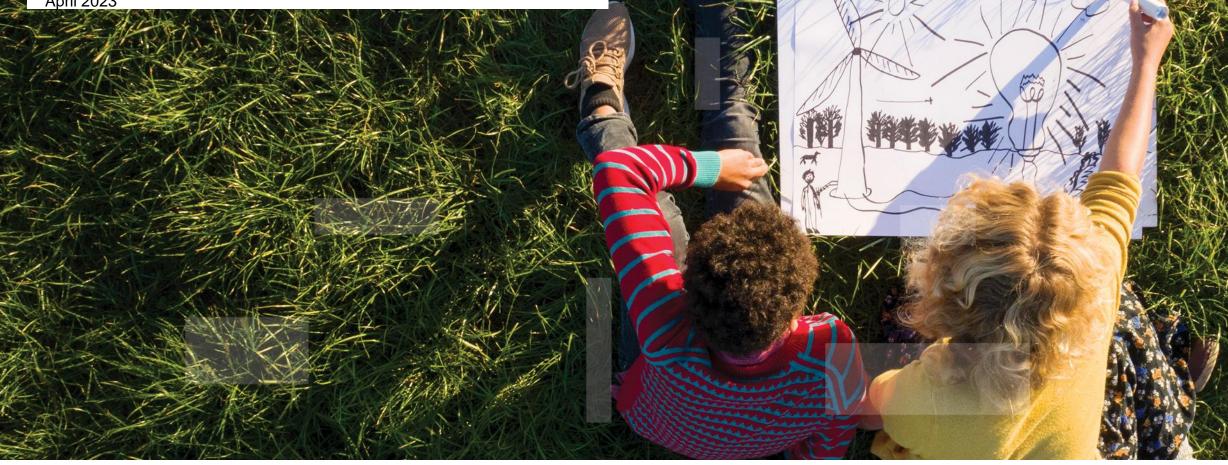
Disorderly climate transitions and systemic risk Westminster Energy Forum

April 2023



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A decarbonized portfolio or a portfolio for a decarbonizing world?

A decarbonized portfolio

Carbon footprint based

 Carbon footprint of the investments in the portfolio should be consistent with science based targets or other climate transition metrics

Alignment with carbon metrics is assumed to manage financial transition risk

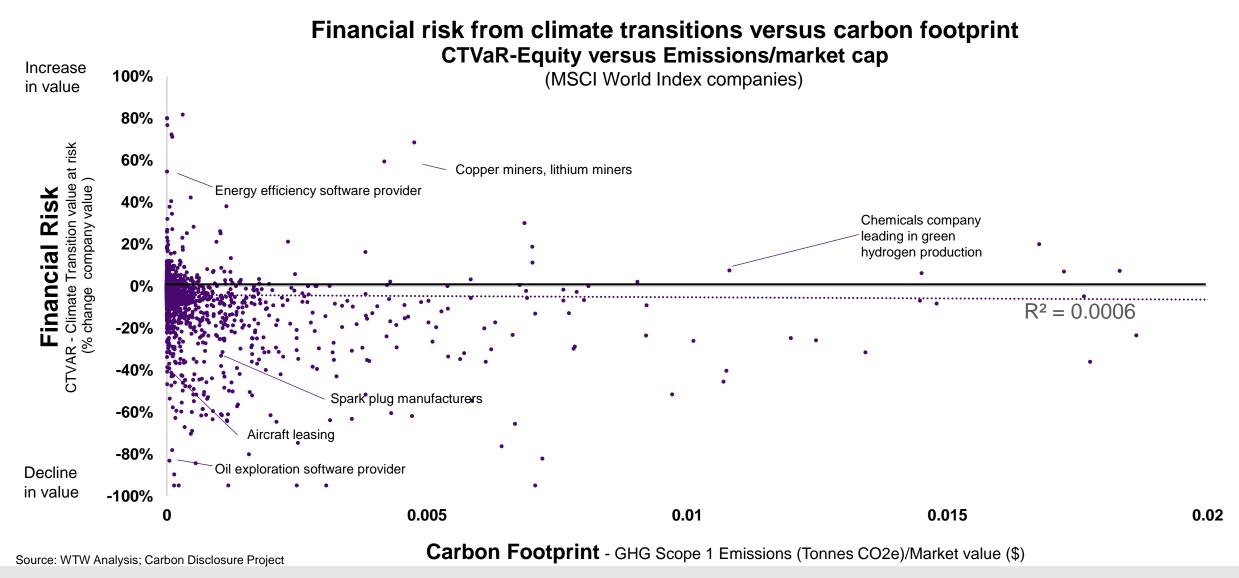
A portfolio for a decarbonizing world

Based on changes to business models driven by requirements to mitigate climate change

- Evaluation of the impact of climate change scenarios on the financial value of assets
- Financial value can be assessed through the impact on future free cash flows

Alignment with carbon footprint pathways is a likely outcome, rather than a constraint

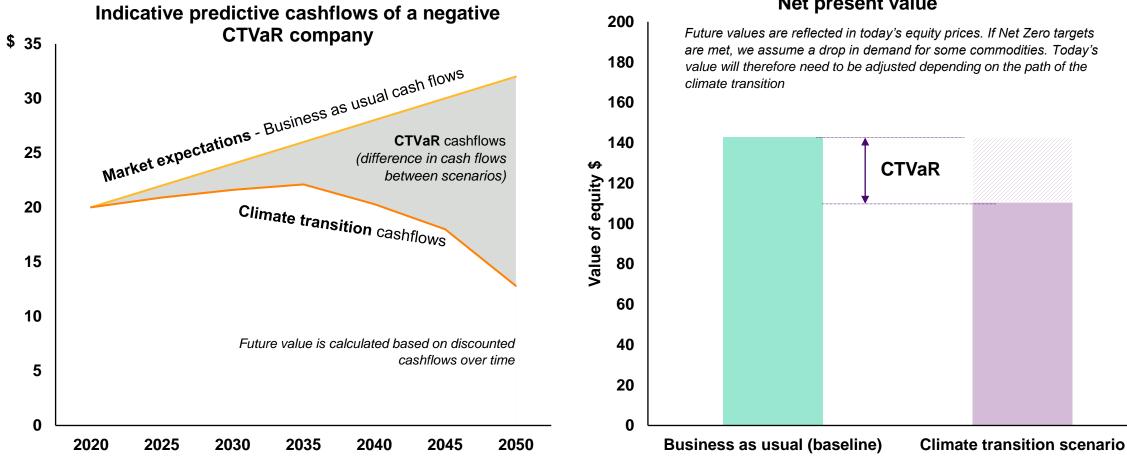
Fundamental value is uncorrelated to carbon emissions



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Climate transitions will impact valuations

Climate Transition Value at Risk (CTVaR) measures the impact of transition scenarios on fundamental value



Net present value

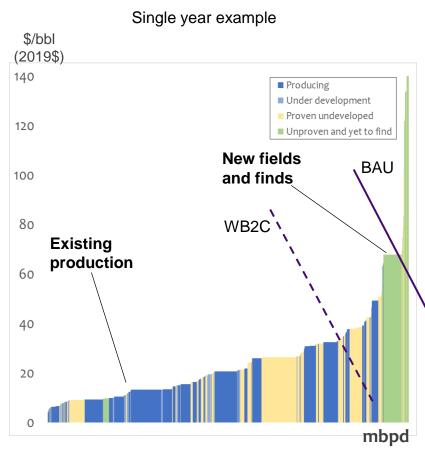
Measuring Transition Risk for upstream oil

Supply/demand for commodities set price, likely development and output

Supply curves based on forward looking costs of incremental supply

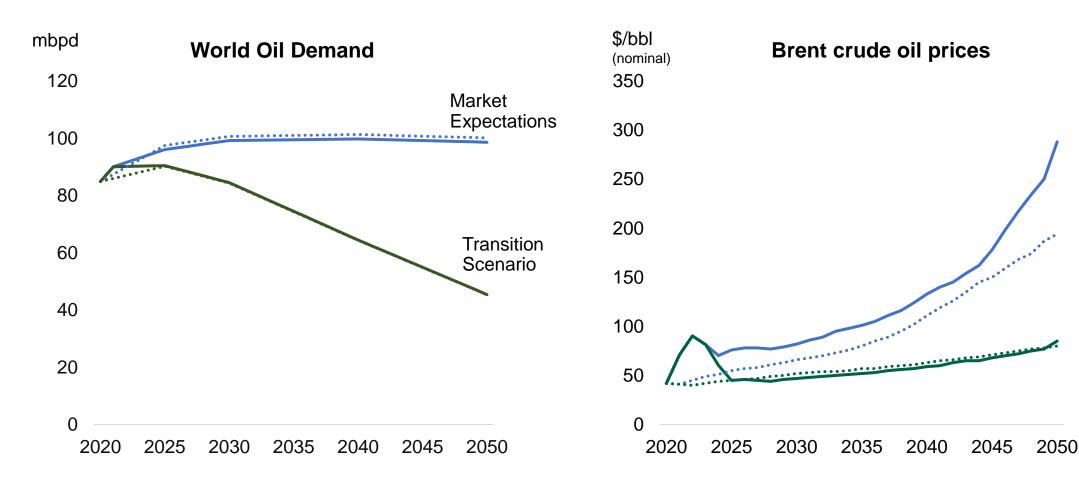
mbpd Price Proven New Finds and Supply New Fields (incremental development cosis) developments (incremental cost) (add development and exploration capex) **BAU** Price Value Lost BAU Existing WB₂C Price Demand Production (after maintenance Existing Policy, innovation, taxes, capex) **Remaining Value** production regulation, behavior, trend causes a shift, the model WB₂C does not need to know which Demand Demand/ 2025 2020 2030 2035 2045 2050 2040 Production

The impact is on a field by field basis, with significant variation between resources



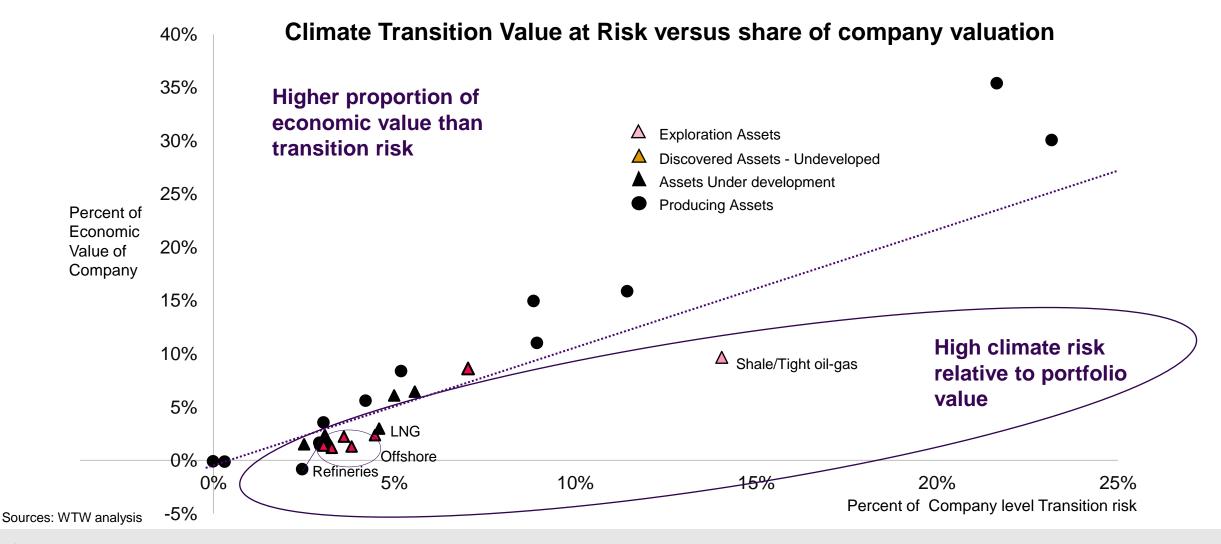
Sources: Rystad; WTW modeling

A climate transition would have a significant impact on oil prices



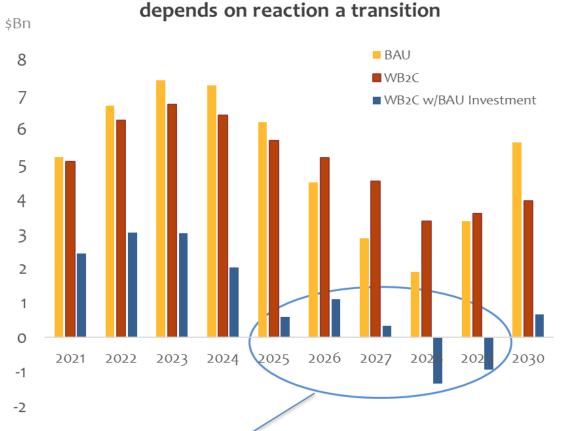
2022 forecast in solid 2021 in dashes Sources: IEA, WTW modelling

What CTVaR measurement tells us about specific assets Portfolio analysis: Transition risk versus contribution to corporate value



... or cash flows and financing

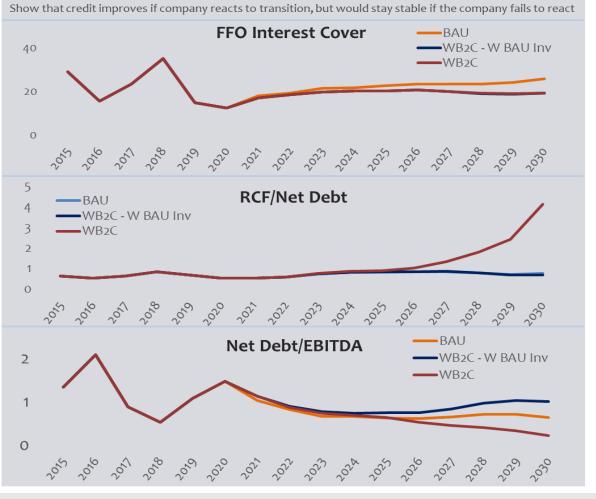
Impact on oil business free cash flows of



Failure to recognize an energy transition occurring and continued investment in new projects, leads to negative free cash flows before dividends

Sources: WTW analysis

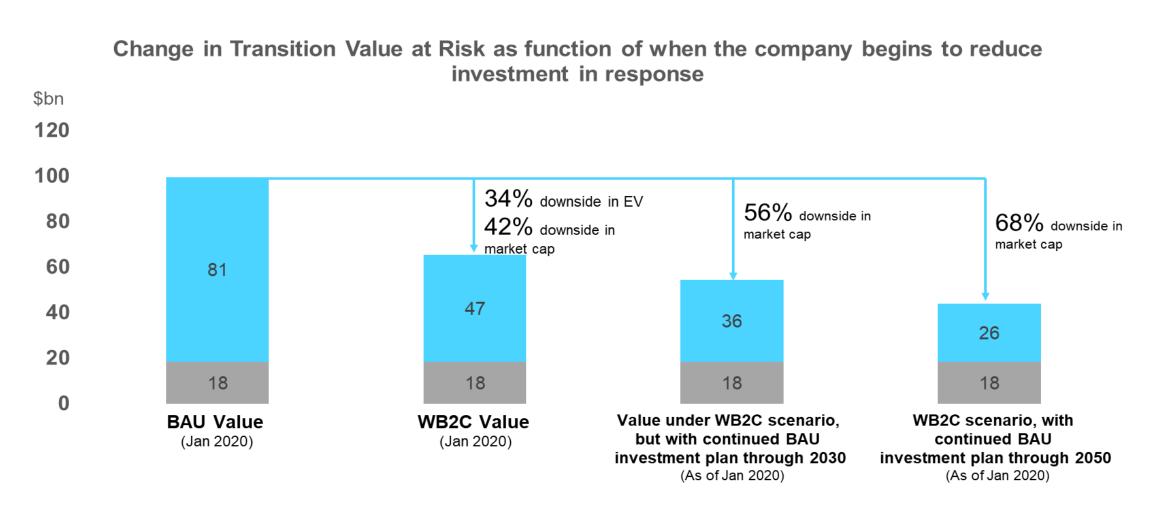
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Selected credit metrics

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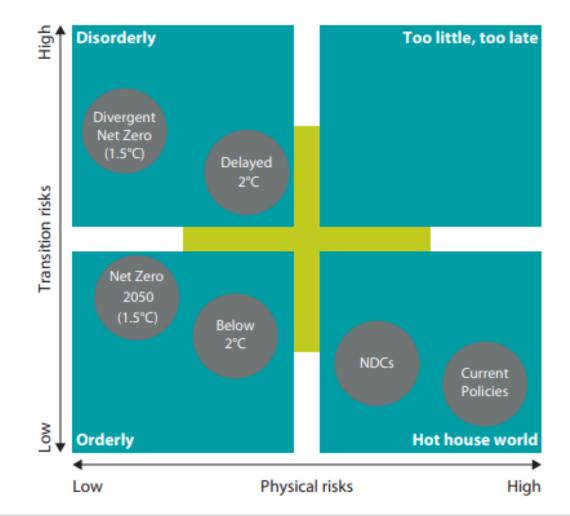
A delayed response can erode shareholder value



Debt Market Cap

Sources: WTW analysis

Scenarios provide the backbone for transition risk analysis Network on the Greening of the Financial System Scenarios form a standard starting point NGFS scenarios framework



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Scenarios provide the backbone for transition risk analysis WTW Scenarios - Disorderly scenarios show that risk can be an order of magnitude higher NGFS scenarios framework

2DD Scenario High Too little, too late Disorderly Measures impact of a delayed transition, but timing, implications for the scale of the accelerated Likely, disorderly response, etc, make this scenario infeasible scenarios Divergent Net Zero **1DS Scenario** (1.5°C) Delayed Measures impact of a 1.5C (50%) scenario, but our models suggest it is infeasible without 2DD risks technological breakthroughs **Transition** 2DS or WB2C scenario 1DS Base WTW scenario used to measure financial risk 2DS purely from the transition and not mismanagement, (1.5°C) elow corresponds to a carbon budget consistent with 2°C 67% chance of below 1.7C temperature increase NDCs 3DS § Hot house world Orderly **Basic CTVaR** Physical risks Pure transition risk Low

Disorderly Scenarios

The most likely transition path is one where some sectors and countries follow more organized paths than others, and where risks change rapidly at a aggregate and asset level. These risks are central to an asset manager's fiduciary duty and to a financial regulator's core responsibility.

Additional CTVaR risk due to disorder, inappropriate policy response, lack of coordination

Market expectations (3DS or BAU) scenarios

Current

olicies

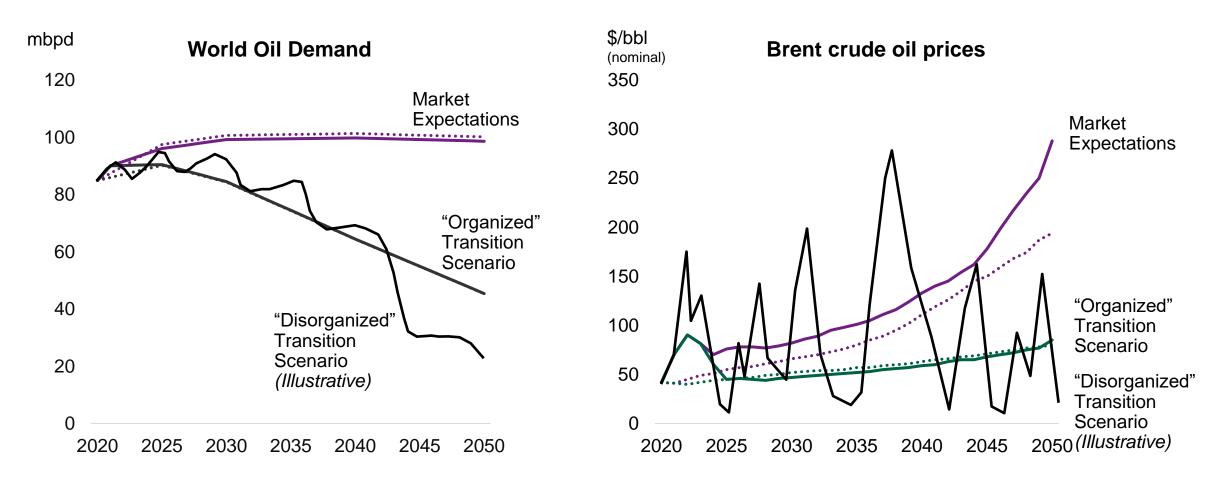
High

This transition risk is fully priced into the market on average, but huge potential for sectoral and regional differences

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Energy markets show the risk of a disorderly scenario



2022 forecast in solid 2021 in dashes Sources: IEA, WTW modelling

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One year of disorder can completely realign risks Change in the long-term oil market from 2021 to 2022

2030 Crude Oil Supply and Demand Curves 2040 Crude Oil Supply and Demand Curves \$/bbl (2023\$) 2022 Forecast **Oil Demand Supply Curve** 130 130 Fewer 2021 fields 32% increase in expected 12% increase in expected oil price per barrel 110 oil price per barrel 110 **5x** expected volatility Similar volatility Higher 90 costs 90 70 Range of climate 70 transition scenarios 50 50 30 30

110

Mbpd

50

60

40

70

80

90

Sources: IEA, Rystad, WTW modelling

85

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80

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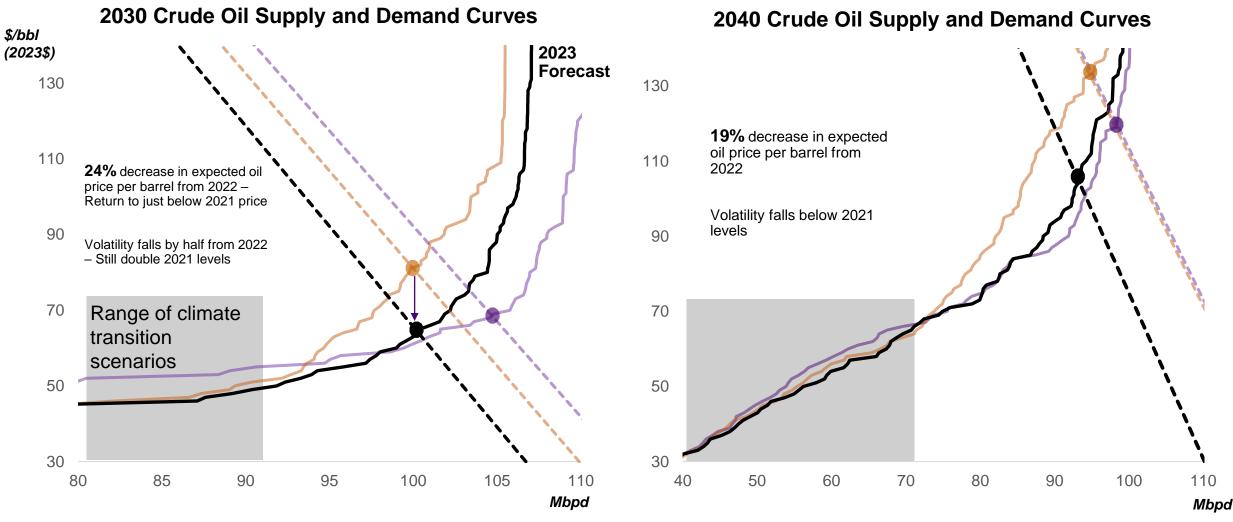
100

105

110

Mbpd

One year of disorder can completely realign risks And again to 2023



Sources: IEA, Rystad, WTW modelling

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Disorder creates two types of risks

Phase out

Retirement of high carbon infrastructure/production

| | Delayed | On Target | | |
|---|---|--|--|--|
| Delayed Phase in Deployment of alternative | Business as Usual (no transition) | Shortages Leading to volatility, higher prices and inflation, supply chain issues, lost production, unemployment, higher interest rates | | |
| energy sources On Target | Stranded Assets Excess investment and unused capacity leads to write downs, defaults, valuation declines, a decrease in financial capacity, higher interest rates | Orderly transition | | |

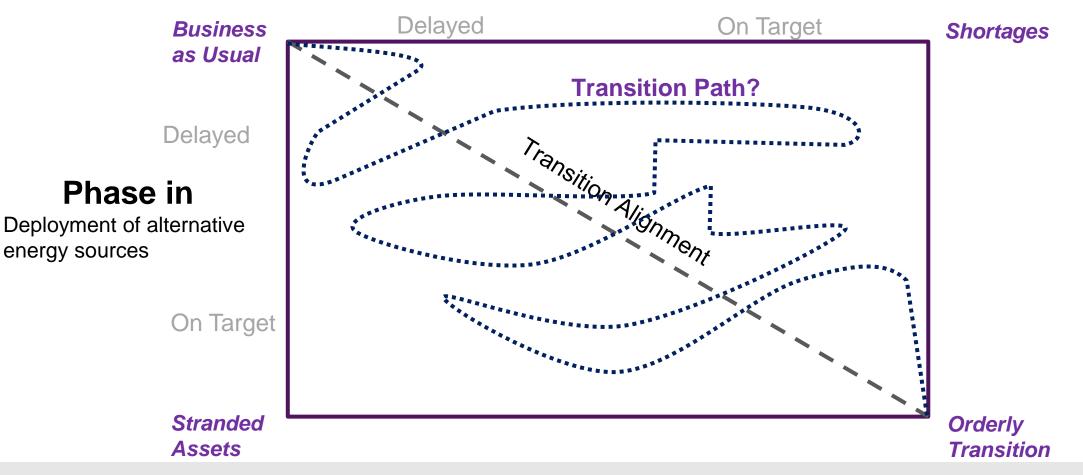
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...And the path is likely to generate both types of risks

Phase out

Retirement of high carbon infrastructure/production



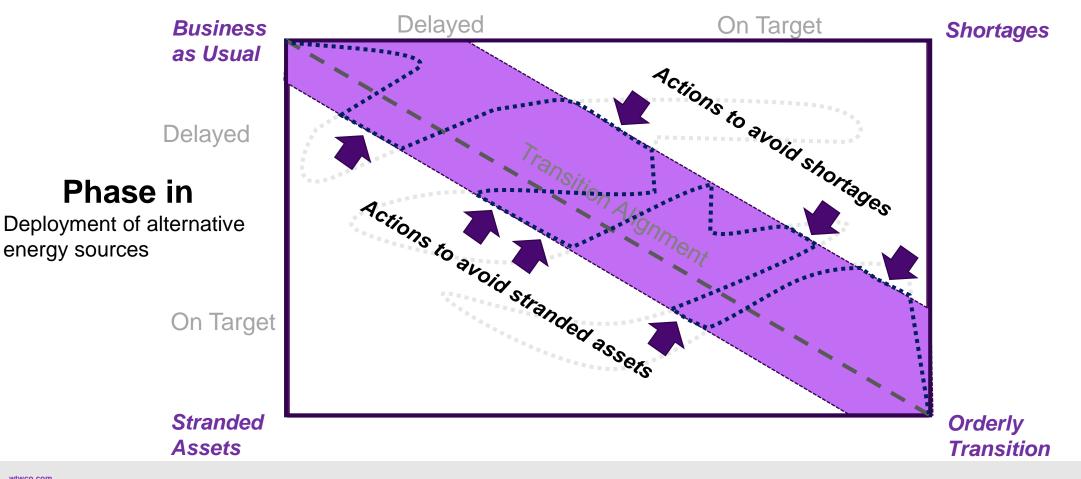
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...And the path is likely to generate both types of risks

Phase out

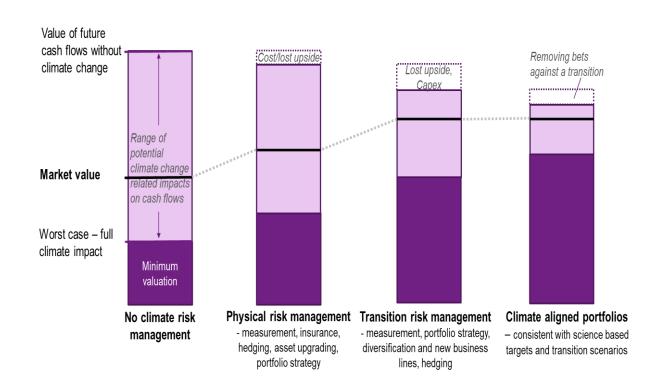
Retirement of high carbon infrastructure/production



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Tools to manage climate risk and improve value Managing physical and transition risk to manage uncertainty/risk, and increase value



| | Risk management tools | | | | |
|--|-----------------------|----------------------|------------------------------------|------------------------------|--------------------|
| Risk Management actions | Risk Measurement | Strategic evaluation | Portfolio analysis and strategy | Financial products/hedges | Insurance products |
| Avoid New high climate risk investments | x | X | | | |
| Improve Climate risk of existing investments | x | X | | | |
| Divest High risk investments | x | x | х | | |
| Diversify To manage portfolio/company level risk | x | X | X | | |
| Hedge Risks that cannot be improved/divested | x | x | X | x | |
| Insure Risks that cannot be otherwise managed | x | X | X | X | x |

