

Optional keyword



## Climate scenario analysis

Free-to-use and commercially available climate scenario tools can help make it easier for investors to implement a key recommendation of the TCFD – scenario planning.

The PRI has been partnering with a number of think tanks and academic institutions to help develop and popularise such tools. Notably:

- The Paris Agreement Capital Transition Assessment (PACTA) tool, which provides portfolio-level analysis of transition risk in public equities and corporate bonds, and uses asset-level data.
- The Transition Pathway Initiative (TPI) – sector-level analysis of companies’ management of carbon emissions and alignment with the Paris Agreement. TPI uses company-disclosed data.
- 2 Degrees of Separation – company and sector-level analysis of the oil and gas sector, using asset-level data.

These tools can help accelerate the pace at which investors can start to explore climate scenario analysis and promote further innovation and evolution of the sector. In addition to the tools above, the PRI has been collecting information on commercially-available tools developed by service providers. This is a rapidly-evolving space and below is a table of providers that the PRI is currently aware of. Contact [Edward Baker](#) with any questions.

## Publicly-available tools supported by the PRI

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<b>2° Investing Initiative</b>	Portfolio-level analysis for equities and fixed income climate transition risks in power and some industrial sectors (cement and steel).	Based on asset-level data analyses, the deviation of a portfolio from an optimally diversified portfolio in terms of energy and technologies under the 2-degree pathway as defined by the IEA, Greenpeace and Bloomberg New Energy Finance. Further details can be found <a href="#">here</a> .	Free, online tool. Source code will be made publicly available.	Graphical representation of current and future (next five years) alignment with 2-degree benchmarks and industry peers. 30-page report.
<b>The Transition Pathway Initiative (of which PRI is secretariat)</b>	Bottom-up assessment of how listed companies are preparing for the transition to a low-carbon economy. Transition risks only.	Evaluates and tracks the quality of companies' management of their GHG emissions and of risks and opportunities related to the low-carbon transition. Evaluates how companies' future carbon performance would compare to the international targets and national pledges made as part of the Paris Agreement.	Tools, research and reports are available <a href="#">here</a> .	In-depth sector analysis of industrial sectors (including steel, mining and automotive).
<b>2 Degrees of Separation - Carbon Tracker and the PRI</b>	In-depth sector and company-level analysis of oil and gas companies' upstream exposure to climate transition risks. Transition risks only.	Uses asset-level data to examine whether the supply options of the largest publicly-traded oil and gas producers are aligned with demand levels consistent with a 2 degree carbon budget. It identifies which companies have the highest exposure to potential capital expenditure through 2025 unaligned with a 2 degree scenario.	Report publicly available <a href="#">online</a> .	Analytical reports, online resources for PRI signatories.

## Service provider tools

Provider	Description and coverage	Methodology	Access and	Outputs
	with climate change analysis for over 22,000 publicly-listed companies, covering equities and corporate bonds with a total of over 300,000 securities.	<div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; margin-bottom: 10px;">Optional keyword</div> approach to climate change scenario modeling. It is top-down due to obtaining national emission reduction targets from NDCs, and assigning the targets to sectors and then companies. It is bottom-up via the estimation of emission reduction requirements for companies at the facility level, using a proprietary asset level database. The physical climate analysis also uses a similar, hybrid approach to climate analysis.	a subscription or project basis. Online, terminal access to Carbon Delta's analysis will be available in early 2019. At that time, a free trial will be available, including sample data.	<p>scenarios, Carbon Delta turns future cost and profit calculations into a meaningful, forward-looking financial metric for investors. By calculating a Climate VaR per security and per scenario, Carbon Delta's analysis helps investors take the necessary action for risk reporting purposes or optimising risk management and market research processes.</p> <p>The Climate VaR can be aggregated across asset classes of a portfolio to actively or passively manage assets with insights into climate change risks and opportunities. Carbon Delta currently has a VaR model based on future costs or profits for listed equities and probability of default analysis for corporate bonds.</p>

Provider	Description and coverage	Methodology	Access and delivery	Outputs
<p><b>Carbone 4</b></p>	<p>Transition risk: Carbon</p> <p>impact of portfolios through the measurement of GHG emissions directly and indirectly induced and saved by companies.</p> <p>CIA also asses the alignment of investor and lender portfolios with the Paris 2° objective.</p> <p>Carbone 4 finance also provides Physical risk evaluation of these issuers with Climate Risk Impact Screening (CRIS).</p> <p>The CRIS method allows asset managers and investors to know the level of risk in their portfolios so that they can manage this risk, track it over time and engage in dialogue with the underlying companies about their vulnerability to climate change.</p> <p>Coverage: equities; bonds and green bonds of corporates; and sovereigns around the world.</p>	<p>CIA: methodology specific</p> <p>Optional keyword</p> <p>portfolio constituent before aggregation at the portfolio level.</p> <p>We complement the quantitative analysis of current performance with a qualitative analysis of a company’s climate strategy.</p> <p>Further details can be found <a href="#">here</a>.</p> <p>The CRIS method enables the provision of a physical risk rating at the issuer and portfolio level, which incorporates a climate component and a sectoral and contextual vulnerability component.</p> <p>More information is availble <a href="#">here</a>.</p> <p>These methods apply to multi-asset investment portfolios (stocks, corporate and sovereign bonds and real assets).</p>	<p>Online access to</p> <p>report; and</p> <p>Access to CRIS database.</p>	<p>Identify corporates</p> <p>physical risk. Identify best-in-class corporates or companies which strongly contribute to decarbonisation and will create value. CIA and CRIS results can be used to :</p> <ul style="list-style-type: none"> <li>▪ support strategic decision of investors in portfolio construction;</li> <li>▪ develop thematic or sector-specific investment strategies;</li> <li>▪ measure climate-related risks in loan books or investment portfolios; and</li> <li>▪ create indices or benchmarks based on climate performance.</li> </ul>

Provider	Description and coverage	Methodology	Access and delivery	Outputs
ClimateWise	ClimateWise Transition	Assesses how the costs and	Open-source	Navigating the
	Optional keyword			
	<p>assess the impact of transition risk and opportunity on the financial performance of investments in infrastructure at the portfolio and asset level.</p> <p>Coverage: includes a step-by-step guide and case studies for investors to:</p> <ul style="list-style-type: none"> <li>▪ assess the breadth of asset types exposed to transition risk and opportunity;</li> <li>▪ define potential impact of transition risk at the asset level; and</li> <li>▪ incorporate transition impacts into an asset financial model.</li> </ul>	<p>considering sectors, geographies and time frames.</p> <p>Adaptable framework to meet investors' specific needs - a variety of transition scenarios, time frames and asset types could be applied.</p>		<p>by-step guide to:</p> <ul style="list-style-type: none"> <li>▪ inform investors and regulators on the future allocation of funds and diversification of investment portfolios;</li> <li>▪ indicate investment options for asset managers and owners to help improve asset resilience; and</li> <li>▪ enable quantification of potential impact on asset returns, investment options or exit strategies.</li> </ul>

Provider	Description and coverage	Methodology	Access and delivery	Outputs
EDM	Key services offered:	Key elements of the	Available	Key outputs:
	Optional keyword			
	<p>transition and physical risks are considered.</p> <ul style="list-style-type: none"> <li>▪ Bottom-up analysis of assets. The analysis could include identification of asset-specific financial drivers and creation of scenarios for asset financial models to understand financial impact.</li> <li>▪ Creation of a dashboard to monitor signpost market indicators within a sector that indicate an inflection point or movement, enabling quick responses and exposure adjustments.</li> <li>▪ Detailed asset-specific consideration of vulnerability and resilience to physical climate hazards, including development of adaptation plans.</li> </ul>	<p>internal proprietary tools which are used to analyse financial opportunities and risks related to the low-carbon transition, and translate these into financial drivers and impacts. A complementary toolkit is used to assess physical climate threats. These tools are applied to the client's portfolio in order to undertake the analysis.</p> <ul style="list-style-type: none"> <li>▪ ERM's methodology is aligned with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD).</li> </ul>		<p>screening</p> <ul style="list-style-type: none"> <li>▪ Bottom-up analysis of assets</li> <li>▪ The creation of a risk management dashboard</li> <li>▪ Asset specific physical climate change risk assessment</li> </ul>
<b>Four Twenty Seven</b>	<p>Bottom-up climate risk scores for global equities, fixed income, sovereign and real assets.</p> <p>Physical climate risk.</p>	<p>Scores measure exposure and sensitivity to climate impacts (storms, droughts, floods, heat waves, wildfires, sea level rises) at the facility-level for publicly-listed companies and real asset portfolios. Focuses on exposure to tail risks and change from current conditions against a 2020-2040 timeframe.</p> <p>More details: white paper on <a href="#">physical risk in Equities</a> and <a href="#">U.S. Munis</a>.</p>	<p>Available commercially as a data feed or via a secure visualisation and analytics platform, as well as for reporting and bespoke analytical projects.</p>	<p>Identify assets, sectors and geographies most vulnerable to physical impacts of climate change. Build a risk mitigation strategy and resilience plan based on granular assessment. Perform due diligence for new asset acquisition.</p>

Provider	Description and coverage	Methodology	Access and delivery	Outputs
ISS –	<p>ISS-Climate offers impact and sector level, and is available for different asset classes. To date, eight scenario approaches are available.</p> <p><b>Impact</b> – allowing an investor to assess how investments contribute to the 2° C goal, and with which climate scenarios they align.</p> <p><b>Risk</b> – allowing an investor to assess exposure to transition and physical risks, and potential financial impacts from those risks.</p>	<p>The approaches build on</p> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; margin: 10px 0; text-align: center;">Optional keyword</div> <ul style="list-style-type: none"> <li>- <a href="#">Carbon Yield</a></li> <li>- <a href="#">Sectoral Decarbonisation Approach &amp; Science Based Targets</a></li> <li>- <a href="#">ISS-ekom Sustainability Solutions Assessment</a></li> <li>- <a href="#">ISS-oekom Carbon Risk Rating</a></li> <li>- Climate scenarios developed by <a href="#">International Energy Agency Energy Technology Perspectives</a></li> </ul>	<p>Available</p> <p>basis with optional advisory services to support investor understanding and implementation.</p> <p>Delivered as raw data or in a report containing the individual outputs (charts, graphs and descriptions) of the chosen assessments. Advisory services are available.</p>	<p>Analyse potential</p> <p>portfolio to support the development of appropriate strategies and plans for action.</p>
Mercer	<p>Top-down, asset allocation climate scenario tool that examines risk/return impacts at total portfolio, asset class and sector level.</p> <p>Transition and physical impact risks.</p>	<p>Development of climate scenario pathways and risk/return sensitivities of asset classes and industry sectors to TRIP climate risk factors (technology, resource availability, impact and policy).</p> <p>Further details can be found <a href="#">here</a>.</p>	<p>Available commercially on a project basis, client retainer agreement or through a research partner arrangement for asset owners.</p>	<p>Identify priority risks and opportunities and the potential relative impacts under different climate scenarios (including 2 degrees or less) to support strategic decision making on asset allocation and portfolio construction.</p>

Provider	Description and coverage	Methodology	Access and delivery	Outputs
Ortec	Climate MAPS quantifies	The orderly transition	Clients can mix	Results are
<div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; display: inline-block;">Optional keyword</div>				
	<p>physical risk (gradual and extreme weather), on the real economy and financial markets. The tool equips investors with knowledge and quantified data of what their climate-related risks/opportunities are, where they are, and what trends they can anticipate over time and across multiple scenarios. This enables consistent integration of climate risk into investment decision-making.</p> <p>Climate MAPS models a Failed Transition Pathway (= current policy and technology trends), a Paris Orderly Transition Pathway and a Paris Disorderly Transition Pathway.</p> <p>Climate MAPS delivers systemic climate risk-aware economic and financial outlooks (covering all asset classes) up to 2060, differentiated per country and sector, per year.</p>	<p>econometric model of Cambridge Econometrics (CE), which take into account worldwide macro-economic interactions. The outputs are deltas in annual growth rates and inflation per country from a climate-uninformed macro-economic outlook.</p> <p>The economic impact of climate-related extreme weather events is modeled in the proprietary catastrophe model Climate PREDICT.</p> <p>The climate-adjusted GDP and inflation shocks from CE and PREDICT are fed into the stochastic financial model of Ortec Finance (the 'OFS'). This translates the impacts of the climate-adjusted GDP and inflation shocks on a wide range of (600+) financial and economic variables. In addition, we model a sentiment shock in the disorderly transition pathway, and pricing-in shocks on financial markets based on the different climate risks.</p> <p>This results in quantified climate risk-aware economic outlooks per global warming pathway.</p>	<p>addition, we offer a range of support options such as results interpretation, bespoke modeling, and portfolio optimization advice.</p> <ol style="list-style-type: none"> <li>1. Access to the Climate Scenario Narratives Dashboard</li> <li>2. Portfolio-specific Climate Risk Report</li> <li>3. Climate-informed Economic &amp; Financial Scenario Database License</li> <li>4. In-depth Climate Risk Methodology &amp; Insights Workshop</li> </ol>	<p>that are easily integrated into any SAA/ALM software.</p> <p>The dataset license includes the underlying economic and financial climate-informed scenarios on a 40 year horizon in preferred data format. This dataset includes time series for macro-economic variables, as well as a wide range of asset class return projections, such as public equity, private equity, sovereign bonds, corporate bonds, credit spreads, real estate, infrastructure, etc. across 29 countries and 11 sectors.</p> <p>The report of the portfolio analysis includes quantified modeling outputs such as:</p> <ul style="list-style-type: none"> <li>▪ (Conditional) value-at-risk</li> <li>▪ Expected return</li> <li>▪ Impact on funding ratio</li> <li>▪ Contribution analysis: climate risk factor decomposition</li> </ul>

Provider	Description and coverage	Methodology	Access and delivery	Outputs
<b>Trucost part</b>	Trucost's Carbon Earnings	Trucost has curated a	Available	Identify carbon
	pricing mechanisms (including implicit regulations including fuel and other taxes) up to 2030.	fuel and other taxes, and potential future carbon pricing scenarios designed to achieve the goals of the Paris Agreement to limit global warming to 2°C or less.	Trucost's environmental data subscription (for example, portfolio carbon footprinting) for asset owners and asset managers.	and/or profit margin) of individual companies and at the portfolio level. This supports company selection and engagement activities for asset managers.
	Transition risks.	The regional carbon pricing information is then combined with a company's greenhouse gas emissions and financial performance data to provide insights on carbon pricing risks to 2030.		This complements other portfolio climate risk indicators provided by Trucost, such as exposure to stranded assets and alignment with 2 degrees scenario.
		The tool models the progressive closure of the spread between carbon prices today and in the future, considering science-based scenarios and climate change commitments.		
<b>South Pole</b>	South Pole's tool Arctica covers physical and transition risks (with primary focus on policy risks). Top-down portfolio analysis for physical risks in equity and fixed income across geographies and sectors. Top-down screening is further complemented by hot spot and deep-dive analysis for a more granular analysis of holdings where required. More information can be found <a href="#">here</a> .	Forward-looking, scenario-based analysis at portfolio, sector and holding level with global sectoral and geographical coverage. Using IPCC, OECD and ND-GAIN data, it models all major physical risks. Transition risk are calculated by integrating OECD and IEA data assessing the risk for a 2-degree scenario based on IEA and SSP scenarios. Risk is defined by hazard, vulnerability and exposure.	Available on commercial terms depending on portfolio size and the level of analysis required.	A risk score for each holding easily integratable by investment managers into their investment decisions. A bespoke graphical report that can be used for TCFD and for ESG teams to engage and brief their investment managers.

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Provider	Description and coverage	Methodology	Access and delivery	Outputs
Vivid	Vivid Economics' Climate	The Climate Risk Toolkit	Available	Asset price value
	Optional keyword			
	<p>listed equities, corporate bonds, real estate and sovereign bonds using a scenario-driven approach.</p> <p>The toolkit covers over 20,000 listed companies, and associated corporate bonds, as well as real estate and sovereign bonds for major economies.</p>	<p>exposure of financial assets under different scenarios.</p> <p>The toolkit incorporates numerous exposure channels including changes in fossil fuel demand, cleantech deployment, carbon prices, labour and agricultural productivity, and the incidence of extreme weather events.</p> <p>Alongside exposure channels, economic responses (emissions abatement and adaptation to physical risks), and competitiveness implications are factored in.</p> <p>This produces a detailed picture of climate risk impacts as shown in the <a href="#">IPR FPS equity results</a>.</p> <p>The Climate Risk Toolkit's modelling horizon is 2020-50.</p> <p>Vivid also offers bespoke scenario analysis, and was involved in the development of the <a href="#">IPR Forecast Policy Scenario</a>.</p>	<p>support around TCFD disclosures, development of bespoke climate scenarios for internal use, and internal climate change strategy development.</p>	<p>modelling of cost, price, and quantity impacts under climate scenarios.</p> <p>These impacts can further be broken down into different impact channels, including transition-related demand destruction, demand creation, direct physical impacts, carbon taxes, abatement opportunities, adaptations to physical risk, and cost-pass through.</p> <p>Vivid also provides carbon intensity and temperature alignment analysis.</p>

## Table of reference climate scenarios

PRI Reporting Framework Indicator SG 13.8CC invites signatories to select which climate reference scenarios they use from a list. See the table below for an overview of these scenarios.

Provider	Name	Key characteristic	Emission	Year for	Reference
		Optional keyword			
IEA	Beyond 2 Degrees Scenario	Limits warming to 1.75°C by 2100. Starts in 2014.	2017	2060	2 Degrees of Separation, PACTA, TPI, TCFD technical annex
IEA	Energy Technology Perspectives 2 Degrees scenario	ETA 2°C scenario. From 2014-2100	2020	2060 for power	TPI
IEA	Sustainable Development Scenario	Combines climate and social targets for limiting global warming to 2°C. Starts in 2016 until 2040.	2020 for energy and industry	Not modelled (beyond 2040)	PACTA
IEA	New Policy Scenario	Pathway if all new policy, set out in countries' NDCs, are effectively implement. From 2016-2040	2029 (China peak energy only)	Not modelled (beyond 2040)	2DS, PACTA, TPI, TCFD technical annex
IEA	Current Policy Scenario (CPS)	Business-as-usual without new climate policies. From 2016-2040	No peak	No net zero	PACTA, TCFD technical annex
IRENA	RE Map	Doubles renewable energy share of world's energy mix by 2030. From 2010-2030			PACTA, TCFD technical annex
Greenpeace	Advanced Energy [R]evolution	Pathway for a fully decarbonised energy system by 2050			PACTA, TCFD technical annex
Institute for Sustainable Development	Deep Decarbonization Pathway Project (DDPP)	Country level pathways for reducing emissions consistent with 2°C. From 2010-2050			TCFD technical annex
Bloomberg	BNEF reference scenario	Power sector pathway scenario			PACTA, TCFD technical annex

## Others

### Physical climate scenarios

IPCC	Representative Concentration Pathway (RCP) 8.5	High emission scenario, 4-5°C, consistent with no policy changes to reduce emissions	No peak	No net zero	TCFD technical annex
IPCC	RPC 6	High-to-immediate climate emissions scenario, 2~3.7°C.	2080	No net zero	TCFD technical annex
IPCC	RCP 4.5	Immediate climate emission scenario. Global emissions peaking in 2040 and falling rapidly thereafter until 2080	2040	No net zero	TCFD technical annex
IPCC	RCP 2.6	Limits warming to the Paris Agreement's target of 2°C by 2100	2020	2070	TCFD technical annex