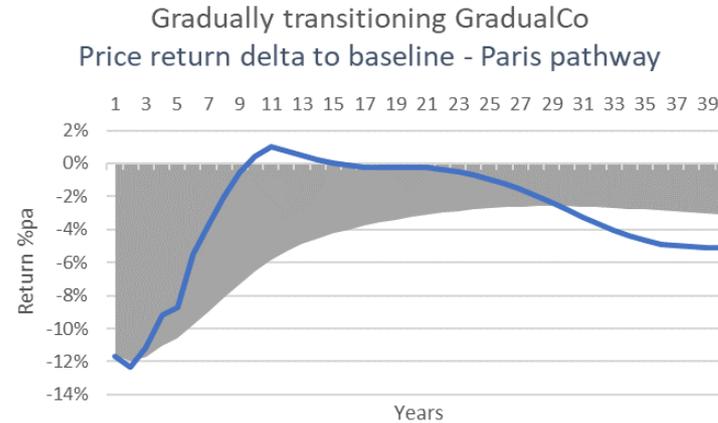
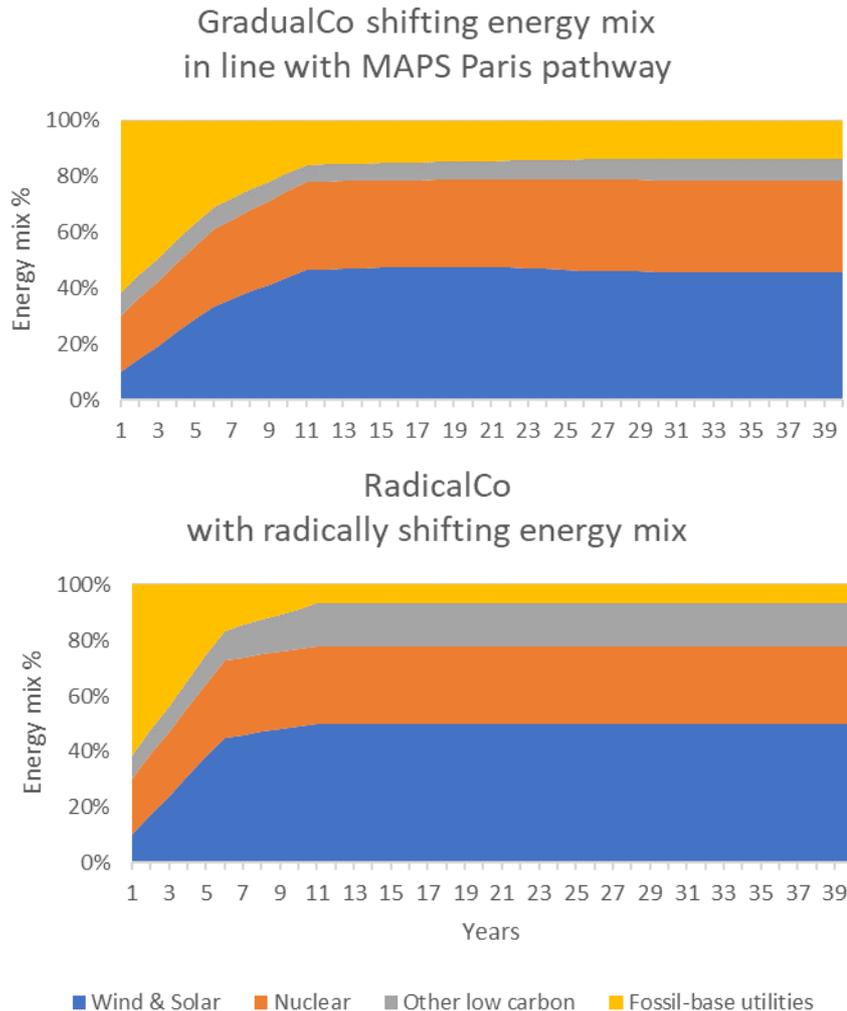
RadicalCo with radically shifting energy mix



■ Wind & Solar ■ Nuclear ■ Other low carbon ■ Fossil-base utilities

Insights on timing of climate-transition relative to (hypothetical) utilities shifting fuel types

If energy utilities fail to rapidly invest in scaling low-carbon energy, pricing-in of transition policy could materially impact valuations



The pricing-in of transition impacts that occurs over the first 5 years impact both companies.

The model does allow for some costs to be passed through to consumers, however the market still prices-in negative impacts for fossil-based power generation.

Over the long term, RadicalCo recovers to have minimal downside relative to the baseline (shown by the grey CAGR%)

Equity and real assets
sector/region deep dive



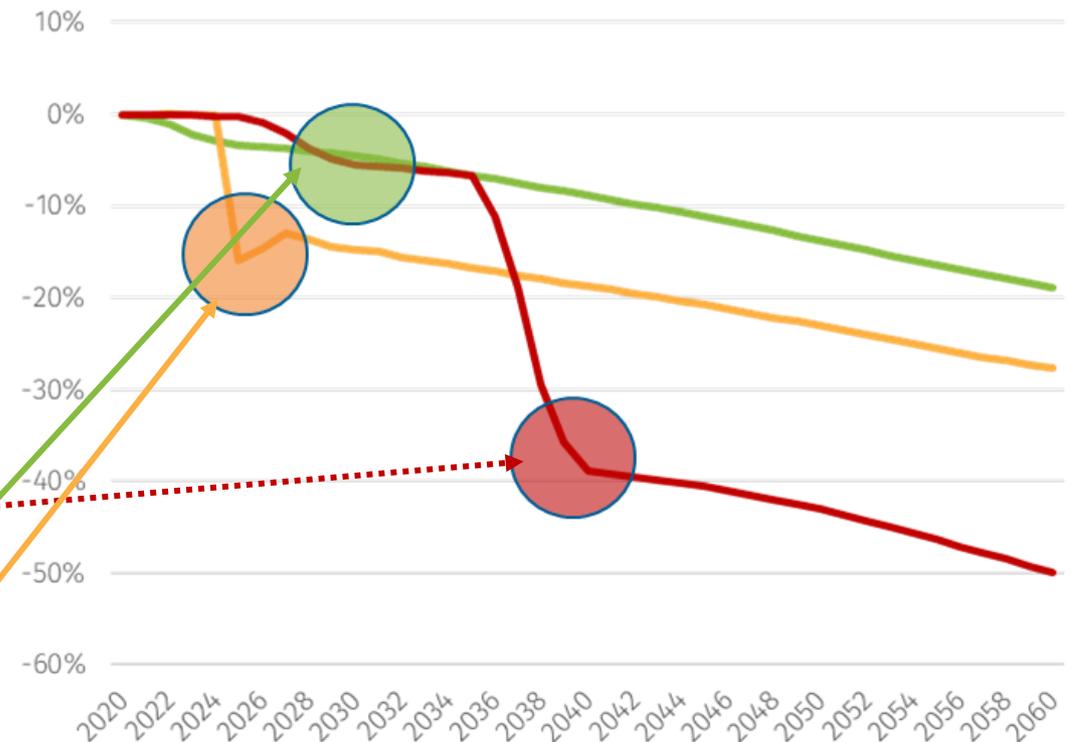
Overview of approach - Sector Risk MAPS

These results forms part of the sector-level insights, lifting useful insights from highly granular data

Sector allocation analysis:

- The premise of these insights is to divide sector/region pairs into categories of risk, based on quintiles of return impact for equity returns.
- We then overlay the portfolio allocations onto each of the sector/region pairs, and map them to the different quintiles.
- This then shows us how the portfolio is allocated to sector/regions of differing levels of climate risk exposure.
- To simplify and focus the output, we have chosen a single time horizon to measure the impacts for the different scenarios.
 - **Failed Transition:** 20y (this is after both pricing in epochs, so the full physical risk impact is captured)
 - **Pairs Orderly:** 10y (this allows time for the transition to be established and economies to stabilise)
 - **Paris Disorderly:** 5y (this is the low point of the disorderly shock and so captures the most concentrated example of transition risk).

Illustrative chart of cumulative return deltas to baseline





Overview of approach - Sector Risk MAPS

These results form part of the sector-level insights, lifting useful insights from highly granular data

Outputs and interpretation:

The main motivation of the outputs is to achieve the following:

- 1) A high-level appreciation of the distribution of allocation to different levels of climate risk exposure
- 2) An ability to help pin-point areas of the portfolio that deserve more **immediate attention in the form of detailed, stock/credit level analysis**
- 3) By cutting through the large volume of data the sector analysis creates, we generate efficient insights more appropriate for senior stakeholders

The portfolio allocations can also be compared to a benchmark. By default, we use MSCI ACWI as representative of the global equity market.

Data reliance:

Necessarily, we can only make inferences based on the data provided to us. Coverage % is included in the tab "SECTOR allocation risk summary"
If it has not been possible to look through into the holdings of funds, for example, then those funds will have been excluded from this analysis.
As such these outputs may provide a partial picture.

Also note that as part of the mapping exercise, pragmatic compromises may have been made.

For example, we would ideally want to reflect the region/sector-activity of economic exposure.

However, these data are typically hard to obtain, so proxies such as GICS/NACE sector may be used and/or region of domicile.

For multinational/diversified companies, the mapping may not fully reflect the scope of exposure. Which would require a more involved mapping exercise.

Remember that sectors should be more accurately thought of as economic activities.

A key example of this is that a large electricity generating company will use a mixture of fuel types to generate power.

Each of these fuels types is represented by an activity within our sector breakdown: Wind/Solar, Fossil fuels, Nuclear and other renewables.

Over the course of the green transition, we would reasonably expect the mix of these activities to shift from fossil to renewables.

A comprehensive dataset can be provided with the full sector/region impact data used for the following slides.

Example quintile grids - Sector Risk MAPS

Failed transition – 20y horizon – physical risk lens

	Consumer discr	Industrials	Health	Telecom	IT	Forestry	Financials	Consumer staples	Materials	Oil and gas	Coal and synthetic fuels	Real estate	Water supply	Other Low carbon and biofuel/elec	Wind and solar	Nuclear	Fossil based utilities	Public admin and defense
China	1	1	1	1	1	1	1	1	1	2	1	1	2	2	2	2	2	2
India	1	1	1	1	2	1	1	1	1	2	2	2	1	2	2	2	2	2
Malaysia	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Australia	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3
Philippines	1	1	1	1	1	1	1	2	2	3	3	2	2	3	3	3	3	3
US	1	1	1	1	1	1	1	2	2	2	3	2	2	3	3	3	3	3
World	1	1	1	1	1	1	1	2	2	2	3	2	2	3	3	3	3	3
Europe	1	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4
Indonesia	1	2	1	1	1	2	2	2	3	4	4	3	3	3	4	3	4	4
Spain	1	1	1	1	2	2	2	3	2	3	3	3	3	4	4	4	4	4
Taiwan	1	2	1	1	2	2	2	3	3	3	3	3	3	4	4	4	4	4
Netherlands	1	1	2	2	1	1	3	2	3	2	3	3	4	4	4	4	4	5
Japan	1	2	1	2	2	2	2	3	3	4	4	3	3	4	4	4	4	4
Thailand	1	2	1	2	2	2	3	3	3	4	4	4	4	4	4	4	4	4
Singapore	1	2	2	2	2	2	3	3	3	3	4	4	4	5	5	5	5	5
Canada	1	2	3	3	3	1	4	2	3	2	2	4	4	5	5	5	5	5
France	1	2	2	3	3	2	3	3	3	2	3	4	4	5	5	5	5	5
South Korea	1	2	2	2	3	3	3	4	4	4	4	4	4	4	4	4	4	4
Brazil	2	3	2	2	3	3	3	4	4	4	4	4	4	4	4	4	4	4
UK	1	2	4	3	3	3	1	4	4	2	2	4	5	5	5	5	5	5
Denmark	1	1	4	3	3	1	4	2	3	4	4	5	5	5	5	5	5	5
Italy	1	3	3	3	3	4	4	4	4	4	5	4	4	5	5	5	5	5
Switzerland	1	1	5	4	1	5	1	3	5	5	5	5	5	5	5	5	5	5
Germany	1	2	4	4	3	3	3	4	4	4	4	5	5	5	5	5	5	5
Norway	2	3	4	4	4	3	4	4	5	3	4	5	5	5	5	5	5	5
Sweden	1	3	5	4	3	5	5	5	5	5	5	5	5	5	5	5	5	5
Finland	2	4	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5
Russia	3	4	5	5	5	5	5	5	4	4	5	5	5	5	5	5	5	5

Paris orderly – 10y horizon – transition risk lens

	Fossil based utilities	Coal and synthetic fuels	Oil and gas	Consumer discr	Nuclear	Financials	Forestry	Health	Public admin and defense	Real estate	Telecom	Materials	Consumer staples	Water supply	IT	Industrials	Other Low carbon and biofuel/elec	Wind and solar
Australia	1	1	1	2	2	2	2	2	2	2	2	3	3	2	2	4	1	2
Canada	1	1	1	1	1	1	2	2	2	2	2	2	3	3	2	2	5	5
Norway	1	1	1	2	2	2	3	2	2	2	3	1	3	3	2	3	5	1
Switzerland	1	2	1	2	1	2	2	2	2	2	2	2	2	2	3	4	5	1
US	1	1	1	2	5	2	2	2	2	2	2	2	3	3	2	2	5	6
Malaysia	1	1	1	2	2	1	2	2	3	3	2	3	2	3	4	4	5	5
Europe	1	1	1	2	1	2	3	2	2	3	3	3	4	5	4	4	2	5
Finland	1	1	2	2	1	2	4	3	3	4	2	4	5	3	4	4	1	2
China	1	1	1	2	5	2	2	3	2	4	3	4	3	2	4	4	1	5
France	1	1	1	2	1	3	2	3	3	3	4	3	3	5	4	4	2	5
Germany	1	1	1	2	1	3	2	2	3	3	4	4	3	3	3	4	5	5
Netherlands	1	1	1	2	5	2	2	2	3	3	3	3	3	2	3	4	5	5
Italy	1	1	1	2	5	2	3	3	3	4	2	4	4	2	5	4	1	5
World	1	1	1	2	5	3	2	2	2	3	2	4	3	3	4	4	4	5
Spain	1	1	1	2	1	3	3	3	2	2	4	3	5	3	4	4	5	5
Indonesia	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5
Sweden	1	1	2	1	3	4	3	3	4	4	4	4	3	4	5	4	1	5
Japan	1	1	2	3	1	4	2	3	3	3	4	3	5	3	4	5	5	5
Denmark	1	1	1	2	5	3	2	3	3	3	4	4	3	5	5	4	5	5
Philippines	1	1	1	3	5	3	4	4	4	2	4	4	4	5	3	4	5	5
Singapore	1	1	1	2	5	4	3	5	5	3	4	4	3	5	4	4	5	5
UK	1	1	1	2	5	3	5	3	3	3	5	4	5	3	5	4	5	5
Thailand	1	1	1	2	5	4	5	4	4	3	3	4	5	5	4	4	5	5
Russia	1	1	1	3	5	3	4	4	3	4	4	5	4	4	5	5	5	5
Taiwan	1	1	4	2	5	4	4	4	4	4	4	5	4	4	4	4	5	5
Brazil	1	1	1	5	1	5	2	5	5	4	5	4	5	5	5	5	5	5
South Korea	1	1	4	2	5	5	4	4	4	5	4	4	4	4	4	4	5	5
India	1	1	1	1	5	5	5	4	5	5	5	5	5	5	5	5	5	5

High level insights - Sector Risk MAPS

Averaging the sector quintiles across all regions, combining results from the two transition scenarios to inform systemic transition exposure and using the failed transition to inform physical risk.

Sector/activity	Sector quintile score (low = worse) across all regions			RiskRank
	Transition quintile	Physical risk quintile	Combined	
Consumer discretionary	2.4	1.2	1.8	1
Oil and gas	1.4	3.0	2.2	2
Coal and manufactured fuels	1.1	3.4	2.2	3
Fossil based utilities	1.0	4.0	2.5	4
Forestry	3.0	2.3	2.7	5
Health	3.1	2.3	2.7	6
Financials	3.0	2.5	2.8	7
Telecom	3.3	2.3	2.8	8
Industrials	3.9	1.9	2.9	9
IT	3.7	2.2	3.0	10
Consumer staples	3.4	2.8	3.1	11
Materials	3.4	3.0	3.2	12
Real estate	3.1	3.5	3.3	13
Nuclear	2.8	4.1	3.4	14
Water supply	3.5	3.5	3.5	15
Public administration and defense	3.1	4.1	3.6	16
Other Low carbon and biobased electricity	4.1	4.0	4.0	17
Wind and solar	4.5	4.1	4.3	18

A key takeaway from this table could be a prioritization for deeper analysis of holdings within these sectors

Listed equity



Public equity | High-level Risk MAP insights

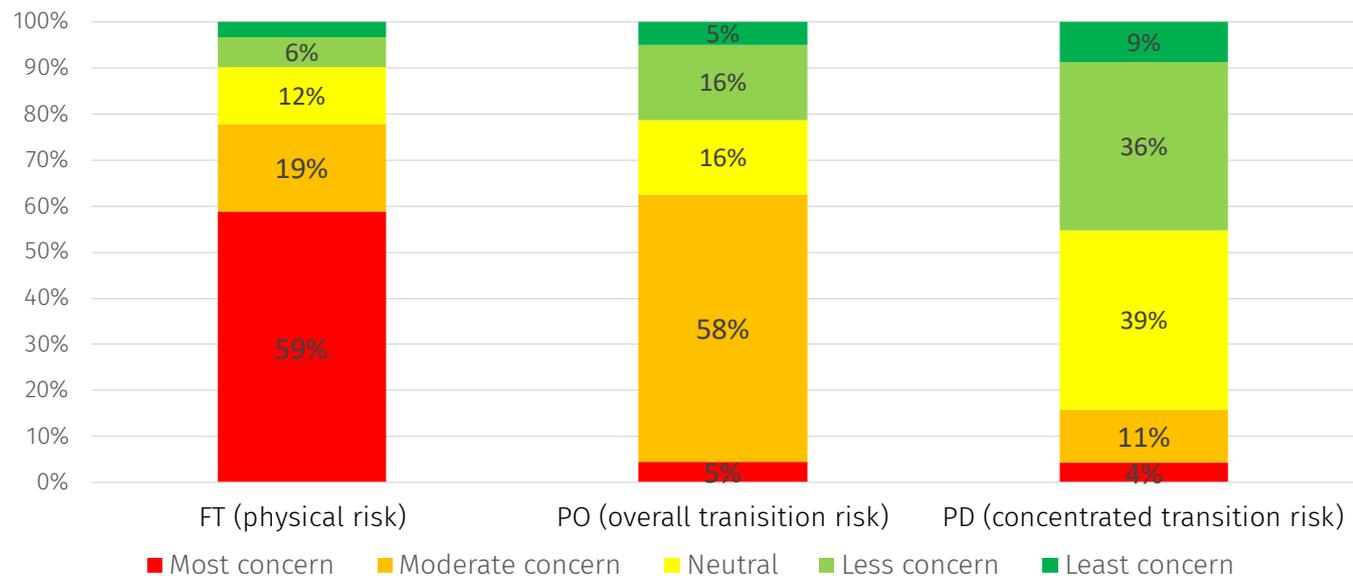
Significant physical risk exposure, moderate overall transition risk.

The failed transition (FT) scenario highlights the physical risk exposures of the portfolio. The sectors mapped to the top 2 quintile are typically either operationally exposed to gradual physical risk (rising temperatures, changing weather patterns), extreme weather, or both. The other physical risk factor is the length and complexity of supply/value chains.

Whilst transition risk is undoubtedly more proximate. These results suggest that physical risk (and the uncertain time when it could be materially priced-in) is significant for this portfolio.

Overall, the portfolio results are similar to the global benchmark.

Portfolio summary | Public equity
Comparison across scenarios: allocation by climate risk quintile



Using these results

We suggest that the sector-level insights from this analysis is used to “triage”/focus deep-dives into the climate-readiness of individual holdings by the asset managers and their analysts; who are best placed to make an “on the ground” assessment of the appropriateness of these holdings given your other investment objectives.

Risk MAP high climate materiality insights| Portfolio

Zooming in on the more climate exposed parts of region/sector grids, we see where portfolio allocations arise in areas that could be more systemically exposed to climate risk.

FT

20y Physical risk outlook		Sector average quintile				
		1.12	1.76	2.09	2.30	2.27
Region average quintile	PORTFOLIO weights	Consumer discr	Industrials	Health	Telecom	IT
1.50	China	0.8%	0.3%	0.1%	0.8%	0.2%
1.76	Australia	0.3%	0.1%	0.2%	0.1%	0.1%
1.78	India	0.0%	0.0%	0.0%	0.0%	0.0%
2.00	Malaysia	0.0%	0.2%	0.1%	0.1%	0.3%
2.00	US	6.3%	5.2%	7.5%	4.9%	13.9%
2.06	Rest of World	0.4%	0.5%	0.2%	0.3%	0.3%
2.09	Philippines	0.0%	0.0%	0.0%	0.1%	0.1%
2.33	Indonesia	0.1%	0.0%	0.1%	0.1%	0.0%
2.42	Netherlands	0.0%	0.0%	0.0%	0.1%	0.1%

PD

5y disorderly transition outlook		Sector average quintile			
		1.00	1.00	1.48	2.58
Region average quintile	PORTFOLIO weights	Coal and synth fuels	Fossil based utilitires	Oil and gas	Consumer discr
1.57	Norway	0.00%	0.00%	-0.03%	0.00%
1.67	Finland	-0.04%	0.01%	0.10%	0.32%
2.00	France	-0.17%	-0.02%	0.00%	-0.33%
2.00	Russia	-0.08%	0.09%	-0.04%	0.07%
2.14	Italy	-0.04%	0.01%	0.04%	0.82%
2.17	Netherlands	0.00%	0.00%	-0.11%	-0.07%
2.22	China	0.02%	-0.04%	0.12%	-0.77%
2.38	Germany	0.00%	-0.02%	0.03%	-0.43%
2.45	Sweden	-0.01%	0.00%	0.08%	0.05%

PO

10y orderly transition outlook		Sector average quintile			
		1.00	1.00	1.33	2.15
Region average quintile	PORTFOLIO weights	Coal and synth fuels	Fossil based utilitires	Oil and gas	Consumer discr
2.00	Norway	0.00%	0.00%	0.00%	0.00%
2.06	Australia	-0.01%	0.04%	-0.01%	0.28%
2.11	Canada	0.00%	0.01%	0.15%	0.15%
2.18	Switzerland	0.00%	0.00%	0.24%	0.02%
2.44	US	0.00%	0.72%	1.27%	6.33%
2.47	Malaysia	0.00%	0.00%	0.08%	-0.02%

Through this more detailed view, we can see the sector/region holding that are driving the quintile 1 and 2 allocations in the previous slide.

Note on conditional formatting:

Zero allocation = grey cell background

Otherwise graded yellow (low allocation) to blue (max blue hue shaded cells show the top 10% region/sector pairs across the whole portfolio.)

To highlight the top 10% of sector/regions TEXT is shown in white. A blue cell with black text isn't quite in the top 10%)

Risk MAP high climate materiality insights | Active weights

Zooming in on the more climate exposed parts of region/sector grids, we see where over/under weights vs MSCI ACWI arise in areas that could be more systemically exposed to climate risk.

FT

20y Physical risk outlook		Sector average quintile				
		1.12	1.76	2.09	2.30	2.27
Region average quintile	ACTIVE WEIGHT	Consumer discr	Industrials	Health	Telecom	IT
1.50	China	-0.77%	0.05%	-0.25%	-0.15%	-0.14%
1.76	Australia	0.15%	0.02%	-0.04%	0.06%	-0.01%
1.78	India	-0.08%	-0.04%	-0.07%	-0.01%	-0.21%
2.00	Malaysia	-0.02%	0.24%	0.08%	0.08%	0.26%
2.00	US	-0.72%	1.51%	-0.33%	-1.77%	-2.13%
2.06	Rest of World	0.15%	0.28%	-0.07%	0.08%	-0.11%
2.09	Philippines	0.03%	-0.01%	0.00%	0.06%	0.06%
2.33	Indonesia	0.05%	0.04%	0.06%	0.04%	0.01%
2.42	Netherlands	-0.07%	-0.09%	-0.08%	0.03%	-0.18%

PD

5y disorderly transition outlook		Sector average quintile			
		1.00	1.00	1.48	2.58
Region average quintile	ACTIVE WEIGHT	Coal and synth fuels	Fossil based utilitires	Oil and gas	Consumer discr
1.57	Norway	0.00%	0.00%	-0.03%	0.00%
1.67	Finland	-0.04%	0.01%	0.10%	0.32%
2.00	France	-0.17%	-0.02%	0.00%	-0.33%
2.00	Russia	-0.08%	0.09%	-0.04%	0.07%
2.14	Italy	-0.04%	0.01%	0.04%	0.82%
2.17	Netherlands	0.00%	0.00%	-0.11%	-0.07%
2.22	China	0.02%	-0.04%	0.12%	-0.77%
2.38	Germany	0.00%	-0.02%	0.03%	-0.43%
2.45	Sweden	-0.01%	0.00%	0.08%	0.05%

Through this more detailed view, we can see the over/under weights relative to MSCI ACWI for sector/region holding that are driving the quintile 1 and 2 allocations in the previous slide.

Note on conditional formatting:

Zero allocation = grey cell background

Otherwise graded yellow (low allocation) to blue (max blue hue shaded cells show the top 10% region/sector pairs across the whole portfolio.)

To highlight the top 10% of sector/regions TEXT is shown in white. A blue cell with black text isn't quite in the top 10%

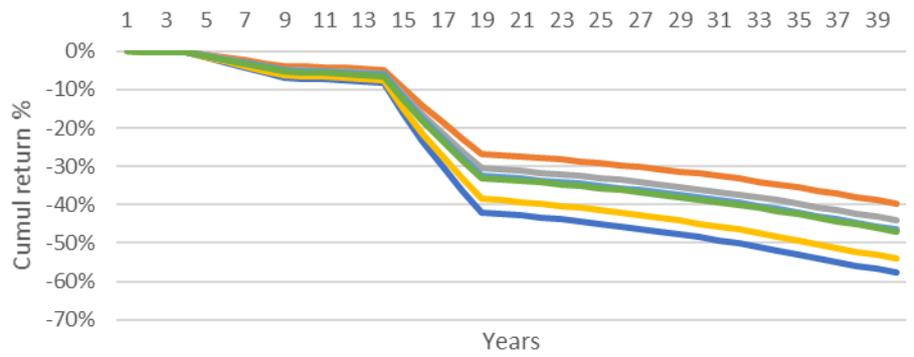
PO

10y orderly transition outlook		Sector average quintile			
		1.00	1.00	1.33	2.15
Region average quintile	ACTIVE WEIGHT	Coal and synth fuels	Fossil based utilitires	Oil and gas	Consumer discr
2.00	Norway	0.00%	0.00%	-0.03%	0.00%
2.06	Australia	-0.04%	0.03%	-0.04%	0.15%
2.11	Canada	-0.13%	-0.03%	-0.11%	0.04%
2.18	Switzerland	0.00%	0.00%	0.24%	-0.10%
2.44	US	-0.82%	-0.22%	0.57%	-0.72%
2.47	Malaysia	0.00%	-0.01%	0.08%	-0.02%

Sector line charts for most material sector/regions

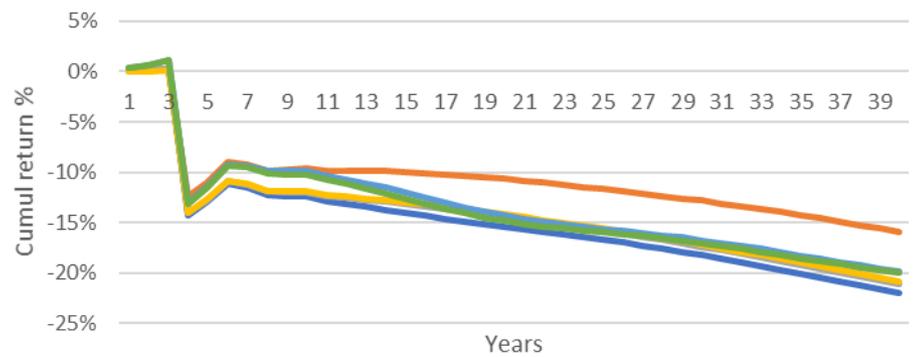
The six most material sectors show a reasonable spread of impacts. These sectors are in the “sectors of concern” for physical risk, but are less significant for transition risk.

FT - Cumul return DELTA - Top six sector/regions

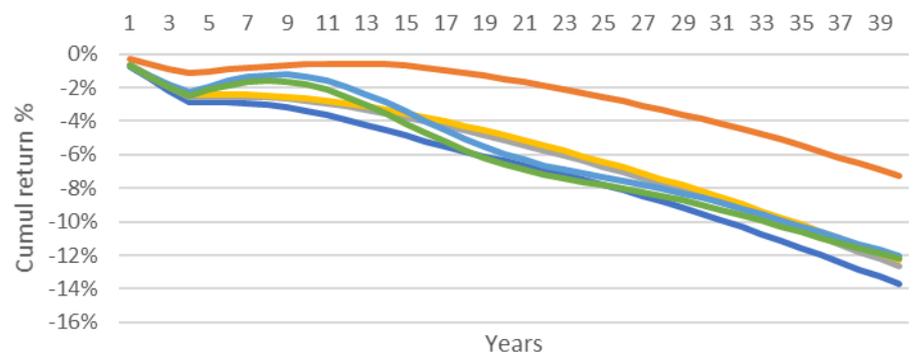


- US - Consumer discr
- US - Consumer staples
- US - Financials
- US - Health
- US - Industrials
- US - IT

PD - Cumul return DELTA - Top six sector/regions



PO - Cumul return DELTA - Top six sector/regions



- US - Consumer discr
- US - Consumer staples
- US - Financials
- US - Health
- US - Industrials
- US - IT

The most material region/sector allocations in the public equity portfolio are:

Region - Sector	Allocation (as % of public equity)
US - IT	13.9%
US - Health	7.5%
US - Consumer discr	6.3%
US - Financials	5.8%
US - Industrials	5.2%
US - Consumer staples	4.3%

Private equity



Mapping for PE sector allocations

- To facilitate the mapping, we collapsed the data provided to us:

STRATEGY		SECURITY		REGION		Actual Weight	TMT	INDUSTRIAL	BUS SERV	CONSUMER	HEALTHCARE	FIG
Venture/Growth	16%	Equity - non-control	100%	North America	37%	5.8%	44%	3%	3%	21%	17%	12%
				Europe	14%	2.2%	37%	1%	9%	13%	21%	19%
				Asia	47%	7.4%	26%	2%	2%	44%	21%	5%
				Latin America	2%	0.3%	30%	3%	3%	22%	23%	18%
Buyout	78%	Equity - control	100%	North America	68%	52.7%	31%	16%	13%	15%	15%	11%
				Europe	26%	20.2%	20%	15%	16%	21%	12%	16%
				Asia	4%	3.1%	18%	18%	10%	32%	11%	11%
				Latin America	2%	1.6%	11%	20%	11%	35%	12%	12%
Distressed Debt	7%	Distressed debt	100%	North America	70%	4.7%	20%	20%	7%	20%	20%	13%
				Europe	25%	1.7%	20%	20%	8%	20%	20%	13%
				Asia	5%	0.3%	20%	20%	10%	20%	20%	10%
				Latin America	0%	0.0%	0%	0%	0%	0%	0%	0%

- To a format that is consistent with input grid for our sector analysis tool:

	Telecom	Industrials	Consumer discretionary	Consumer staples	Health	Financials
US	19.9%	9.4%	12.2%	4.9%	9.6%	7.3%
Europe	5.2%	3.3%	6.0%	2.4%	3.2%	3.8%
China	2.5%	0.8%	2.6%	2.2%	2.0%	0.8%
Brazil	0.3%	0.3%	0.5%	0.3%	0.3%	0.2%

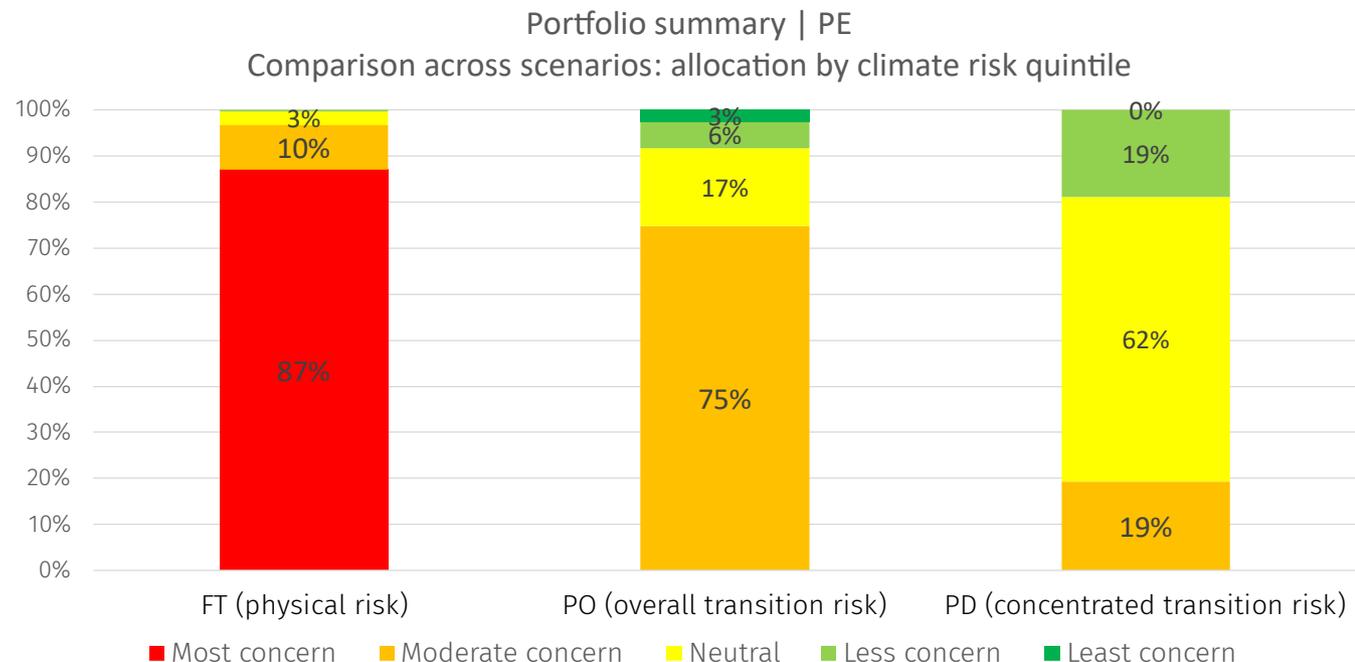
PE | High-level Risk MAP insights

Significant physical risk exposure, moderate overall transition risk.

More so than for listed equity, the failed transition (FT) scenario highlights the physical risk exposures of the PE portfolio. The sectors mapped to the top 2 quintile are typically either operationally exposed to gradual physical risk (rising temperatures, changing weather patterns), extreme weather, or both. The other physical risk factor is the length and complexity of supply/value chains.

Whilst transition risk is undoubtedly more proximate. These result suggest that physical risk (and the uncertain time when it could be materially priced-in) is significant for this portfolio.

The illiquidity of this asset class suggest that climate risk should be considered as part of deal due diligence, since exiting positions can take significant time.



Using these results

We suggest that the sector-level insights from this analysis is used to “triage”/focus deep-dives into the climate-readiness of individual holdings by the asset managers and their analysts; who are best placed to make an “on the ground” assessment of the appropriateness of these holdings given your other investment objectives.

Risk MAP high climate materiality insights| PE

Zooming in on the more climate exposed parts of region/sector grids, we see where portfolio allocations arise in areas that could be more systemically exposed to climate risk.

FT

20y Physical risk outlook		Sector average quintile				
		1.12	1.76	2.09	2.30	2.27
Region average quintile	PORTFOLIO weights	Consumer discr	Industrials	Health	Telecom	IT
1.50	China	2.6%	0.8%	2.0%	2.5%	0.0%
1.76	Australia	0.0%	0.0%	0.0%	0.0%	0.0%
1.78	India	0.0%	0.0%	0.0%	0.0%	0.0%
2.00	Malaysia	0.0%	0.0%	0.0%	0.0%	0.0%
2.00	US	12.2%	9.4%	9.6%	19.9%	0.0%
2.06	Rest of World	0.0%	0.0%	0.0%	0.0%	0.0%
2.09	Philippines	0.0%	0.0%	0.0%	0.0%	0.0%
2.33	Indonesia	0.0%	0.0%	0.0%	0.0%	0.0%
2.42	Netherlands	0.0%	0.0%	0.0%	0.0%	0.0%

PD

5y disorderly transition outlook		Sector average quintile			
		1.00	1.00	1.48	2.58
Region average quintile	PORTFOLIO weights	Coal and synth fuels	Fossil based utilities	Oil and gas	Consumer discr
1.57	Norway	0.0%	0.0%	0.0%	0.0%
1.67	Finland	0.0%	0.0%	0.0%	0.0%
2.00	France	0.0%	0.0%	0.0%	0.0%
2.00	Russia	0.0%	0.0%	0.0%	0.0%
2.14	Italy	0.0%	0.0%	0.0%	0.0%
2.17	Netherlands	0.0%	0.0%	0.0%	0.0%
2.22	China	0.0%	0.0%	0.0%	2.6%
2.38	Germany	0.0%	0.0%	0.0%	0.0%
2.45	Sweden	0.0%	0.0%	0.0%	0.0%

PO

10y orderly transition outlook		Sector average quintile			
		1.00	1.00	1.33	2.15
Region average quintile	PORTFOLIO weights	Coal and synth fuels	Fossil based utilities	Oil and gas	Consumer discr
2.00	Norway	0.0%	0.0%	0.0%	0.0%
2.06	Australia	0.0%	0.0%	0.0%	0.0%
2.11	Canada	0.0%	0.0%	0.0%	0.0%
2.18	Switzerland	0.0%	0.0%	0.0%	0.0%
2.44	US	0.0%	0.0%	0.0%	12.2%
2.47	Malaysia	0.0%	0.0%	0.0%	0.0%

Through this more detailed view, we can see the sector/region holding that are driving the quintile 1 and 2 allocations in the previous slide.

Note on conditional formatting:

Zero allocation = grey cell background

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Real assets



Mapping for Real asset sector allocations

- To facilitate the mapping, we collapsed the data provided to us, aggregated over both equity and debt:

	Utilities	Transport	Renewables	Power	Digital	PPPs	O&G mid	O&G up	Metals & Mining	Timberland	Agriculture
North America	6.3%	4.4%	5.3%	7.0%	5.8%	2.5%	11.7%	15.2%	3.6%	4.1%	3.7%
Europe	2.7%	1.6%	2.1%	1.3%	4.5%	0.2%	1.8%	0.1%	0.5%	0.0%	0.2%
Asia	1.2%	0.8%	0.9%	0.3%	1.2%	0.0%	0.9%	0.0%	2.8%	0.0%	0.0%
Brazil	0.5%	0.6%	0.8%	0.0%	1.0%	0.0%	0.5%	0.0%	1.0%	0.0%	0.2%
World	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	0.0%

- Into a format that is consistent with input grid for our sector analysis tool*:

	Fossil based utilities	Nuclear	Other Low carbon and biobased electricity	Wind and solar	Industrials	IT	Public admin and defence	Oil and gas	Materials	Forestry	Consumer staples
US	7.9%	0.9%	0.5%	5.9%	4.4%	5.3%	5.8%	2.5%	26.9%	3.6%	4.1%
Europe	1.7%	0.2%	0.5%	3.0%	1.6%	2.1%	4.5%	0.2%	1.9%	0.5%	0.0%
China	0.9%	0.0%	0.2%	1.1%	0.8%	0.9%	1.2%	0.0%	0.9%	2.8%	0.0%
Brazil	0.1%	0.0%	0.6%	0.9%	0.6%	0.8%	1.0%	0.0%	0.5%	1.0%	0.0%
World	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%

*this included “respreading” the power and utilities allocation as described on slide 5

Real assets | High-level Risk MAP insights

Moderate physical risk exposure, moderate overall transition risk.

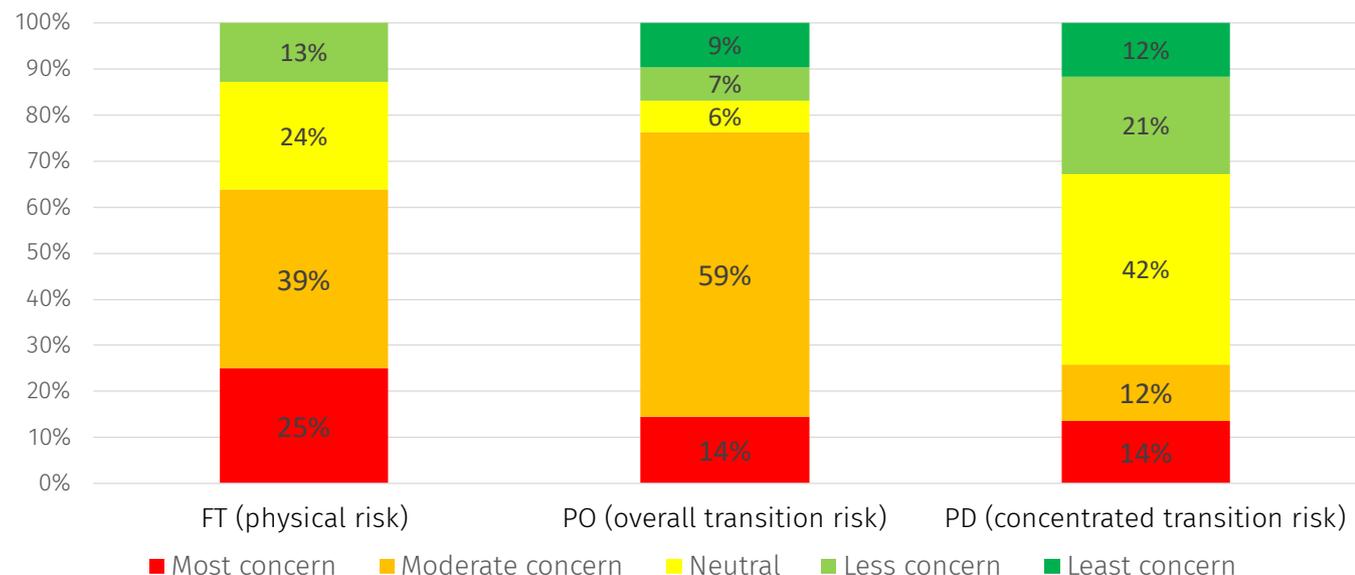
Compared to the other two portfolios, the risk profile distribution is more balanced across physical and transition risk, and with less extreme allocations to “concerning” sectors.

There remains, however c.60% (physical risk) and c.75% (transition risk) of holdings falling in the upper two quintiles. Perhaps indicating valuable areas to focus any more detailed assessments.

The illiquidity of this asset class suggest that climate risk should be considered as part of deal due diligence, since exiting positions can take significant time.

Portfolio summary | Real Assets

Comparison across scenarios: allocation by climate risk quintile



Using these results

We suggest that the sector-level insights from this analysis is used to “triage”/focus deep-dives into the climate-readiness of individual holdings by the asset managers and their analysts; who are best placed to make an “on the ground” assessment of the appropriateness of these holdings given your other investment objectives.

Risk MAP high climate materiality insights | Real assets

Zooming in on the more climate exposed parts of region/sector grids, we see where portfolio allocations arise in areas that could be more systemically exposed to climate risk.

FT

20y Physical risk outlook		Sector average quintile				
		1.12	1.76	2.09	2.30	2.27
Region average quintile	PORTFOLIO weights	Consumer discr	Industrials	Health	Telecom	IT
1.50	China	0.0%	0.8%	0.0%	0.0%	0.9%
1.76	Australia	0.0%	0.0%	0.0%	0.0%	0.0%
1.78	India	0.0%	0.0%	0.0%	0.0%	0.0%
2.00	Malaysia	0.0%	0.0%	0.0%	0.0%	0.0%
2.00	US	0.0%	4.4%	0.0%	0.0%	5.3%
2.06	Rest of World	0.0%	0.0%	0.0%	0.0%	0.0%
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2.33	Indonesia	0.0%	0.0%	0.0%	0.0%	0.0%
2.42	Netherlands	0.0%	0.0%	0.0%	0.0%	0.0%

PD

5y disorderly transition outlook		Sector average quintile			
		1.00	1.00	1.48	2.58
Region average quintile	PORTFOLIO weights	Coal and synth fuels	Fossil based utilitires	Oil and gas	Consumer discr
1.57	Norway	0.0%	0.0%	0.0%	0.0%
1.67	Finland	0.0%	0.0%	0.0%	0.0%
2.00	France	0.0%	0.0%	0.0%	0.0%
2.00	Russia	0.0%	0.0%	0.0%	0.0%
2.14	Italy	0.0%	0.0%	0.0%	0.0%
2.17	Netherlands	0.0%	0.0%	0.0%	0.0%
2.22	China	0.0%	0.0%	0.0%	2.6%
2.38	Germany	0.0%	0.0%	0.0%	0.0%
2.45	Sweden	0.0%	0.0%	0.0%	0.0%

PO

10y orderly transition outlook		Sector average quintile			
		1.00	1.00	1.33	2.15
Region average quintile	PORTFOLIO weights	Coal and synth fuels	Fossil based utilitires	Oil and gas	Consumer discr
2.00	Norway	0.0%	0.0%	0.0%	0.0%
2.06	Australia	0.0%	0.0%	0.0%	0.0%
2.11	Canada	0.0%	0.0%	0.0%	0.0%
2.18	Switzerland	0.0%	0.0%	0.0%	0.0%
2.44	US	0.0%	7.9%	2.5%	0.0%
2.47	Malaysia	0.0%	0.0%	0.0%	0.0%

Through this more detailed view, we can see the sector/region holding that are driving the quintile 1 and 2 allocations in the previous slide.

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