



# Looking forward to a rising temperature?

**Practical insights for a  
climate risk scenario analysis**

July 2020

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# Looking forward to a rising temperature?

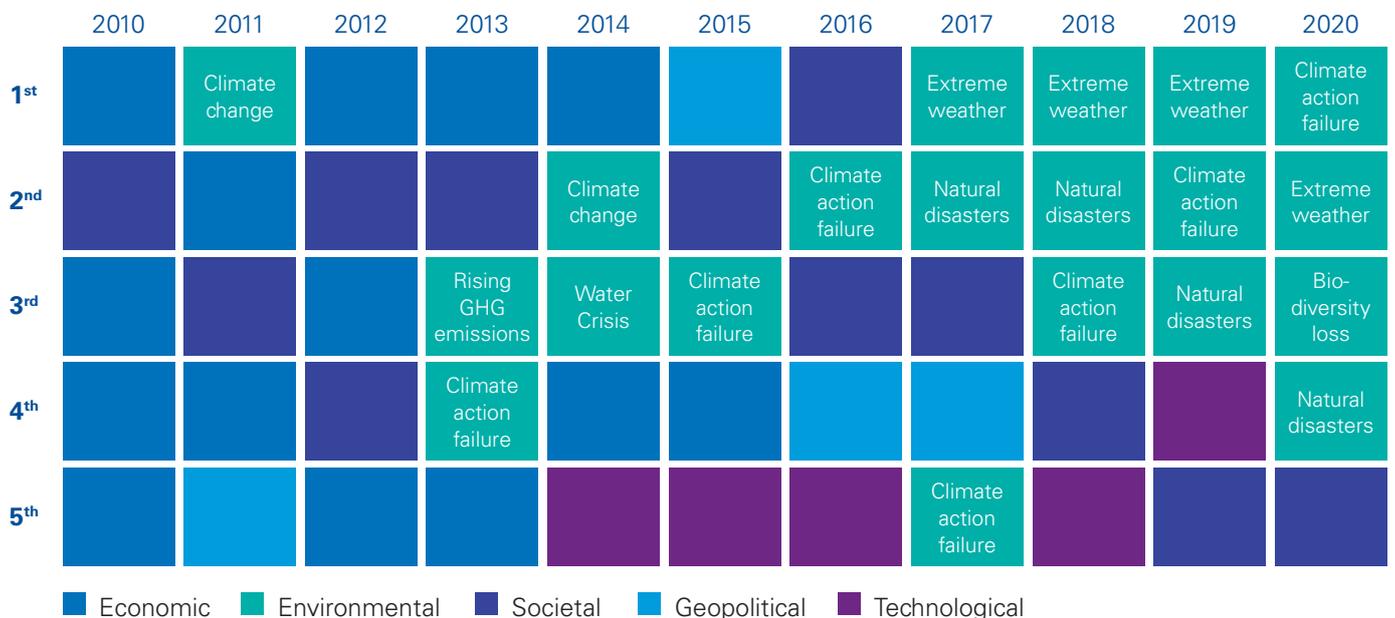
## Early 2020, the Covid-19 outbreak shocked the world with its, arguably, unprecedented consequences.

Despite the warnings of the likelihood of a pandemic from epidemiologists, academia, business tycoons and, among others, the World Health Organization (WHO, 2003)<sup>1</sup>, the outbreak took the world by surprise and devastated health

systems and economic, social equilibriums. Ultimately, Covid-19 reminded the world of how unexpected events can have a shocking impact, and underscored the importance of preparing for highly impactful events.

Climate change is expected to be one of these impactful events and has long been a recognized risk with large potential implications, dominating the World Economic Forum’s Global Risks Report year on year as depicted in Figure 1.

**Figure 1:** Evolution of the importance of climate-related risks in the last decade



**Source:** World Economic Forum – Global Risks Report, 2010 to 2020. KPMG analysis of likelihood and impact

<sup>1</sup> <https://www.who.int/mediacentre/news/releases/2003/pr56/en/>



The Covid-19 crisis and the 'tragedy of the horizon' caused by climate change, as described by Mark Carney<sup>2</sup>, may ignite similar drastic disruptions (e.g. unavailability of natural resources, forced consumer behaviors) and immediate and long-lasting changes (e.g. forced societal changes, drop in GDP, nationalistic behavior), but the impact of a climate crisis will certainly be greater, last longer, be more frequent and will be unprecedented.



The content of this paper is based on our experiences from working with companies in defining scenarios, identifying their climate-related risks and opportunities in these scenarios and assessing whether their strategy is future-proof. We have come across a number of challenges in developing and conducting scenario analyses, some very specific and technical, and others more fundamental.

This paper summarizes the key practical lessons that we advise companies to consider when starting their scenario analysis journey. It is intended to provide an easy-to-read overview of essential considerations when starting their scenario analysis, rather than a full 'how to'. For the latter, the Task Force on Climate-related Financial Disclosures (TCFD) provides further comprehensive guidance to the overall process<sup>3</sup>.

<sup>2</sup> Governor of the Bank of England, in his famous speech 'Breaking the tragedy of the horizon' initially delivered at Lloyd's of London and subsequently, among others, also to the European Commission.

<sup>3</sup> The TCFD will release further detailed scenario analysis guidance in autumn 2020 to assist companies in completing the process of scenario analysis. KPMG Netherlands has assisted in developing this guidance. See [www.fsb-tcfd.org](http://www.fsb-tcfd.org).

# Scenario analysis: key practical lessons

## Scenario analyses differ from traditional risk management and can be used in a broader context

In a changing world in which long-term considerations are becoming increasingly important, the climate crisis requires an unconventional risk mindset, moving away from traditional risk management and with more dynamic and long-term assessments.



“ Awareness [of climate change] is rapidly changing, and I believe we are on the edge of a fundamental reshaping of finance...

Larry Fink, BlackRock chairman and CEO.

Scenario analysis can be considered to be a form of risk management, but it has distinctly different characteristics, especially with regard to its long-term outlook (>10 years) and acknowledgement of the power of volatile events.

Traditional risk management will analyse risks that occur in the near future (typically 1 to 5 years) and is typically carried out through the following steps:

- Development of a risk inventory
- Assessment of likelihood and impact of the identified risks to the company
- Analysis and prioritization of the list of risks
- Development of a risk management strategy to mitigate, adapt or accept the prioritized risks based on the company's risk appetite.

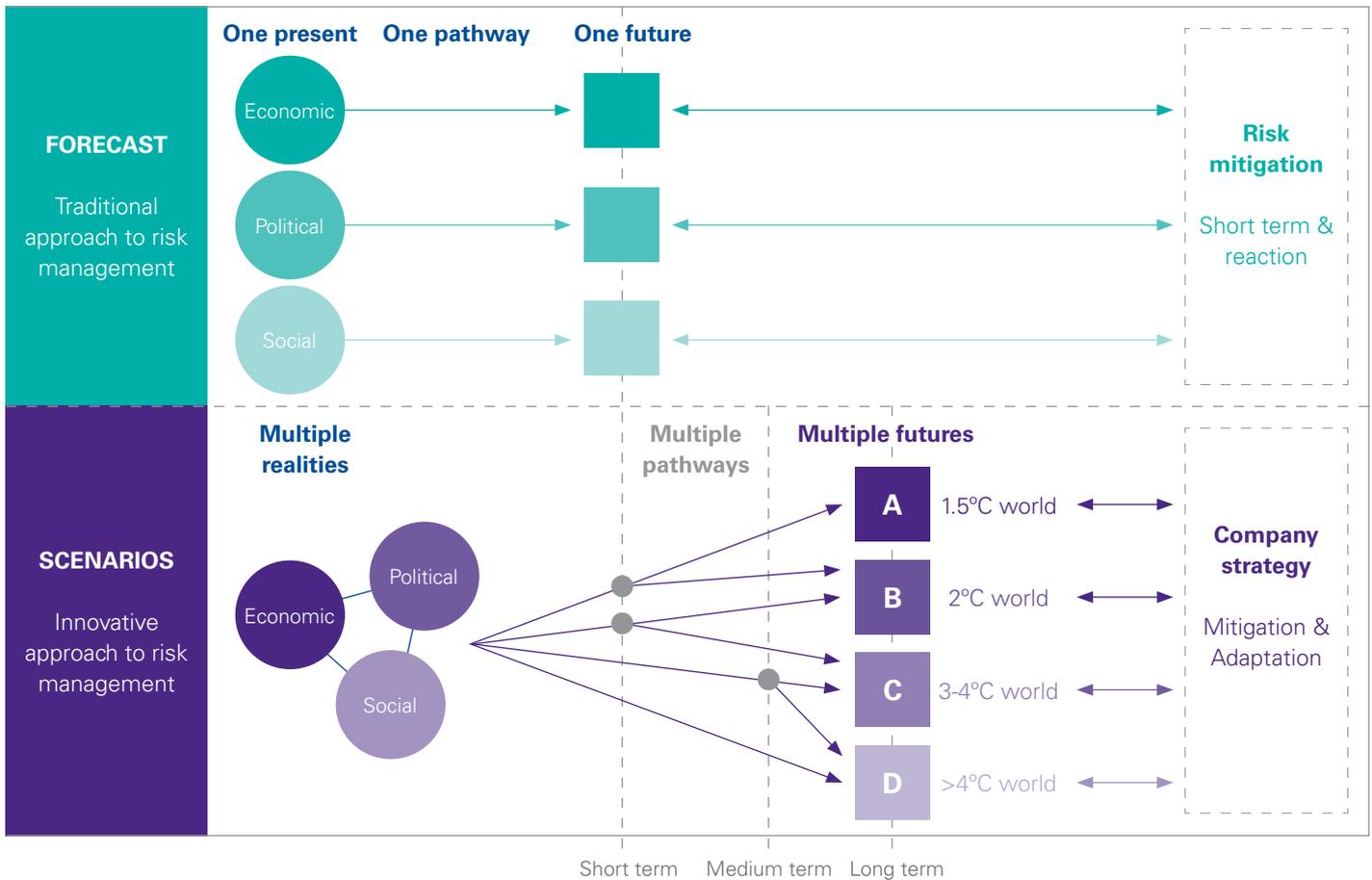
Scenario analysis provides a structured way to identify a range of potential long-term futures, allowing companies to understand the climate-related risks relevant to their business and how they may evolve over time. Companies can then identify strategies to be resilient in these different futures.

In contrast to risk management, scenarios typically focus on the long term and take uncertainty of the future as a given in reviewing risks and opportunities. They are characterized by answering 'what-if' questions, and thus do not aim to forecast or predict (by assessing likelihood). To answer the 'what-if' questions, scenario analyses provide results based on a number of assumptions of a plausible future following a certain pathway.

## Scenarios do not depict what the future will be, but what it could be

While scenario analyses can provide insights into several potential futures, it is important to stress that the purpose of scenario analysis is **not to predict the future or forecast or project trends. It is not a sensitivity analysis and does not rely on probability.** Instead, it is a creative exercise to imagine potential futures based on a company's own vision, and build resilience against medium and long-term risks.

**Figure 2:** Simplified View on Scenarios



Source: KPMG

**Companies that employ traditional risk management may not identify the full range of risks and their effects, as the approach relies on assumptions founded in the current context.** By focusing on the short term, this type of risk management does not encourage deep consideration of risk outcomes and implications, nor does it enable companies to ask creative questions and challenge established practices. Companies may not take into account systemic developments that are impacting a risk such as climate change; for example, a health pandemic, a drought that triggers geopolitical conflict, or an extreme weather event that damages a power plant and disrupts operations. While these types of events are not common at a global scale (yet), the damage inflicted can be incredibly high, if not much higher than the damage inflicted by a high-probability event in any given year.

New York Professor Nassim Taleb explains in his book 'The Black Swan: The power of highly improbable events' that expectations for the future based on historical or current events can fail dramatically due to the risk of low-probability, high-impact events. Companies and organisations are hardwired to restrict their thinking to what is known, not to the 'impossible', massively impactful events, for which they are truly vulnerable. **Scenario analyses can be used to identify these black swans and spot sources of risk and opportunity that would normally go undetected.**

## Scenario analyses will help companies be (more) future-proof

Companies will need to conduct research and undertake internal brainstorming sessions or workshops in order to define future states of the world at different time horizons (e.g. 2030, 2040, or 2050) and discuss how the company will fit into such states, and what actions the company would need to take to either mitigate the associated risks or grasp the associated opportunities.



### What happens to the company if ...



Figure 3: Examples of 'What-if' questions to be considered in the process

Source: KPMG

Reflection on these types of questions is crucial to continue to be relevant and aware of current and future trends, and challenge business-as-usual assumptions.

Perhaps the most striking quality of scenario analyses is the way in which they guide companies to strategically 'think outside of the box'.

**CASE STUDY**

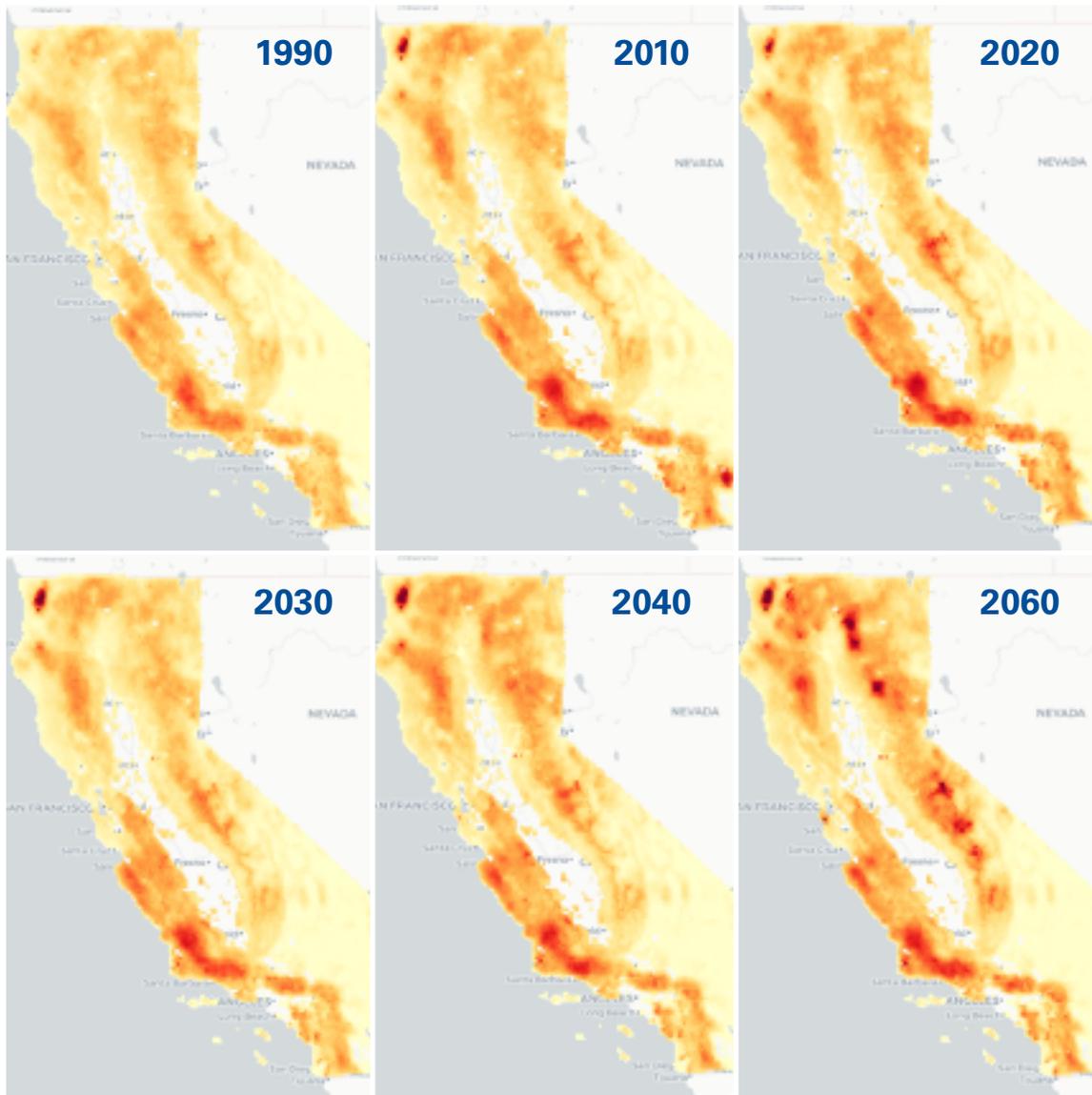
Pacific Gas & Electric (PG&E) has become the largest utility in the United States to declare bankruptcy triggered by USD 30 billion in liabilities from wildfires<sup>4</sup>. The state of California faces an increasing threat of wildfire disasters and extreme weather events, which forces PG&E and companies in this state to consider how to prepare for more frequent and impactful climate-related events.



This is the end of business as usual for PG&E.

**Governor Gavin Newsom, California<sup>5</sup>**

**Figure 4:** Evolution of wildfires in California – Historical and forward looking (1990 - 2060)



**Source:** Cal-Adapt tool ([www.cal-adapt.org/tools/wildfire](http://www.cal-adapt.org/tools/wildfire)) – historical and forward looking (RCP 4.5 scenario)

The analysis of climate models over years help identify areas of potential vulnerabilities, exposure where physical hazards are expected to intensify, resulting in potentially increased risks for companies that are either sourcing, operating or having customers in California.

<sup>4</sup> <https://www.nytimes.com/2020/05/18/business/energy-environment/pge-bankruptcy-wildfire-victims.html>

<sup>5</sup> <https://www.nytimes.com/2020/03/20/business/energy-environment/pge-deal-gavin-newsom-california.html>

## Companies should not quantify scenarios too early

Scenario analysis is sometimes placed in the same context as scenario modelling, financial modelling, or climate projections. Therefore, companies starting to use scenario analysis quickly turn to quantitative figures to substantiate claims about the future, which is a common pitfall.

### KPMG VIEW

Companies should not move into quantitative assessments too early, as companies run the risk of rapidly being overwhelmed by too many challenges, which are mainly characterized by:

1. the complexity of the various methodologies developed to quantify climate-related risks;
2. the broad range of assumptions made; and
3. the data availability to support these assumptions, both from external and internal sources.

**A qualitative assessment can be equally valuable in an uncertain and increasingly dynamic world.**

Starting with qualitative scenarios can help the company explore a range of possible futures, and as the company gains more experience in scenario analysis, it can later use more rigorous and sophisticated data and models to substantiate the narrative.



 Quantifying too early creates the risk of getting it perfectly wrong.

**Wim Bartels**, Partner at KPMG and TCFD member.



## Scenarios need to fulfil certain characteristics: Our PICTURA scenario principles

With the increased expectation that companies will need to demonstrate the resilience of their strategy in their annual filing, as recommended by the TCFD, companies need to develop scenarios that are credible and plausible for external stakeholders, especially investors. Credibility can be ensured through the use or leverage of latest scientific research and plausibility through iterations with internal and external sectoral experts.

### KPMG VIEW

Considering the rather complex task of developing the required scenarios, it is important to keep in mind a number of criteria or characteristics that companies will need to consider in different stages of the process: from start to finish, but also throughout. To help with this process, KPMG has set up the PICTURA scenario principles, as described in Table 1.

**Table 1:** PICTURA Scenario Principles

Scenario principles		Description	Illustrative example
<b>P</b>	<b>Plausible</b>	Scenarios help in dealing with uncertainties in an increasingly dynamic world, especially if they can be perceived as plausible. This can be achieved through stakeholder engagement as it is one of the main ways to confront views and build coherent, plausible futures.	<b>Not plausible:</b> A scenario depicting oil in the energy mix similar to today may not be the most plausible scenario for 2050.
	<b>Innovative (creative, challenging)</b>	Scenarios challenge conventional thinking and business-as-usual assumptions. They encourage the reader and the business to think about alternative ways of doing business.	<b>Innovative:</b> A scenario where an entirely new mode of transportation has emerged by 2050.
<b>I</b>	<b>Inclusive</b>	Scenario development requires time investment to grasp internal and external stakeholders' divergent experience, expertise, values and beliefs. It is important to get top management buy-in at an early stage to allow the process to run smoothly and ensure stakeholder engagement.	<b>Not inclusive:</b> A scenario developed only by a core sustainability team that does not take into account the beliefs and ideas of other stakeholders within the organization and outside of the organization, may not be supported by the rest of the organization.
<b>C</b>	<b>Credible</b>	Scenarios need to be substantiated with references, metrics, expert judgment and interviews, stakeholder sessions, and/or technical evidence.	<b>Credible:</b> A scenario making references to reputable scenarios (e.g. IEA, IRENA, IPCC) for certain narratives or metrics used.
<b>T</b>	<b>Tailored</b>	Scenarios may draw from other established scenarios (e.g. IEA, IPCC RCP, SSP), but the scenarios need to be tailored to the business context and individual vision of the company, that will in most cases be different from its peers and competitors.	<b>Not tailored:</b> A chemical company using a standard IPCC scenario (created for policymakers) cannot capture value that is relevant for the company itself.
<b>U</b>	<b>Unique (distinctive)</b>	Each scenario should have a unique message and storyline, sufficiently distinctive from the other scenario(s) to allow for meaningful analysis when assessing the impact on the company.	<b>Not unique/distinctive:</b> A company developing two scenarios in line with 2°C temperature trajectories – one where the renewable energy mix moves gradually and one where this development starts later with a sharper increase (but still orderly) – does not allow to understand sufficiently the differences in social, economic, political developments and therefore the range of business implications.
<b>R</b>	<b>Rigorous</b>	Scenarios are characterized by some degree of complexity; they do not address just one topic, but link several themes together in a coherent story. Each scenario describes what happens, why it happens, and how it happens.	<b>Not rigorous:</b> A scenario of a transport company that does not consider the level of penetration to city centres or the energy mix.
	<b>Relevant</b>	Scenarios must be relevant for the company and for external stakeholders in terms of financial and strategic implications.	<b>Not relevant:</b> A scenario of a transport company that does not consider the level of penetration to city centres or the energy mix.
<b>A</b>	<b>Articulated (coherent)</b>	Trends in the scenarios should be linked, so that the scenarios as a whole are internally coherent. A clear storyline should be drawn from the scenario.	<b>Not articulated/coherent:</b> A scenario involving global cooperation (political dimension) and an absence of carbon tax in most OECD countries (political dimension).

Source: KPMG

# Tips to get companies started on scenario analyses

## Companies should define the scope of their scenario analysis

Based on our interactions with companies, we currently see two main ways companies approach scenario analyses:

- **Holistic scope:** companies defining trends and developments that will impact their entire value chain, supplies, operations, customers, regardless of their locations.
- **Focused scope:** companies applying a risk-based approach and deciding to focus on certain parts of their business:



Value chain (e.g. based on criticality, volumes, revenues, margins, locations): for example, a F&B company could focus on certain agricultural commodities sourced from regions that will be highly impacted by climate change.



Product category: for example, a diversified company could identify the products that will trigger most customer behavioral change towards low carbon products and focus on the analysis of their most energy-intensive products.



Location: for example, a company with a significant portion of its revenue being generated in China, may want to focus the analysis on this country.

### KPMG VIEW

There is not a right or wrong answer to the best approach; it depends how mature the company is, their primary purpose of using scenario analyses, and other factors, such as the complexity of their value chain, the diversity of sources of supply and products categories, and their geographical spread.

Scenario analyses will take some time and resources to meet the PICTURA Scenario Principles (Table 1), and one should expect some intellectual and practical challenges along the way, simply because defining a future is not a business-as-usual activity.

While working with companies, we have defined a set of scoping criteria that we consider to be critical for delivering on the expected outcome of scenarios analyses.



**Table 2:** Scoping Dimensions for Scenario Planning and Considerations

Scoping criteria	Possible options	Considerations
<b>Number of scenarios</b>	<ul style="list-style-type: none"> <li>— 2 scenarios</li> <li>— 3 scenarios</li> <li>— 4 scenarios</li> <li>— &gt;4 scenarios</li> </ul>	Start with a minimum of two scenarios in year 1, sufficiently distinct, and build on complexity in year 2 and 3.
<b>Temperature trajectories</b>	<ul style="list-style-type: none"> <li>— 1.5°C</li> <li>— 2°C</li> <li>— 4°C</li> <li>— &gt;4°C</li> </ul>	Follow the TCFD recommendations and apply at least a 2°C scenario. Consider alignment with internal/external commitments (e.g. Science-Based Target).
<b>Existing scenarios to leverage</b>	<ul style="list-style-type: none"> <li>— IPCC RCP</li> <li>— SSP</li> <li>— IEA</li> <li>— IRENA</li> </ul>	Leverage the best available data (based on scientific consortium); for this, companies will need to undertake some research. Scenarios need to be tailored to the sector (not available in scenarios aimed at policymakers).
<b>Time Horizon</b>	<ul style="list-style-type: none"> <li>— 2030</li> <li>— 2040</li> <li>— 2050</li> <li>— &gt;2050</li> </ul>	Consider alignment with internal/external commitments and (long-term) strategic plans and the average investment timeframe. To be meaningful, a 10-year horizon is a minimum.
<b>Pathway</b>	<ul style="list-style-type: none"> <li>— Orderly</li> <li>— Disorderly</li> </ul>	The consideration orderly/disorderly is relatively recent as there are multiple pathways to reach a certain future state. There is still hope and confidence that the climate issue can be solved in an orderly manner under the Paris agreement.
<b>Applicability</b>	<ul style="list-style-type: none"> <li>— Geography (e.g. global, region, country, city)</li> <li>— Product type</li> <li>— Supply type</li> </ul>	This depends on certain factors. If possible, consider starting small (describe global mega-trend) in year 1, then build on complexity (focus on a region, a country) in year 2 and 3.

**Source:** KPMG



## Companies should not forget the stakeholder engagement dimension: it is crucial for success

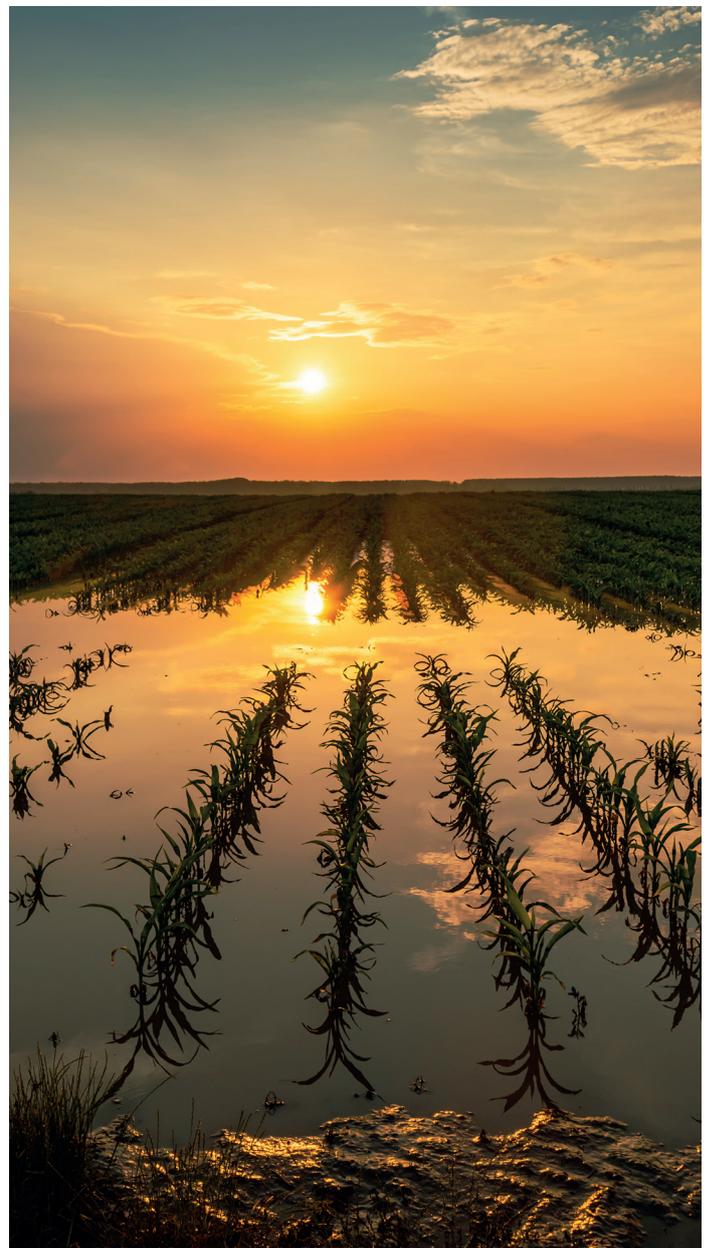
Scenario analyses need to reflect the company's consolidated vision of the future state of the world and the social, economic and technological developments required to reach this end-state. **The initial discussion with internal stakeholders should allow for alignment on the expectation of the scenario analysis process: what it is and what it is not.**

### KPMG VIEW

Scenario analysis should be an iterative process, with the aim to gather and challenge different views from various parts of the company. Ideally, people involved in the process have worked within the company for a sufficient number of years to understand the forces that impact the sector and have a creative mindset to define future developments and their implications for the company.

If stakeholders grasp the concept and participate in the development of the company's scenarios, they will understand the trends that could lead to risks to the company when they emerge and therefore better anticipate on these. This will also make the process to integrate climate-related risks and opportunities in the context of long-term scenarios smoother and more effective.

The involvement of external stakeholders will bring unbiased, expert insights to the table that will strengthen the scenario narratives and enhance their plausibility, especially if the company aims to disclose some narratives publicly. We have listed some suggestions to select stakeholders to address the PICTURA Scenario Principles.



**Table 3:** Selecting Stakeholders

Scenario Principles		Seniority in the company	Long history in the company	Visionary / Thinking outside the box / Work outside comfort zone	Expertise (e.g. scientific, sector, value chain)	Understanding of sectors, market, world trends	Attention to details	Experience with long-term project
Type of stakeholders		Internal	Internal	Internal External	Internal External	Internal External	Internal	Internal
P	Plausible	✓				✓		
I	Innovative (creative)		✓	✓		✓		
	Inclusive	✓	✓		✓			
C	Credible				✓	✓		
T	Tailored (to the company)		✓			✓		
U	Unique (distinctive)			✓		✓		
R	Rigorous				✓		✓	✓
	Relevant	✓						
A	Articulated (internally coherent)						✓	✓

Source: KPMG

## Companies should not take existing scenarios for granted, but leverage on them

There are a number of reputable scenarios available, but most of them have been created for policymakers, and as a result, are difficult to apply directly in a business context. However, within these scenarios lies valuable information about different dimensions of the future that can be extracted for business purposes. For example, companies can leverage information on GHG emissions, temperature increase or sea level rise from the IPCC scenarios, socio-economic evolutions from the SSP scenario, and energy technologies, energy mix evolutions and trends from the IEA scenarios.

### KPMG VIEW

Companies will need to use these scenarios to understand the context of the changes over many years, and can use and tailor them to the vision of the company.

Table 4 demonstrates how the assumptions in the SSP scenarios can be leveraged by an energy company to develop tailored scenarios.



**Table 4:** Example of scenarios created for policymakers tailored to a company

Extract from SSP scenarios ...	... tailored into a scenario narrative for an energy company	
<p><b>Sustainability scenario – Taking the Green Road</b></p> <p>The world shifts gradually but pervasively towards a more sustainable path, emphasizing a more inclusive development that respects perceived environmental boundaries. Management of the global commons slowly improves, educational and health investments accelerate the demographic transition, and the emphasis on economic growth shifts towards a broader emphasis on human well-being. Driven by an increasing commitment to achieving development goals, inequality is reduced both across and within countries. Consumption is oriented towards low material growth and a lower resource and energy intensity.</p>	<p><b>Political &amp; Legal</b></p> 	<ul style="list-style-type: none"> <li>— <b>Government-led rapid intervention</b></li> <li>— Electricity sector <b>carbon prices</b> in OECD countries increase to around \$250 per tonne by 2030.</li> </ul>
	<p><b>Economic</b></p> 	<ul style="list-style-type: none"> <li>— <b>&lt;20% fossil fuel use by 2040. Large scale renewables</b> are built to replace centralized fossil fuel assets, with significant distributed energy mini grids in regional areas.</li> <li>— <b>Green hydrogen</b> takes off and displaces natural gas from 2030 onwards, especially in long-haul transport.</li> <li>— <b>Electricity market</b> achieves zero-carbon emissions and the price of electricity generation decreases substantially due to the high level renewable generation.</li> </ul>
	<p><b>Social</b></p> 	<ul style="list-style-type: none"> <li>— <b>High level of consumer awareness</b> for low carbon products. Consumers select Renewable Energy when possible, regardless of the higher price.</li> </ul>
	<p><b>Technological</b></p> 	<ul style="list-style-type: none"> <li>— <b>Extensive investment</b> in technological solutions.</li> </ul>

Source: SSP scenarios and KPMG

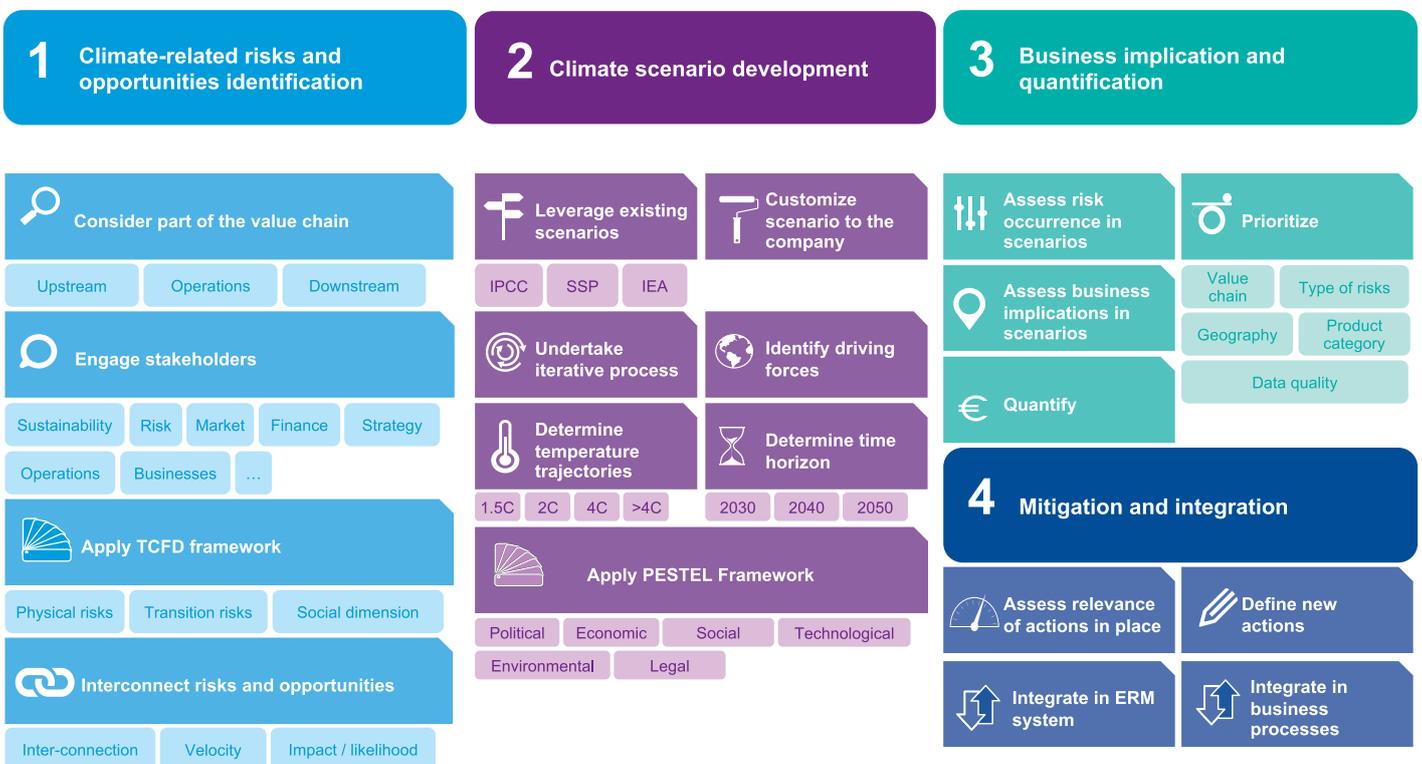
# How we can help you

In our view, there is not a ‘one-size-fits-all’ approach to scenarios development; it is not a stand-alone exercise and needs to be embedded into a strategic process, starting from the identification of climate-related risks and opportunities and moving towards assessing business implications and impacts.

To address this, KPMG has developed a pragmatic and modular approach in four steps that will help you to:

- **Select fit-for-purpose external climate databases**, their purpose and relevance for your company.
- **Understand your company’s exposure along your value chain** to both to the physical effects of climate change and to the regulatory and economic impacts of the shift to a low-carbon economy.
- **Understand and define the correct and relevant boundaries/scope** of your scenarios, as defined in Table 2.
- **Develop future states of the world or scenarios** in line with temperature trajectories such as a 2°C or 1.5°C world.
- **Understand how and where the different climate-related risks and opportunities could affect your business**, qualitatively but also quantitatively (where needed), which will allow you to prioritize your actions.
- **Assess whether mitigation strategies in place** are sufficient to address the risks, taking into account your risk appetite.
- **Integrate** climate-related risks and opportunities and the scenario approach into the ERM system and business process.

Figure 5: A four-step approach



Source: KPMG

# Conclusion

There are many things to consider when starting with scenario analyses and it is a complex process. This paper has addressed some key learnings and attention points to take into account when starting the process. We are confident that these suggestions will help in avoiding some of the key pitfalls that we have seen over the past years, and we hope that this paper stimulates companies to start integrating scenario analyses into their climate risk assessments.

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