



Climate scenarios and consumer business

Four futures for a changing sector

September 2020

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Foreword from Deloitte

The future of consumer business, rewritten

The carbon footprint of the consumer business sector, which we classify as retail, consumer products, automotive, and travel and hospitality, is significant. A recent Climate Watch report shows that air transport makes up 1.9% of global emissions with agriculture contributing 11.8% and road transport adding a further 11.9%.²

Reducing these emissions represents a huge global challenge, and the inevitability of the transition is clear: either we radically change how we live and work, halving emissions within the next decade, or we wait to be disrupted by a less stable, reliable climate with all the social, political and economic consequences that may bring.

Progressive organisations are already asking themselves what this means. What risks and opportunities are presented by climate change? What's the best way to get more useful information, to inform better strategic decisions today? How can supply chains be reorganised to reduce exposure to climate change?

Scenario analysis helps business to answer these questions. Recommended by the Task Force on Climate-related Financial Disclosures (TCFD), and embraced by sector leaders disclosing against CDP's climate benchmark, scenario analysis is set to become widely-used by global businesses over the next two or three years.³ In this publication, we illustrate the value that scenario planning can bring to the consumer business sector – mapping the divergent possibilities for supply chains, operating models and consumers themselves in four plausible versions of the future.

So, in a future where much will change, what can we be confident about?

First, we know we need organisations from every sector, everywhere in the world to step up on climate change. Deloitte research shows that, while 91% of business leaders say that climate change has already affected their business and 84% are very concerned on a personal level, just 23% of the same sample thought business should lead the change.⁴ While business cannot address all the challenges ahead in isolation, business does have a leading role to play in addressing both the mandate for, and the opportunity in, transformation.

Beyond this, the central tenets of consumer business – that the customer is always right, and that convenience is king – will need to be reimagined in an era shaped by climate change. Systemic shifts have to be prioritised over consumer behavior change; the sector has to lead customers towards a net zero future in the next decade. Innovation will be critical in shaping the sector for a low-carbon future; embracing this technology presents both risks and opportunities for the proactive, but only risks for the reactive.

And, beyond this, we know that stakeholders from across the spectrum want corporate purpose to be evidenced in practice; addressing climate change is a highly effective way to do this.

There is much to be done, but action today can prevent supply chains collapsing, or consumers taking their custom elsewhere informed by a changing climate. Better information, better planning and better decision making are all facilitated by the discipline of scenario analysis to which this publication is dedicated. We wish you well on your own journey to a zero carbon future.

Mike Barber
Partner, UK Sustainability and Climate Change Lead
Deloitte LLP



Foreword from the Met Office

Climate change is happening. Global average temperatures have increased by more than 1 degree Celsius since pre-industrial times. How these temperatures continue to change through the 21st century will depend on society's response to climate change and the success of efforts to transition to a low-carbon economy.

Successful mitigation measures, in line with the Paris Agreement, could limit global average temperature change to below 1.5 degrees of warming; conversely, continued dependence on fossil fuels could lead to more than 2 degrees of warming by the middle of the century and 4 degrees of warming towards the end of the century.

These headline figures mask the complexity of climate change and its potential impacts on society. Warming is predicted to be more rapid over land surfaces than oceans; and warming in the Arctic is likely to be even greater still as melting ice and snow expose darker surfaces absorbing more of the sun's energy. Changes in the frequency and severity of heatwaves and extreme temperatures will alter patterns of human behaviour.

Similarly, changing patterns of flooding, drought and storm events could have devastating consequences on communities around the world.

What does this mean for businesses in the consumer sector? Through this report we have worked with Deloitte to explore the potential impacts of climate change on various aspects of the consumer sector. We have used four plausible scenarios as lenses through which to consider the possible consequences of future climate change. These scenarios try to take account of society's potential responses to climate change as well as the direct impacts associated with changing climatic conditions.

We do not advocate that one scenario is more likely than another and it is impossible to cover all possibilities in a single report. Equally, no matter what efforts take place to reduce carbon emissions and mitigate climate change, the science shows us that a certain amount of warming is unavoidable, particularly over the next few decades. This means that the physical impacts of climate change on the consumer sector that are identified in this report are relevant no matter which scenario we follow and adaptation is critical.

The scenarios are merely intended to provide a framework for businesses to consider some of the possible impacts of climate change on their infrastructure, operations, supply chains and markets.

Our role at the Met Office is to provide world-leading and independent weather and climate science to help the public, governments and the private sector to stay safe and thrive in a changing world. We work with a wide range of industry customers to help them to understand and manage current and future changing risks associated with weather and climate change. With the rapid adoption of the recommendations of the TCFD we are increasingly working with customers and partners like Deloitte to help businesses apply climate science in the best possible ways to support risk assessment and adaptation decision making. Through this article we demonstrate some of the issues that could be considered in this context by consumer businesses.

Tom Butcher
Head of Industry Consultancy
Met Office



Driving better strategic decisions with climate scenario analysis



The value of climate scenarios for business

Scenarios describe what the future could look like, and are created to challenge conventional wisdom and drive better decisions. They are not predictions about what *will* happen, but rather hypotheses about what *could* happen, designed to highlight new opportunities or hidden risks.

Consumer businesses have, in many instances, already started to engage with the challenge posed by a changing climate. Stores, vehicles and manufacturing processes are all more carbon efficient than ever before, and brands increasingly recognise the potential for green credentials to build loyalty and engagement with consumers.

Big questions to accelerate action

All of this is positive and welcome. However, over the next decade, we must collectively halve the amount of carbon we emit, in absolute terms, if we are to avoid the worst impacts of climate change. This means we need to cut further and faster than we have done to date. We need to reconcile this urgent need for transition with our collective aspirations for improvements to shared prosperity for all in society.

Can any business say they are ready for this challenge? And that they understand the uncertainties, have developed a set of potential responses, and feel confident that they have the information and capabilities to make and execute on the right choices?

Change, or be changed

Stepping up to this challenge means consumer brands must make bold moves to innovate with service-led business models, to re-educate consumers, and account for the real cost of carbon in manufacturing and supply chains. In short, addressing climate change, and limiting warming to 1.5 degrees, means big changes.

And if we fail to transition? In a world where nothing is done to cut emissions, supply chains become less reliable, operating conditions become less predictable, and markets experience more volatility as a result of weather-related shocks.

In either future, consumer businesses that are better prepared for whatever change comes along are more likely to be resilient in the face of uncertainty.

So, how do brands manage this?

Unlocking possible futures with scenario analysis

While climate science provides a sound understanding of how humans are changing the climate, this is only part of the puzzle for business. Arguably more critical than the changing physical environment is how we will collectively behave when confronted with the knowledge of the challenge ahead. Uncertainty around this future behaviour means that an infinite set of possible futures exist.

In this context, scenarios provide a way for organisations to consider how the future might look if certain trends continue or certain conditions are met.⁵ Scenarios allow organisations to ask 'what if?' in relation to how human behaviour could impact climate change and test their resilience to the different potential answers.

In this report, we use four scenarios, which are described as follows:



Fossil-fuelled global growth



An unequal world



Regional rivalry



Steady path to sustainability

The climate scenarios used in this report

To be useful for business, the scenarios we describe must bring together a number of factors including climate, emissions, vulnerability, environmental and socioeconomic change. Two key frameworks are used by the climate scientific community to combine these different factors, with a common set of narratives – the Shared Socioeconomic Pathways (SSPs), which describe different socioeconomic futures, and the Representative Concentration Pathways (RCPs), which model different emissions pathways and the associated impact on the climate.⁶

Scenarios can be constructed by pairing an SSP and an RCP together. While there are lots of potential SSP/RCP combinations, there are some central combinations consistently used by the climate science community.

The four scenarios examined in this report are grounded in these central SSP/RCP pairings, but pay particular attention to the factors most relevant to the consumer industry.

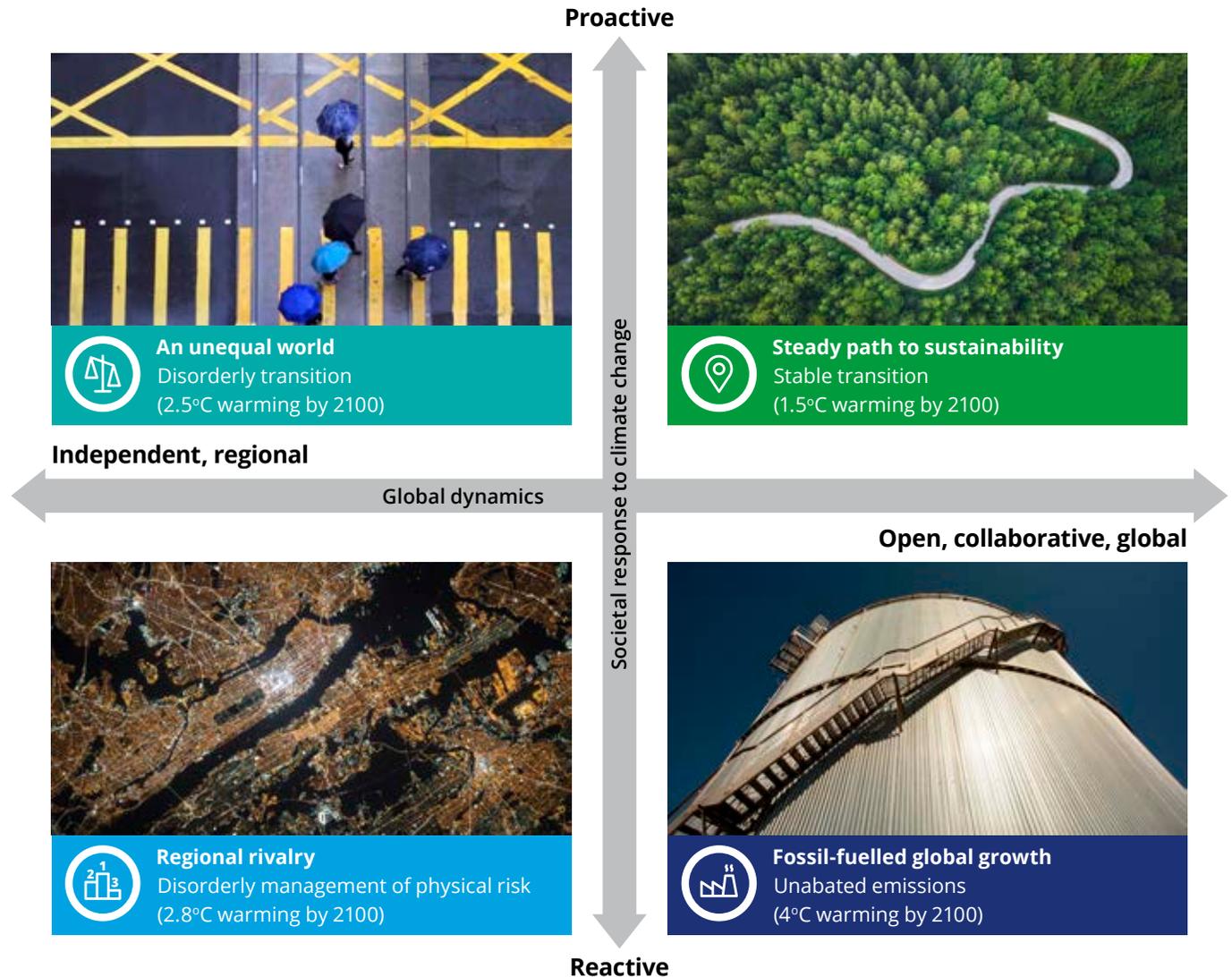
As illustrated in Figure 1 (right), these scenarios are centred around two dimensions, which are explored on the next page.

A note on the climate science

The SSP/RCP pairings underpinning our scenarios are:

- Fossil-fuelled global growth – SSP5/RCP 8.5.
- An unequal world – SSP4/RCP 4.5.
- Regional rivalry – SSP3/RCP 6.0.
- Steady path to sustainability – SSP1/RCP 2.6.

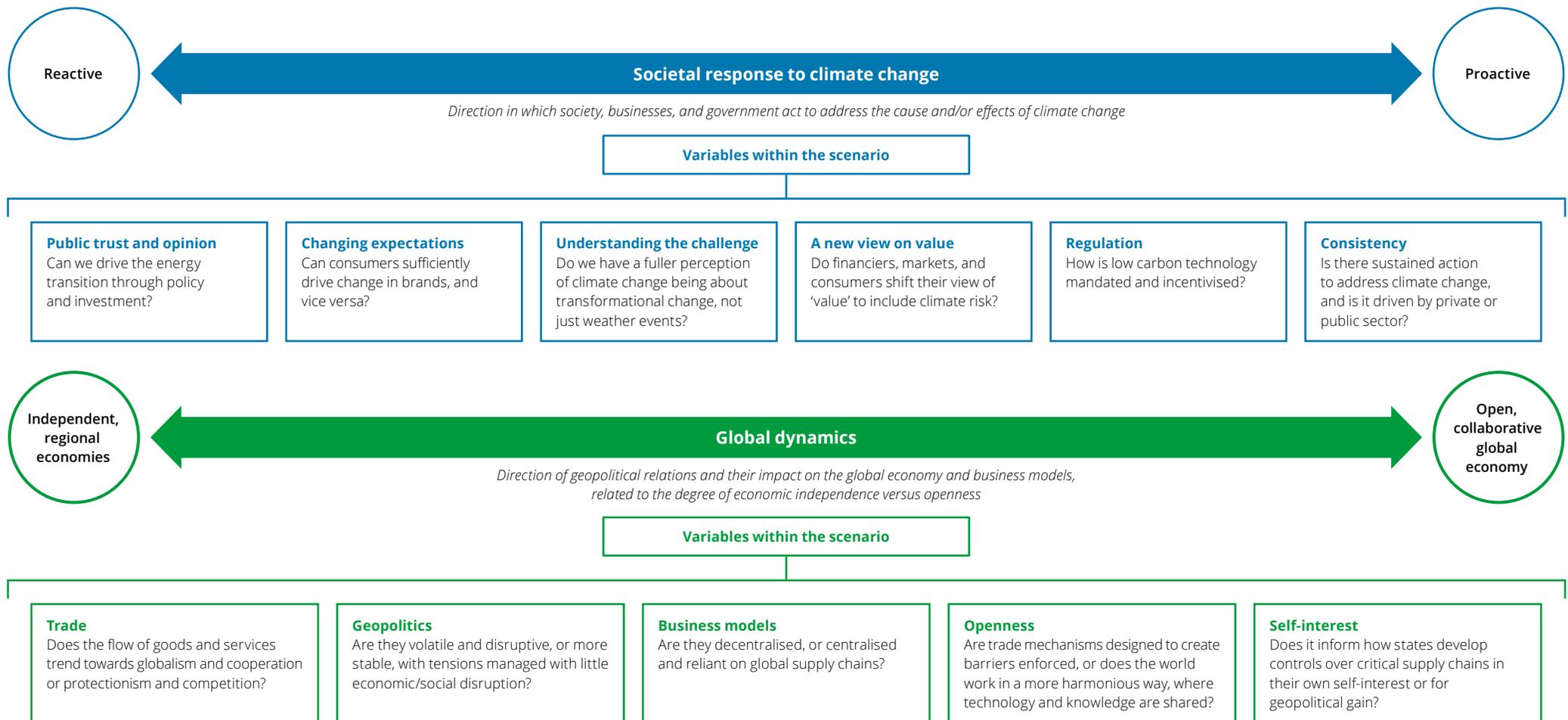
Figure 1. Our four scenarios



Building plausible scenarios

The SSPs are structured around two key dimensions: whether society will adopt a proactive or reactive approach to managing climate change; and whether global dynamics will be characterised by international cooperation or independent action. These two dimensions are explored in Figure 2 (below).

Figure 2. A deeper look at the two core dimensions



Meet our model consumers

In each of the scenarios presented in this report, we use three model consumers to help bring to life the potential impacts of climate change and low carbon transition.

Through Darren, Lori, Patrick and Grace, we show how the outlook, behaviours and spending patterns of archetypal consumers change in four starkly different versions of the future.

Throughout the publication, we'll follow our model consumers and look at how their lives may change between now and 2050.

Darren

'Gig-economy single dad'

Age: 38
Occupation: Self-employed delivery driver
Household income: £14k per annum
Family: Divorced. Ten year old son



"I recently started doing some work delivering parcels and take-aways. I've heard people say some negative things about it, but it suits my lifestyle as it gives me flexibility to see my son. I work whatever hours I want and if I need to earn more money, I just work longer. The best part is I don't have to wear a uniform anymore – I can just wear the stuff I feel comfortable in and I can get all of that for next to nothing down the local sports store.

Outside of work, my life is pretty simple. I'm not the best cook, so I tend to eat ready meals and the odd take away here and there. I'll take my boy out for a burger if he's doing well at school, but his mum tells me I have to keep an eye on his diet and make sure he's eating healthy food.

I don't earn enough to go on expensive holidays every year, but I am saving up to go and see family in Spain next year. During the summer, I just have to hope that the weather's nice so I can take my son out for day trips when he's off school.

Climate change? I guess that's something I should probably know about. My son says he learns about it in school. Not sure how it's going to affect me though, I certainly can't afford one of those electric cars I see people driving around! Besides, I need my car for work and can't be stopping to charge it all the time anyway, I'd never get anything done."

Lori & Patrick

'High-flying couple'

Ages: 49 & 50
Occupation: Lawyers
Household income: £600k per annum
Family: No children of their own, but spoil their niece when they get the chance



"We met at university and have been together ever since. We've supported each other throughout our careers – from our first jobs in London, through a stint in Singapore, a decade in Sydney and now back to where it all began.

We have worked hard and it has paid off – we are both partners at the same law firm in London and enjoy the perks that brings.

We both do a lot of travel for work. I have a client in Japan that I have to visit at least six times a year, but that's not exactly a hardship when they pay for me to fly first class! We rack up the air miles and put them to use whenever we can. We love jetting off for a short break, and also take two weeks off every winter to hit the ski slopes. There's nothing else we'd rather be doing!

Patrick's biggest vice is cars. On top of his brand new luxury sedan, he has two high performance sports cars that he can take on the track. He bought me a luxury SUV recently, but I've never liked driving in the city so we either use his car or I get a taxi. Meanwhile, I still stay on top of the latest fashion trends. I know it's silly, but I'll pay a bit more to get things before my friends or anyone else in the office does.

Climate change? Of course we know about that. We offset our travel and our work has a 'green' policy. I'm sure we could do more, but we really are very busy. Our teenage niece is very vocal about climate change as well, so she'll keep us honest as we get older."

Grace

'Part-time activist'

Age: 25
Occupation: Graphic Designer
Household income: £30k per annum
Family: Hoping to move in with her partner she met at work soon!



"I finished uni a couple of years ago and moved back in with my parents whilst I started looking for a job in my home town. I've been here longer than planned, but I've managed to save up a small deposit and I'm looking for a place with my partner. Hopefully we should be homeowners sooner rather than later! The best thing about living with mum and dad? I'm still insured on their car! I have never owned my own car.

My partner and I are both very conscious about the environment. My partner has been vegan for the last 5 years now and I'm trying my best to get on board. You could probably call me a 'meat reducer' or a 'flexitarian' rather than a fully-fledged vegan. I am 100% non-dairy, because I've noticed a difference in my health since I stopped, but I can't resist a bacon sandwich once a week at work.

The more I learn about climate change, the more I look back on things I used to do and shake my head. At university, I would buy something just because I was going out that weekend and wanted a fresh look. I try and avoid 'fast fashion' now and only buy clothes from ethical brands.

I'm trying to do my bit to make a difference, but I think that the government and brands should do more."

A guide to making the most out of this report



When reviewing each of the scenarios, business leaders should consider the following key questions:



Does this scenario describe a world that you are preparing for?



What is the potential impact of this scenario on your business or sector?



What aspects of the scenario stand out?
What surprises you?



What are some 'no-regret' actions that you could take that would mitigate risks presented by this scenario?



What capabilities, partnerships and strategies would you require in order to adapt to the operating environment described in this scenario?



Will your post COVID-19 recovery plans strengthen your resilience to this scenario?

Our four futures



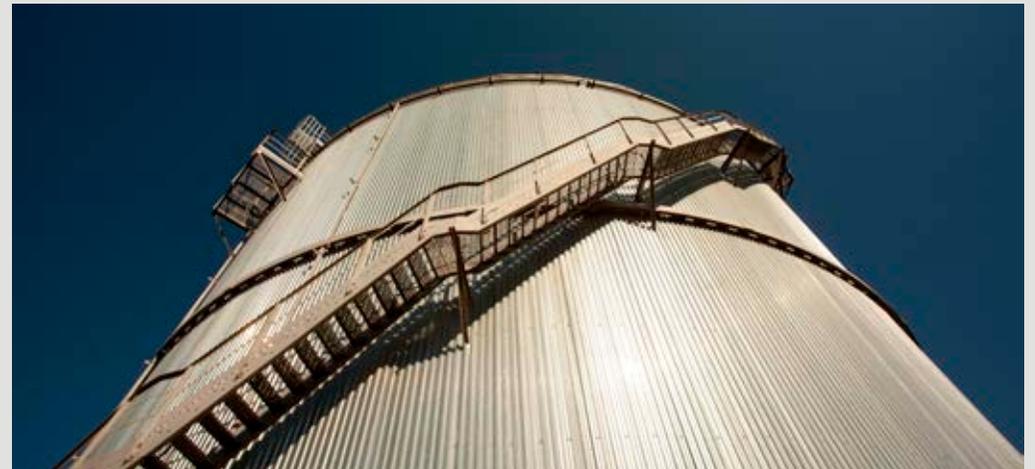
 An unequal world



 Steady path to sustainability



 Regional rivalry



 Fossil-fuelled global growth

Scenario A: Fossil-fuelled global growth



In this scenario

Climate: Global warming of 4°C above pre-industrial levels by 2100.

SSP5/RCP 8.5

Societal approach to climate: Global collaboration focused on protecting the population from a changing climate (*as opposed to reducing human-induced climate change*).

Economy: While the economy experiences strong long-term growth through to 2050, the catastrophic economic toll of climate change becomes an unprecedented drag on economic growth.

Winners: Global companies operating efficient, just-in-time global supply chains with in-built resilience to cope with extreme climate and economic shocks.

Losers: Organisations that have invested in fixed assets in locations disrupted by climate change.



Under this scenario, the world continues to prioritise short-term economic growth, which leads to increases in wealth and the quality of life for some. Trust is placed in innovation and a collaborative, global economy to produce rapid technological progress as the path to sustainable development.

The focus on short-term objectives means that growth and improvements in quality of life are driven by the continued use of fossil fuels. More and more consumers around the world engage in energy-intensive activities and lifestyles.

By 2050, the world looks set for global warming of up to 4°C by 2100. Advanced technologies create new options for addressing climate change and the deployment of hard adaptation measures is used to protect vulnerable populations. However, the cost of deploying these measures to protect the world's population is becoming a heavy burden on the economy.



In focus: Consumer behaviour

- Consumer demand remains strong globally, driven by the large growth in middle class consumers with greater disposable income throughout the 2020s and into the 2030s.
- A growing, and increasingly prosperous, population worldwide drives increased demand for products considered to be part of a developed country lifestyle.
- Individualism and expressions of personal identity drive consumer behaviour. As a result, high carbon emitting brands and sectors continue to thrive; global demand for meat and carbon-heavy diets increase, food waste continues to be a problem and fast fashion remains popular.
- However, by the 2030s, consumers are becoming increasingly aware that their lifestyles may be disrupted due to the effects of climate change. This leads to some adjustments in what consumers value, with reliability and quality valued just as much as price.

Our consumers under this scenario



Darren's rented accommodation is flooded twice in short succession. A government-backed scheme helped Darren to regain his possessions and the property is covered by a new, more robust flood prevention scheme. However, he is now more cautious with his limited savings in case things go wrong again.

Darren notices that the cost of his weekly shop has gone up. A combination of drought in southern Europe, along with unprecedented flooding in other agricultural zones means that food prices have risen significantly.



Lori and Patrick spoil their niece on her eighteenth birthday. They pay for a round the world trip making sure that she sees sights at threat from climate change that she might not otherwise get to see in her lifetime.

Patrick joins Lori in having an SUV. However, there is a huge delay in getting hold of the new vehicle. Disruption to the supply of critical components due to adverse weather conditions means that final assembly is significantly delayed.

Lori and Patrick's house is flooded in the winter, but the summer sees water shortages across southern England and they are told they can't fill their swimming pool.



Despite the world seemingly going in a different direction, Grace and a significant minority of her generation have stuck to their convictions and continue to live environmentally sustainable lives.

A number of large consumer businesses have come out in support of a geoengineering initiative that claims to help stabilise weather around the world and boosting profits for those companies. Grace is appalled – what if it goes wrong? She is part of a mass movement boycotting the companies who support the initiative.

Grace sources her food locally and clothes from sustainable boutiques. She encourages her parents to do the same, but they are shocked at the cost.

In focus:

How might supply chains evolve?

Supply chains



Supply chains are still global and interconnected in order for businesses to remain competitive and meet consumer demand.



By the 2030s, the supply of commodities, production facilities and international shipping are subject to increasingly variable weather and often severe weather-related disruptions.



Agricultural regions and production facilities in already vulnerable climate danger zones – such as low lying deltas and equatorial regions – become economically unviable.



Companies, alongside suppliers, are required to make significant investments in hard adaptation measures to protect infrastructure in the long term. However, companies must accept that it will not always be possible to prevent significant periods of business disruption.



By the 2040s, there are significant challenges associated with the supply of commodities. Certain commodities are in short supply, while greater seasonal variability has resulted in greater price volatility, as well as worsening levels of inefficiency.

How will climate change reshape the way we travel and the relative desirability of travel destinations?



Climate is an important factor influencing the geography and seasonality of tourism demand and spending.⁷ Under the 'fossil-fuelled global growth' scenario, a more rapidly changing climate is likely to impact the overall attractiveness of different tourist destinations for a variety of reasons.

These include the changing comfort level of the climate, perceived risk or damage from increased extreme weather events, and deterioration of attractions (such as changes to the natural landscape, loss of wildlife and damage to cultural attractions or tourist infrastructure). Holiday seasonality is also expected to change as climate norms shift for different regions.

Climate change is expected to lead to tourism gains in some regions and losses in others.⁸ For example, the Mediterranean is projected to become less attractive to tourists during summer due to increasing temperatures and humidity. In Southern Europe an increase of 2°C of warming is projected to reduce tourism by up to 11 per cent, equivalent to a loss of €6 billion per year.⁹ In contrast, a 2°C warmer world is projected to result in a potential gain of €500 million per year in the UK driven by domestic 'staycations' and foreign tourism.¹⁰ Any risk to the tourism industry will be even more keenly felt in light of the major financial losses suffered as a result of COVID-19.

Tourism is often vital to local economies, providing employment and maintaining other businesses in the area.¹¹ Countries with the highest risks and where tourism has historically represented a significant proportion of the national economy (more than 15 per cent of GDP pre-COVID) include Africa, the Middle East, South Asia and small island developing nations in the Caribbean, and Indian and Pacific oceans.¹²

Changes in tourist demand patterns will not only affect local economies, they will also have a serious impact on the wider travel industry with aviation and other transport sectors particularly exposed to risk.¹³

Consumer demand for sustainability across all aspects of their lives will mean that the travel industry will need to demonstrate its eco-credentials. As a result, certification and eco-labelling programmes will become more popular and increase consumer trust.

In Southern Europe an increase of 2°C of warming is projected to **reduce tourism by up to 11 per cent**, equivalent to a loss of €6 billion per year.



To demonstrate the risks the travel industry will face in a 'fossil-fuelled global growth' scenario, we examine the future of two types of holiday: ski tourism and 'last chance' tourism. In both instances, it is clear that the travel industry will have to adapt to manage risk, but also to maximise potential opportunities.

Consumer demand for sustainability across all aspects of their lives will mean that the travel industry will need to demonstrate its eco-credentials.

Ski tourism

With warmer temperatures, precipitation increasingly falls as rain instead of snow at lower altitudes (below 1,500 metres above sea level),¹⁴ but potentially more snow at higher altitudes (above 2,500 m above sea level). This means that, overall, fewer resorts will be 'snow reliable', with lower altitude resorts in particular being less reliable.¹⁵

Under the scenario described, changes in winter temperatures will likely result in shorter and more variable snow seasons.¹⁶ Snowline rise and glacier shrinkage are already expected to impact tourism resources in the European Alps.¹⁷ The length of the snow season in the Alps started to decrease in the 1970s, although with substantial annual variations. Below 1,500 metres above sea level, total snowfall is also decreasing.¹⁸

With warmer temperatures, precipitation increasingly falls as rain instead of snow at lower altitudes (below 1,500 metres above sea level).

To remain profitable, existing resorts will need to invest in seasonal diversification which could involve creating spas, implementing snowmaking and grooming ski slopes to reduce snow depth requirements. Meanwhile, travel companies that have invested heavily in ski tourism will need to consider the resources required to maximise opportunities in new or previously underutilised locations.



An analysis of rising sea level risk to 720 UNESCO Cultural World Heritage sites projected that about **110 sites might be at risk under 2°C of warming.**



Last chance tourism

There is some evidence of the development of 'last chance to see' tourism markets where travellers visit destinations, such as environmental and cultural heritage sites, before they are substantially degraded by climate change impacts.¹⁹ For example, Antarctica has become more popular with tourists seeking to admire the glaciers. Small island nations threatened by the rise in sea levels are also attracting more tourists as are the Amazon rainforest and the Great Barrier Reef.²⁰

Existing tourist destinations are likely to be considered 'last chance' as threats from climate change increase. For example, an analysis of rising sea level risk to 720 UNESCO Cultural World Heritage sites projected that about 110 sites might be at risk under 2°C of warming.²¹ Rising sea levels represent the main threat for the survival of Venice, where 25 centimetres of relative sea level rise has already occurred over the last century.²² This has increased the flood frequency more than seven times causing severe damage to its heritage. The frequency of tides higher than 110 centimetres, (the value above which the gates would close the lagoon to the sea), is projected to increase from 4 times a year to between 20 and 250 times by the end of the century.²³

While last chance tourism will attract a premium, a business model built on providing tourists with these experiences is not sustainable. Businesses involved in last chance tourism need to consider putting back investment into local sites to sustain tourism for the longer term. Adjusting practices such as limiting the number of visitors or restricting travel routes will be key to maintaining tourist destinations for the long term.

How could climate change affect the vulnerability of coastal assets?



Ocean conditions

Changes to wind, wave height and storm intensity in some regions (e.g. high latitudes) will increase the vulnerability of ocean-based industries, risking loss and damages to shipping and coastal and offshore structures.²⁷ Adaptation options include limiting activities to particular times of the year or developing strategies to decrease vulnerability of structures and operations.²⁸ Changing conditions caused by climate change will also open up new trade routes and opportunities for international supply chains. For example, the decline of Arctic sea-ice coverage may extend seasonal accessibility to high-latitude shipping routes. By 2050, the frequency of navigable periods is projected to double for standard open water vessels, as routes across the central Arctic become available.²⁹

By 2050, the frequency of navigable periods in the Arctic Ocean is projected to double for standard open water vessels, as routes across the central Arctic become available.

The probability of a sea-ice-free Arctic Ocean during summer is substantially higher at 2°C of global warming than at 1.5°C. Model simulations suggest that at least one sea-ice-free Arctic summer is expected every 10 years for global warming of 2°C.³⁰ This may enable economically viable trans-Arctic shipping, with potentially shorter trade routes and decreased shipping times. For example, the northwest shipping route through the Arctic connects the Atlantic to the North Pacific and has potential to reduce the transport route between Europe and Asia by 10 days compared to alternative routes.³¹

A mean sea level rise of 0.25m is estimated by 2050 (likely range 0.19-0.32m).²⁴ Sea level rise will continue to occur to 2100 and well beyond.²⁵

This will affect the viability of existing shipping routes and ports, with serious implications for international supply chains. As a result, consumer businesses will need to invest heavily in adaptation in order to protect their businesses.

Shipping and ports have strategic importance and play a key role in international trade and supply chains.²⁶ Therefore, they will continue to be considered as critical infrastructure into the foreseeable future and their growth and operations will be prioritised for protection. With the cost of air freight likely to increase in all scenarios, including this one, shipping takes on an even more critical role.



Sea-level rise will increase **international flood losses to US\$60-63 billion per year in 2050** (compared to approximately US\$6 billion per year in 2005).



The vulnerability of ports and their strategic importance in international supply chains means that extreme regional weather events associated with global warming could interrupt the world economy.

Ports

Without increased adaptation, sea level rise associated with a 1.5°C or 2°C warming this century is expected to put at least 136 port cities with populations greater than 1 million at risk from flooding.³²

Extreme events, such as storms, are particularly hazardous for ports, and will likely become an increasing risk with climate change.³³ For example, when Hurricane Sandy hit the New York region it led to a week-long shut-down of one of the largest container ports in the USA.³⁴

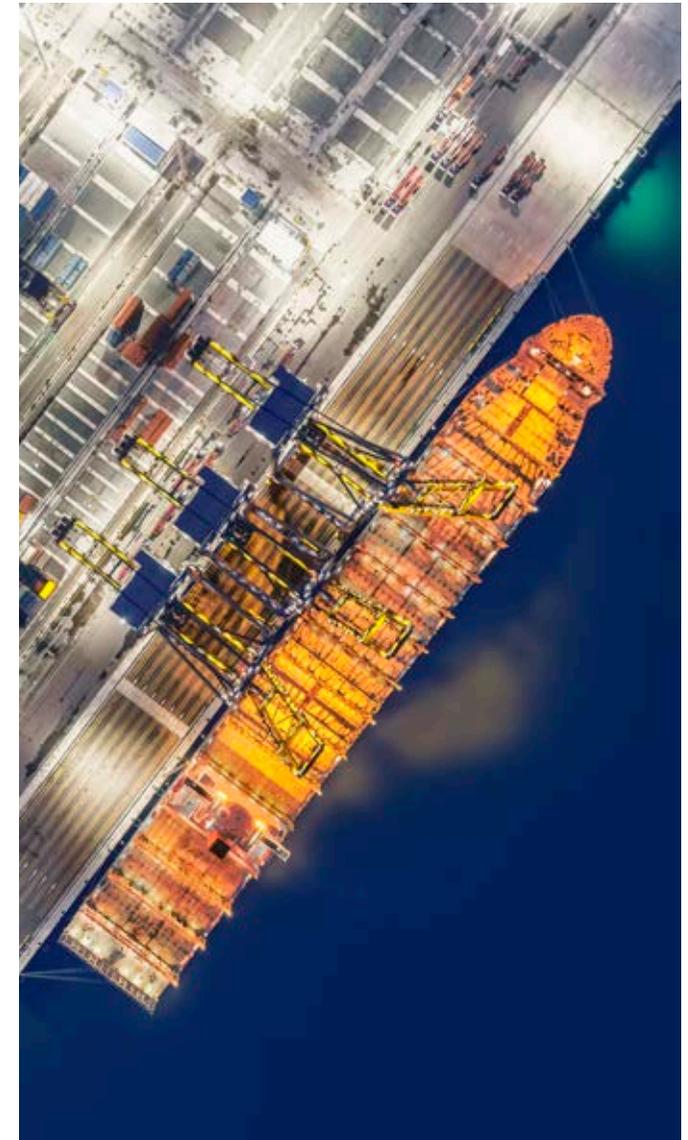
The vulnerability of ports and their strategic importance in international supply chains means that extreme regional weather events associated with global warming could interrupt the world economy. Manufacturers who rely on products from one regional area are heavily exposed to risk in this instance.

Advantages of adaptation

Adaptation has the potential to substantially reduce risk. For the 21st century, the benefits of protecting against increased coastal flooding and land loss due to submergence and erosion at the global scale are larger than the social and economic costs of inaction.³⁵

There is an expectation that governments will continue to invest in coastal flood defences, despite the sizeable capital expenditure required. However, even with large-scale adaptation investments, sea-level rise will increase international flood losses to US\$60–63 billion per year in 2050 (compared to approximately US\$6 billion per year in 2005).³⁶

Given the costs associated with adaptation, not all regions can be expected to make progress at the same rate. Therefore, there is an imperative for businesses to invest in their own forms of adaptation to protect their assets. This could include exploring the possibility of public-private-partnerships to co-fund coastal defences.



Sectoral implications under Scenario A

Retail



In the short term, physical retailers lose a disproportionate share of the market to dotcom retailers as consumers become increasingly focused on convenience.



By 2050, there is growing international consensus around the need to explore geoengineering as a potential solution. Grocers voice concerns around the potentially disastrous consequences of a failed geoengineering attempt on crop yields.

Consumer goods



UK fashion and luxury brands maximise their growth by focusing on the developing middle class in countries where economic growth is unabated. The heritage of UK brands makes them popular across the globe and the value of these companies grows accordingly.



Demand for meat and carbon heavy diets increases. In order to cope with this demand, regulations are eased and the sector becomes responsible for producing a disproportionate share of carbon emissions.

Automotive



Electric vehicles (EVs) continue to grow at a steady rate, due to strategic investments made in the 2020s.



Incumbent original equipment manufacturers (OEMs) dominate the market after investing heavily in manufacturing technology.



Economic growth opens up new geographical markets to premium and luxury brands.

Travel & Hospitality



Climate change affects the desirability of some regions and tourist destinations. Tourism companies that invested in fixed assets such as hotels and local infrastructure struggle to survive.



Rather than trying to reduce their emissions, travel companies pay increasingly high prices to offset their carbon footprint.

Scenario B: An unequal world



In this scenario

Climate: Global warming of 2.5°C above pre-industrial levels by 2100.

SSP4/RCP 4.5

Societal approach to climate: Delayed, disorderly transition to low carbon which results in widening inequalities.

Economy: Increasingly divergent outcomes at both a micro and macro level, facing permanent scarring due to disorderly transition.

Winners: Well-established global brands with the financial resilience to survive a disorderly transition.

Losers: Mass market brands with inefficient supply chains will see their fixed costs rising whilst demand from the 'squeezed middle' shrinks.

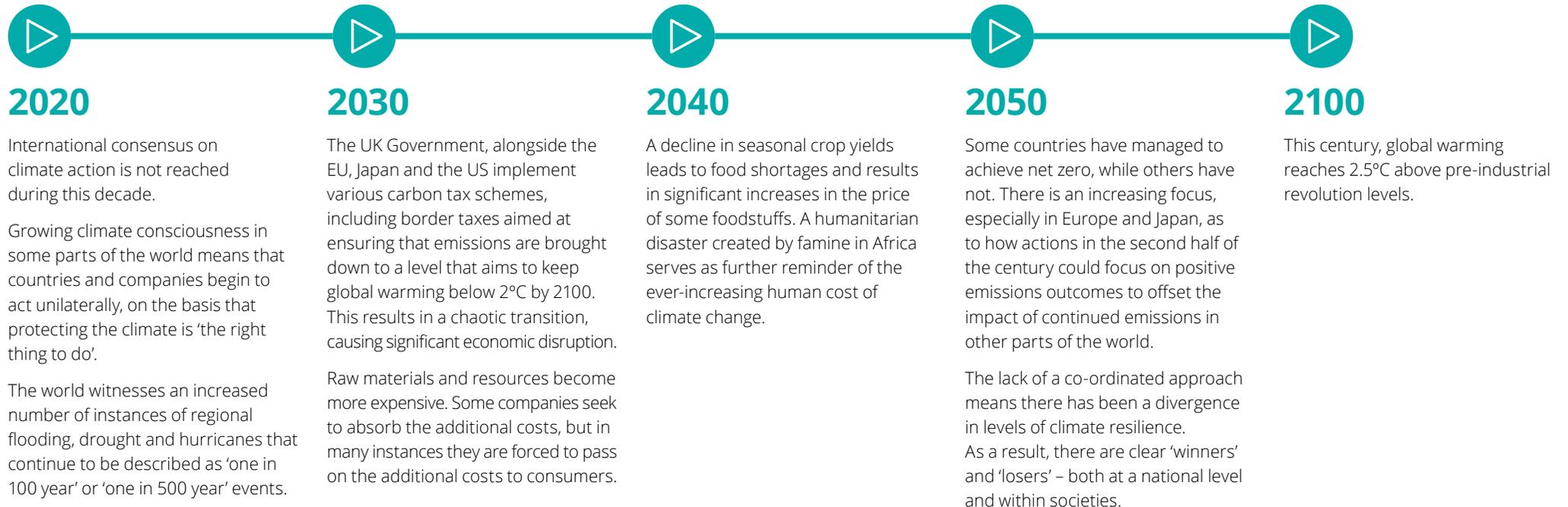


In this scenario governments fail to coordinate a response to climate change throughout the 2020s. As a result, individual nations, local authorities, companies, as well as individuals take it upon themselves to tackle climate change.

The major transition to a low carbon economy is delayed until the 2030s and takes place in a disorderly manner. The transition results in an economic shock and is painful for many companies and consumers.

This painful transition has significantly limited global warming and by 2100 it is anticipated that the world will have warmed by just over 2.5°C. In this world, there are global winners and losers.

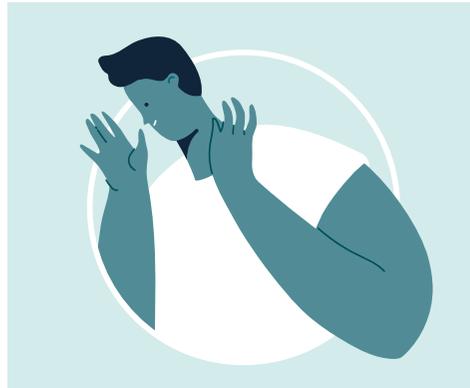
By 2050, wealthier nations and individuals have successfully transitioned to a low carbon world and additionally they are able to protect themselves from the adverse impacts of the changing climate. However, there are a disproportionate number of people in less developed countries who now face a more precarious future.



In focus: Consumer behaviour

- Those benefiting economically from the rapid decarbonisation during the 2030s promote a trend towards luxury and premium markets, including the emergence of numerous premium 'low-carbon' brands.
- However, by the mid 2030s, a number of these brands have fallen foul of 'greenwashing' scandals.
- By the late 2030s, there is a much greater emphasis on certified low-carbon products. Consumers within this premium market expect a high degree of transparency and information to make informed choices on the sustainable or green products and services they buy.
- The trend to luxury contrasts with a move towards necessity for the bottom 80 per cent of society. The effects of climate change and rapid decarbonisation have left this group of consumers (who exist in both higher and lower income economies) with less disposable income.

Our consumers under this scenario



Darren sees a sharp change in the price of a whole range of items; takeaways, ready meals and eating out with his son all become more expensive. Even his clothes cost more.

Darren's discretionary income plummets. Eating out and going on holiday now feel like luxuries Darren can no longer afford.

Even if Darren managed to save enough for a holiday, it certainly wouldn't involve getting on a plane – he has been completely priced out of the market.



Lori and Patrick's lifestyle becomes significantly more expensive. They are in the fortunate position to be able to fund it but make some adjustments anyway as they learn more about their impact on the world around them.

Lori is embarrassed to discover that her 100 per cent sustainable dress was not actually that sustainable at all. She never went back to the retailer who sold it to her and warned her friends off the brand.

Patrick, Lori and many of their friends become more engaged in philanthropic activities. They expect the brands who they spend their money with and the company they work for to do the same.



Grace becomes fully vegan. However, the switch is driven by economics as much as concern for the environment. The cost of meat is just too high.

Official certification and new technology make it easier for Grace to ensure she is buying sustainable products. She will only shop with brands that she believes have engaged with climate justice in an authentic manner.

While she travelled a little when she was younger, even more sustainable ways of getting abroad have become rare, because of the cost. When Grace does take a break, it's typically to one of the UK's increasingly-popular seaside resorts.

In focus:

How might supply chains evolve?

Supply chains



Throughout the 2020s and 2030s, supply chains remain global in nature – servicing demand primarily in higher and middle income economies and exploiting lower labour costs overseas.



Efficiency remains paramount. Improvements in technology such as AI, machine learning and predictive algorithms have resulted in ever more efficient (and decentralised) logistics networks.



By 2030, the public mood on the climate emergency has shifted in several high-income countries, leading to an overhaul of emissions trading schemes and carbon taxes that amounts to a comprehensive carbon tax covering all economic activity, including a tax at the border.



Because of delayed action, the price of carbon must be set at a higher price to achieve decarbonisation by 2050, than if decarbonisation had commenced in 2020. This creates a significant increase in the price of goods.



Companies now strive for accurate collection of emissions data within the supply chain – under the new regime companies that target emissions reductions throughout the supply chain can gain significant advantages on cost.



Many companies now engage with their suppliers on carbon to minimise bureaucracy at borders and reduce the carbon footprint of their products. Engagement ranges from more stringent carbon reporting requirements, through to assisting in the deployment of technology solutions to deliver lower-carbon operations. However, many companies have found that the new measures have made new supply chain options more attractive and are forced to switch suppliers to remain competitive.



Multinational companies are now forging longer-term partnerships with suppliers, to offer suppliers the confidence that they will realise a return on investment for lower-carbon production methods.

Carbon pricing: Sharing and bearing the cost of climate change in an unequal world



In the 'unequal world' scenario, a lack of coherent policy or action on climate change in the early part of this decade means that more drastic action is required in the late 2020s to manage decarbonisation and mitigate the most extreme impacts of climate change.

As a result, governments will likely begin to take decisive unilateral actions, relying on market-based policy mechanisms to drive change, either in the form of carbon taxes or emissions trading schemes.

While on aggregate, carbon pricing raises more from the wealthy groups in society, there is a risk that carbon pricing could proportionally weigh more heavily on households with lower incomes. This is because low-cost goods would be subject to greater proportional increases in price, further increasing inequality.³⁷

To illustrate the challenges that businesses will face in this scenario, we examine the impact of carbon pricing on two common, high-carbon consumer products: a hamburger and a long-haul flight. In both cases, carbon pricing has the potential to impact consumer habits dramatically and re-structure the financial landscape of entire sectors.

While on aggregate, carbon pricing raises more from the wealthy groups in society, there is a risk that carbon pricing could proportionally weigh more heavily on households with lower incomes. This is because low-cost goods would be subject to greater proportional increases in price, further increasing inequality.³⁷

The hamburger

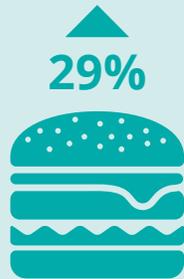
Beef is a well-known emission intensive food, with associated carbon emissions estimates ranging from 40 to 60 kilograms of CO₂e per kilogram of beef produced.³⁸ This is much higher than other food groups and means that high-carbon meats such as beef will likely be more acutely impacted by carbon pricing.

In this scenario, the impact of a carbon price differs depending on the cost of raw ingredients as a proportion of retail prices. As a result, the effect on the price of a shop-bought hamburger is much greater than on burgers bought from fast-food restaurants where overheads and staff costs make up a higher proportion of the overall price.

In 2030, with a 2°C-aligned carbon price of £75 per tCO₂e, a burger from a fast-food restaurant could experience a price rise of 12 per cent, in comparison the price of a shop bought burger could increase by 54 per cent.³⁹

By 2040, a rapid increase in 2°C aligned carbon prices will have resulted in these increases moving to 17 per cent and 74 per cent respectively. By 2050, a fast-food burger will likely have increased in price by 29 per cent and a shop bought burger by 127 per cent compared to 2020 inflation-adjusted prices.⁴⁰

By 2050, a fast-food burger will likely have **increased in price by 29%** under this scenario.



These price increases – particularly for products for home consumption – will likely further the existing shift towards ‘flexitarian’ diets with consumers choosing to eat meat at home less frequently or not at all, while purchases from fast-food chains may become a rare luxury for some less affluent consumers. As dietary preferences continue to change, both retail and restaurant chains, and particularly low-cost providers, will have to support consumers in managing their diets and budgets by rebalancing their product offerings to more affordable and attractive low-carbon options.



The long-haul flight

In 2018, 52 per cent of UK citizens took at least one international flight.⁴¹ This comes at a major cost to the environment, due to the carbon intensity associated with flying. Evidence suggests that flying – particularly long-haul – is price elastic meaning that any carbon pricing mechanism that increases the cost of airline tickets will negatively impact demand.⁴² With airline margins low, maintaining seat occupancy levels through demand has been crucial to profitability.

Flights departing from the UK are already subject to air passenger duty (APD), which although introduced as an excise tax is now viewed by many as a proxy carbon tax. Assuming that a carbon pricing mechanism on aviation would either replace or be an extension of APD, we assessed the impact of increasing the APD value to a 2°C-aligned carbon price on the cost of a one way flight from London to Los Angeles. The economy class flight costs £350 and emits 1.3 tCO₂e.⁴³

Replacing APD with a 2°C carbon price would result in the tax increasing from £80 to £104 by 2030 (adjusted for inflation), leading to an increase in the ticket price of seven per cent.⁴⁴

However, due to the current carbon intensity of flying, increasing carbon prices post-2030 would lead to ticket price increases of 19 per cent and 48 per cent by 2040 and 2050, respectively.⁴⁵

For airlines and the wider aviation sector, this should serve as a wake-up call. While price elasticity is generally not considered large enough for a seven per cent increase in inflation-adjusted prices to impact demand significantly, large price increases in the following two decades will in all likelihood be more damaging, particularly to low-cost carriers where taxes already make up a large share of many fares.

Under this scenario, the price of economy tickets for a return flight from London to Los Angeles would **increase by 48%** by 2050.



Sectoral implications under Scenario B

Retail



The growing disparity in wealth means that we are witness to a bifurcation of the retail market. In parallel there is both a race to the top and the bottom. Some retailers thrive on providing luxury goods which charge a premium, but generally, brands which focus on necessity – providing more for less – thrive.

Consumer goods



Raw materials and resources become increasingly expensive. Consumer goods companies have an economic incentive to reduce their usage, but not all companies are adaptable enough to survive the added costs to their business.



Those consumers benefiting economically from the rapid decarbonisation of the economy during the 2030s increasingly gravitate towards luxury and premium markets. Consumer goods companies recognise this trend and cater to it accordingly.

Automotive



There is growth at both the luxury and low cost ends of the market, but mainstream brands suffer as the 'squeezed middle' reconsider major purchases and their impact on the environment.



Global companies must come to terms with different local laws and legislation targeting the emissions that their vehicles produce.



Supply chains remain global in nature, but manufacturers invest heavily in technology to drive efficiency.

Travel & Hospitality



Travel and leisure activities seen to be 'sustainable' or 'low carbon' attract a price premium. This luxury market serves elites who are highly educated and therefore expect a high degree of transparency and information in order to make informed choices on the sustainable or green products and services they choose to buy.



Today's fixed assets – such as hotels – are at risk of becoming stranded assets in regions that are disproportionately negatively affected by climate change.



Travel companies invest heavily in gaining access to certain desirable locations. Cruise ships are known to dock on private islands. The only access locals have to this land is if they are lucky enough to secure a job with the company.

Scenario C: Regional rivalry



In this scenario

Climate: Global warming of 2.8°C above pre-industrial levels by 2100.

SSP3/RCP 6.0

Societal approach to climate: Failure to reduce emissions, with nations and regions focusing individual efforts on protecting their own populations from a changing climate (*as opposed to reducing human-induced climate change*).

Economy: Economic growth significantly hampered by the catastrophic effects of a changing climate.

Winners: Well-established regional brands with the financial resilience to survive a disorderly transition.

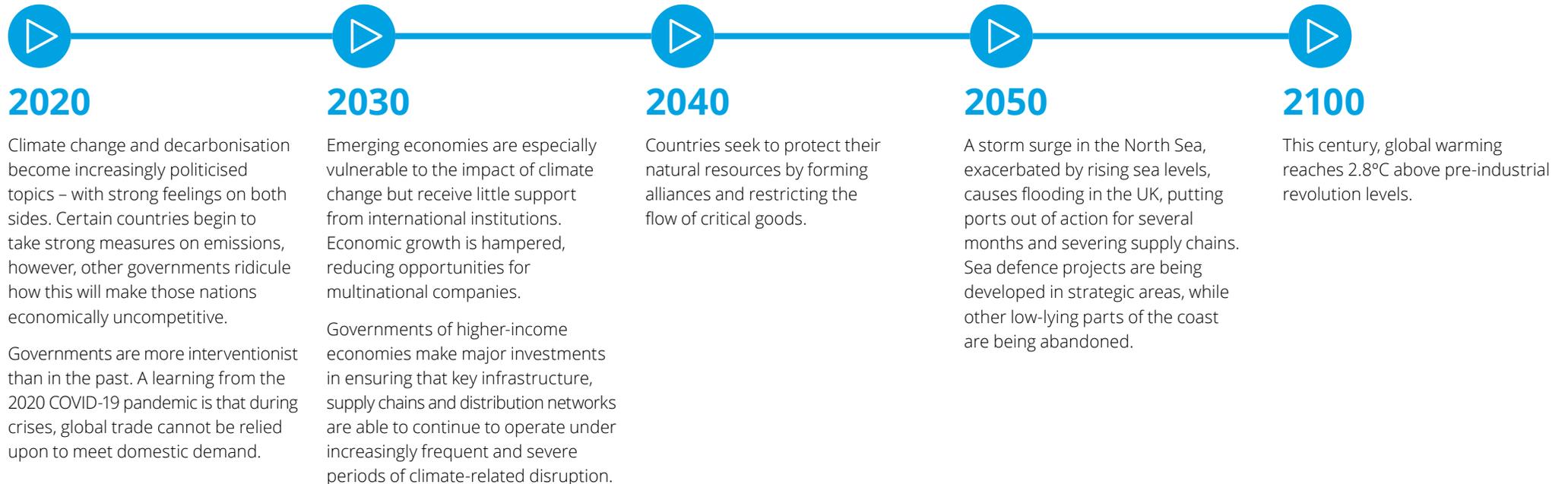
Losers: Global companies with complex supply chains that are unable to manage the increasingly complex regulations in different countries.

Under this scenario, the world is characterised by tribalism. Growing rivalry between large industrial powers trying to maintain relative economic competitiveness serves to undermine climate talks throughout the 2020s.

Protectionist policies that create trade barriers and restrict technology and knowledge transfer prevail, limiting the movement of people and goods. Governments, aware of increasingly scarce resources, compete for access to cheap and stable energy resources, along with other commodities.

By the 2030s, it is apparent to many national governments that they will need to respond to climate change. However, concerns about international competitiveness and security mean that national responses are, in the main, focused on adaptation rather than mitigation.

This means that by 2050, the world is on a trajectory of global warming of around 3°C by the end of the century. Climate change responses are disparate, reactive, and focused on localised infrastructure projects rather than abatement.



In focus: Consumer behaviour

- Throughout the 2020s and 2030s, stagnant economic growth erodes disposable income and reduces consumer confidence.
- This loss of confidence is compounded by the increasing frequency of climate-related extreme weather events and higher levels of political unrest. As a result, overall consumer demand for international travel is reduced.
- From the late 2020s through to the mid-2030s, national identity grows in importance. Consumers aim to support national brands and as such, companies work hard to reestablish the regional and national brand identities that cater to this demand.
- Higher levels of business disruption, and the increasing shortages of some essential goods, result in a slight uptick in panic buying across a range of consumer goods. They also lead to a decline in consumer confidence and lower spending on non-essentials, which has a disproportionate impact on the travel and leisure industry.

Our consumers under this scenario



When Darren visits the supermarket, or goes shopping for clothes, there's less choice than there was before. Unlike some other shoppers, Darren doesn't mind; he is happy with a standard set of choices that feel familiar and safe to him.

Darren thinks that the best way for us to adapt to the consequences of climate change, and the uncertainty it brings, is to stick together as a nation. He's therefore loyal to brands which are seen to be working in the national interest. As a result, he buys his next car because of where it is built.

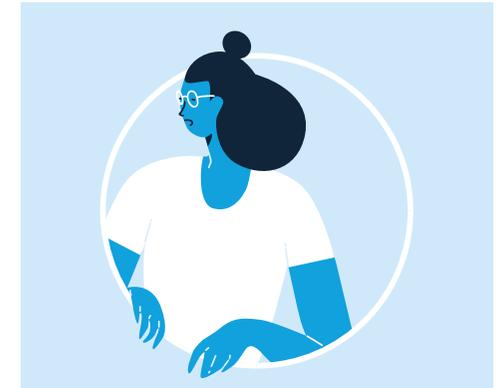
Holidays abroad are no longer on Darren's agenda. Instead, he makes the most of the hotter UK summers by planning 'staycations'.



Lori and Patrick's law firm no longer has a global client base. Many of the clients they have serviced for years now want work delivered by people closer to home, who understand what's going on in their part of the world.

Despite losing clients overseas, Lori and Patrick still fly abroad for holidays as often as they can. However they sense that their days of international travel are over. They feel that only certain parts of the world are now safe to travel to.

Lori is forced to stop looking overseas for luxury and focuses on buying high quality products made in the UK.



Grace and her partner do not have a positive outlook for the future. Their concern about climate change is a leading factor in their decision not to start a family.

Grace notices that there is less choice at an affordable price point when she goes shopping. To get everything she used to buy in a weekly grocery shop, she now has to visit multiple retailers and be prepared to pay significantly over the odds.

Grace continues to enjoy success in her career, but notices a significant shift in tone across the advertising industry. A lot of her consumer packaged goods and retail clients want to emphasise their national identity over everything else.

In focus:

How might supply chains evolve?

Supply chains



The growing emphasis on national resilience undermines the just-in-time model.



International trade continues to be prevalent, however there is a growing divide between competing economies.



The heightened risk of business disruption arising from climate change makes international supply chains more vulnerable. This helps drive a trend towards supply chains focusing on a more limited range of jurisdictions.



However, within these jurisdictions, supply chains become increasingly localised and diversified.



In the 2040s, there are a series of poor crop yields around the world. Supply chains that were previously considered reliable collapse as resources are diverted to serve the national interest of the producer country.



From the late 2030s, there is increasing political unrest in areas facing acute climate pressures. As a result, companies are more reliant on private security forces as well as government security forces to protect their operations and supply chains.

How could climate-induced water scarcity affect the consumer industry?



About 80 per cent of the world's population already suffers from serious threats to their water security, as measured by indicators including water availability, water demand and pollution.⁴⁶

An estimated **net increase of 185 million people** will be exposed to increased water resources stress by 2050.



Climate change is projected to reduce renewable surface water and groundwater resources in most dry subtropical regions, as well as increase the frequency of droughts in currently dry regions.⁴⁷ As a result, an estimated net increase of 185 million people will be exposed to increased water resources stress by 2050.⁴⁸

Industrial water use accounts for about **20% of total worldwide water use.**



In areas affected by water scarcity, there will be increased competition for water between agriculture, industry, energy production and the general needs of the population.⁴⁹ This competition will have a major impact on consumer businesses, affecting the cost and viability of international supply chains. The approach that consumer businesses take to water scarcity will also become a major factor in the ethical credentials of a brand and could influence consumer choices at the point of purchase. Indeed, whole industries face a threat to their existence if they do not meet this challenge in an appropriate, ethical way.

The approach that consumer businesses take to water scarcity will also become a major factor in the ethical credentials of a brand and could influence consumer choices at the point of purchase.

Water scarcity and the impact on manufacturing

Industrial water use accounts for about 20 per cent of total worldwide water use.⁵⁰ This includes water used for fabricating, processing, washing, diluting, cooling, or for cleaning. The production of paper, plastics, chemicals, refined petroleum, and primary metals involve large amounts of water.⁵¹

In future, water supplies may not be able to meet industrial demands, which may affect the feasibility of having certain industries in certain locations. Manufacturers will likely need to reassess and adapt their future industrial activities so that they are more resilient to water resource stress. A key consideration for manufacturers will be the suitability of factory locations.

Water scarcity and the impact on agriculture and commodity crops

Agriculture currently accounts for about 70 per cent of total worldwide water use.⁵² Climate change adds further pressure on water resources and exacerbates human water demands by increasing temperatures over agricultural lands.⁵³ Many regions, especially at low latitudes, are projected to experience climate change-induced reductions in crop yields.⁵⁴ As a result, global food prices could increase by up to 84 per cent by 2050.⁵⁵

Under this scenario, water scarcity will also have a major impact on food security. The production of certain crops may not be viable which will influence supply of certain foods for local or international markets. The impact of climate change on food security can be reduced through adaptation measures such as appropriate investment, making farmers more aware of new technologies for maintaining yields, and developing strategies and policies to encourage sustainable agricultural choices.⁵⁶

Cotton and the fashion industry

Water-intensive crops such as cotton are at risk from climate change and increased water scarcity.⁵⁷ Cotton is an extremely thirsty crop, with 2.6 per cent of freshwater worldwide used in its production.⁵⁸ One kilogram of cotton – the amount needed to make one t-shirt and one pair of jeans – requires up to 22,500 litres of water.⁵⁹

Cotton is grown in warm countries, some of which already have freshwater shortages. Under the 'regional rivalry' scenario, these countries will be at risk of increased water scarcity in the future, meaning that businesses wanting to buy cotton will experience a reduction in its availability and increased prices.⁶⁰

We are already seeing an increase in consumer perception and awareness of environmental and social issues relating to clothing production. In any future scenario, mounting consumer pressure on fashion retailers to be more environmentally and socially conscious would force them to be more transparent about the impact their use of cotton is having on the environment and regional freshwater sources. If this pressure were to count, fast fashion would likely suffer disproportionately compared to the rest of the industry. Fast fashion currently encourages a high volume of buying and discarding clothes meaning that the sector puts an undue strain on water resources. In fact, fast fashion faces becoming economically unsustainable as water scarcity makes it impossible to produce cheap clothing at scale and consumers shun environmentally dubious practices.



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Sectoral implications under Scenario C

Retail



Retailers are forced to reduce their ranges. Grocers are forced to stock local and regional food products only. This means that consumers have to get used to buying what is in season.



Higher levels of business disruption, and the resulting frequency of shortages of some essential goods, result in a slight uptick in panic buying of a range of consumer goods. The majority of retailers have resilience built into their supply chains in order to cope with this demand, but even the most resilient companies sometimes suffer unexpected shocks to their systems.

Consumer goods



There is a re-emergence of brands closely associated with national and regional identities.



Global consumer goods companies are forced to carve up their businesses as their ability to operate in certain countries is increasingly constrained by legislation.



Certain products that rely on raw materials only found in specific regions become consigned to the history books as consumers adapt to a new way of life.

Automotive



Countries with a strong history of automotive production experience a resurgence in national pride, driving domestic sales.



Divergence of rules and regulations across economic blocs forces manufacturers to localise their supply chains.



Governments financially support the interests of their automotive industries in order to protect jobs and stimulate the economy.



It becomes increasingly difficult to ethically source the cobalt needed for EV batteries. Manufacturers are forced to pass on the additional costs to the consumer.

Travel & Hospitality



Consumers become dismayed by the increasing restrictions placed on their travel. Not only are costs rising, but some countries that were 'hot-spots' in the past are designated no-go zones due to civil unrest.



Low levels of consumer confidence hit the travel and hospitality sectors hard. Consumers increasingly limit their discretionary spend. In-home entertainment thrives as bigger-ticket leisure activities such as holidays and even eating out become harder for consumers to justify.

Scenario D: Steady path to sustainability



In this scenario

Climate: Global warming limited to below 1.5°C above pre-industrial levels by 2100.

SSP1/RCP 2.6

Societal approach to climate: Globally co-ordinated efforts to reduce emissions to net zero by 2050 and avert the worst effects of climate change.

Economy: The world makes a gradual but continual shift away from only valuing economic growth towards a wider sense of prosperity and well-being.

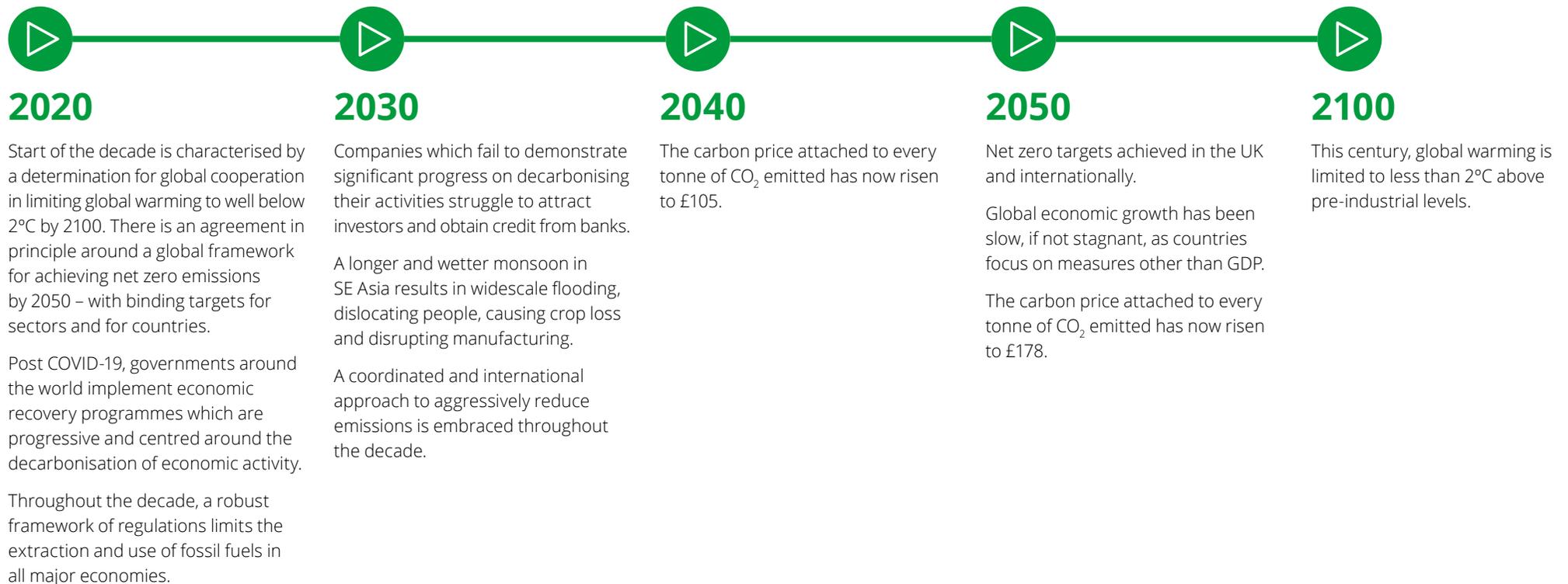
Winners: Brands associated with sustainability who can actively prove their low-carbon credentials.

Losers: Companies which fail to demonstrate significant progress on decarbonising their activities. These companies will struggle to attract investors and obtain credit from banks.

Under this scenario, the world makes a gradual but continual shift away from only valuing economic growth towards a wider sense of prosperity and well-being. Consumer behaviour changes dramatically to reflect this change in values – consumerism and the “throw-away culture” of the early 21st Century decline significantly.

Awareness of the urgency of decarbonisation is high, and there is broad support for measures to decarbonise, even if this comes at the expense of traditionally defined economic welfare.

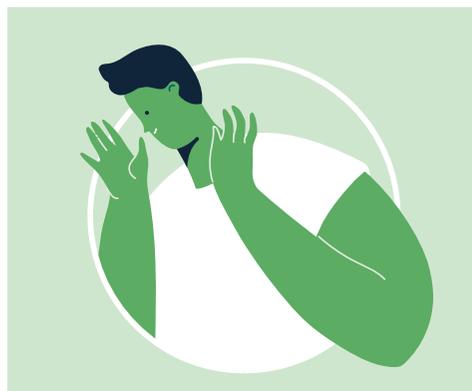
By 2050, the world is on track to limit global warming to well below 2°C above pre industrial levels, in line with the commitments made under the 2015 Paris Climate Agreement. While some climate change has occurred, the dangerous consequences of higher levels of warming have been avoided.



In focus: Consumer behaviour

- By the 2030s, mass consumption is viewed as excessive and selfish. Quality and durability matter far more to consumers. Products are designed to last and from 2025, circularity and reuse move into the mainstream.
- Far more people are vegan, vegetarian or flexitarian. While meat is still available, it is more costly. Supermarkets now stock significantly expanded plant-based ranges and proactively direct customers to 'climate smart' purchases.
- This scenario sees the rise of the 'sharing economy.' This is not limited to big-ticket items such as cars, but also other items such as clothes and general merchandise.
- 'Flight-shame' became a phenomenon in the 2020s. Long-distance travel takes more time – however new experiences have opened up around longer journeys.
- A more holistic understanding of prosperity means that consumers have a greater amount of leisure time, directed to services and experiences.

Our consumers under this scenario



Darren retrains to maintain EV infrastructure and he earns more than he used to. He's one of a new generation of green economy workers.

Darren's ready meals and his son's burgers now feature low carbon, lab-grown meat; Darren doesn't notice the difference.

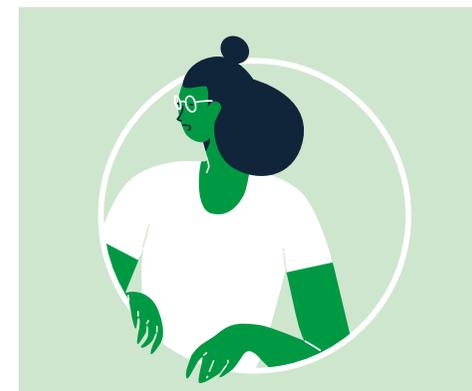
When Darren wants to see his family in Spain, he's able to take advantage of affordable, high speed rail network which connects with other modes of public transport. Travelling this way is now the norm.



Lori and Patrick reduce consumption and focus on well-being ahead of possessions. When they do buy things, they are happy to pay a big premium to reflect the true cost of the goods.

The law firm that Lori and Patrick work for dramatically reduces the number of flights their staff take per year and regular work trips become a thing of the past. Rather than hopping on a jet for a quick weekend getaway, they now spend extended periods travelling, blending work and holiday.

Lori has ditched the SUV. Not only was it expensive, but all her friends are more impressed by her fashionable new EV anyway.



Grace goes fully vegan. Although she went through a phase of being a purist about eating unprocessed plant-based foods, she is happy to relapse when she fancies the equivalent of her bacon sandwich.

Grace never buys a car, and reduces her spend on clothes. Instead, she uses an on-demand car service, which always has a car nearby, and signs up to a subscription site which allows her to rent clothes for special occasions.

Grace and her partner have two kids: the eldest loves food and works in agritech by 2050; the youngest graduated from a mechanical engineering course at university and works for a world leader in new, low carbon transport materials.

In focus:

How might supply chains evolve?

Supply chains



Worldwide agreements for enforcing strict emissions reductions targets on international aviation and shipping serve to make long, complex supply chains less competitive.



Businesses adjust to a raft of new global environmental regulation, helping to establish an international playing field, but also leading to increased costs.



Businesses and public bodies collaborate to discover innovative new methods for producing more from less.



Shipping of products by air is tightly controlled – not only must these goods now be supplied by ships, under new global regulations, ships are required to slow-steam in order to reduce their carbon footprint.



Crop prices are subject to greater fluctuation – while average crop yields are no longer anticipated to decline in the second half of the century, the frequency and severity of flooding, drought and storms has still increased, due to the emissions of the early 21st Century.



Overall the cost of raw materials has increased, as some countries turn to biofuels as a lower carbon fuel. Rewilding and afforestation initiatives needed to capture carbon have also increased competition for land.



Shorter supply chains, with lower associated carbon emissions, reshape local economies and, in some instances, reinvigorate communities.

How could more frequent and severe heatwaves impact retail demand?



When COVID-19 emerged as a threat to the UK population, a combination of panic buying and stockpiling by consumers put a major strain on retail supply chains. The empty shelves were a stark reminder about the vulnerability of a 'just-in-time' retail supply chain designed to cope with continuous, predictable levels of demand.

A 'steady path to sustainability' scenario offers the greatest hope that there will be a coordinated international effort to mitigate the impact of climate change. However, in spite of the actions that are taken to prevent further damage, our previous actions mean that there is a greater chance of hotter, drier summers in the UK, with an increase in the likelihood of extreme weather conditions, such as heatwaves.⁶¹ As climate change increases the chance of extreme weather events, the likelihood of further shocks to the system grows.

Indeed, not only are heatwaves expected to become more common, they are also expected to be more severe and longer lasting.⁶² Retailers will need to address this by building increased resilience into their supply chains and adapting to changes in the volume and timing of consumer demand for different products.

Heatwaves to become more common in the UK

A heatwave is widely understood to describe sequences of unusually hot weather. A heatwave definition adapted for the UK climate describes a heatwave as at least three consecutive days in which the daily maximum temperature exceeds a threshold defined for recognised UK counties ranging between 25°C and 28°C, which are based on local climatological conditions.⁶³

Throughout the summer of 2018 the UK experienced a heatwave which was the joint hottest on record and regularly experienced spells of daily maximum temperatures in the low- to mid-30s °C. Anthropogenic climate change significantly increased the risk of a 2018 summer temperature anomaly; a 2018 Met Office study showed that heatwaves of this magnitude are now 30 times more likely than in 1750.⁶⁴

Even within the 'steady path to sustainability' scenario, hot summers are expected to become more common. With future warming, by 2050 there is a chance that the UK will experience a heatwave of equivalent magnitude to the 2018 event every other summer.⁶⁵ The heatwave season is projected to expand from July through August in the present-day climate to May through September by 2050.⁶⁶

We also expect to see regional differences in heatwave activities across the UK. For example, there is a difference in the projected changes in summer temperatures between the north and south of the UK, with greater increases in maximum summer temperatures over the south, which already experiences the highest summer temperatures in the UK.⁶⁷

In addition, different behaviours between the west and east of the UK are suggested, with western areas seeing an increase in the number of heatwaves and eastern areas seeing the lengths of the heatwaves increase, with very long heatwaves of 20 days+ projected.⁶⁸ Urban development and increasing population density will exacerbate the risks of increasing intensity and duration of hot spells for those living in urban areas.⁶⁹

Heatwaves and their effect on UK retail

Food sales are responsive to both current and forecasted weather. Sales of certain food items spike with hot weather, most noticeably on the first hot weekend of the year when people buy BBQ foods and ice cream, for example. Sales of these items then decrease to normal levels after the hot weekend. Under the 'steady path to sustainability' scenario, the same trend would likely be seen at the start of a heatwave, but the return to normal sales will likely be more gradual as the hot weather is sustained for a longer period.

In contrast, non-food retail sales are not often as directly responsive to the weather. However, a warmer than average summer will increase sales of non-food summer goods, on a seasonal rather than responsive scale.

With the heatwave season projected to expand to May through September by 2050, the influence of heatwaves at the extremities of the summer season may influence sales which respond to the change in seasons.⁷⁰ If temperatures are warmer than the previous year, clothing and footwear see increased sales between March and mid-June, and decreased sales for mid-August to early October.⁷¹

As UK consumers become used to hotter summers, it is also likely that their behaviour will adjust to reflect the new way of living. For example, more houses could be built with air conditioning units in place, and barbecues could become as commonplace as they are in countries like Australia.

For both food and non-food, a 'steady path to sustainability' scenario sees the share of online sales increase during heatwaves. This is because the increased intensity of heatwaves in the UK makes going outside uncomfortable for some and potentially dangerous for others. As a result, consumers will likely rely on home deliveries during such times.

Retailers need to adapt to the UK's changing climate

As heatwaves become more commonplace and increase in intensity across the UK, retailers will need to build more resilience into their supply chains to cope with unexpected growth in demand for certain weather-affected products. The most common way retailers will do this is through increasing their use of advanced data analytics and collaboration with climate experts to improve their forecasting and planning.

In the 'steady path to sustainability' scenario, post COVID-19, many retailers would be better able to cope with the shocks that heatwaves cause to demand as the experience has sharpened the focus on resilience. Retailers are also better equipped to respond to changes in where and how consumers shop as the pandemic ultimately leads to increased investment in online logistics and delivery infrastructure to reflect changes in consumer behaviour. Retailers also make better use of day to day weather data, finding that it provides an immediate return on investment compared to some other adaptation strategies.

A 'steady path to sustainability' scenario offers the greatest hope that there will be a coordinated international effort to mitigate the impact of climate change.



How will climate change force systemic changes in the automotive sector?



To achieve the target of net zero by 2050, the UK needs to tackle emissions from across the transport industry. Transport is now the highest emitting sector in the UK and contributes 23 per cent of all global energy-related greenhouse gas emissions.⁷²

Despite manufacturers successfully reducing the average CO₂ emissions per car since 2000 (-31.2 per cent), a recent shift from diesel towards petrol has seen the average CO₂ emissions for newly registered cars in the UK actually rise in the last two years.⁷³ To reverse a trend that is being seen across Europe, the European Federation for Transport and Environment recently advised that governments need to ensure that more electric vehicles (EVs) are sold than required by the EU CO₂ regulation.⁷⁴

The UK government has responded by proposing a total ban on the sale of diesel, petrol and hybrid new cars by 2035, pledging £500 million towards the roll out of a rapid charging network and providing additional funds to extend the existing plug-in grant and the new benefit-in-kind tax scheme, which supports the use of EVs as a company car.

EVs are already driving change in the sector

Although EVs only command a small share of the total car market, preparations for their growth are forcing original equipment manufacturers (OEMs) to make major changes to their supply chains.

While the manufacture of EVs requires fewer mechanical parts, it does require a large number of new electric and electronic components, and a battery – the most expensive part of the vehicle. Battery packs are difficult and costly to transport, necessitating their production (and the prior cell production) close to vehicle assembly. However, today the bulk of cell production is located in Asia. As a result, OEMs will either rely on Asian batteries or invest heavily in bringing battery cell production closer to home, with additional costs incurred as a result of punitive carbon taxes.

Transport is responsible for the emission of **23% of greenhouse gas emissions globally.**



Battery packs also pose a challenge at the end of their life. While some organisations will be able to absorb the costs, the majority of manufacturers will have to consider creating partnerships to give battery packs a 'second life' in the form of industrial on/off grid energy storage or domestic powerwall energy storage.

The UK government has proposed a **total ban on the sale of new diesel, petrol and hybrid cars** by 2035.





Electric Vehicles will only grow in prominence

Under the 'steady path to sustainability' scenario we would expect to see the focus on EVs increase as the positive environmental impact of zero-emission vehicles makes their widespread adoption a necessary step towards achieving the UK's climate change goals.

The market share of pure EVs increases steadily over the next decade and, as manufacturers continue to release new, more advanced models, consumers' fears over range and cost are consigned to history. Also under this scenario, investment in charging infrastructure supports mass adoption and city centre restrictions put in place after COVID-19 are modified to encourage the use of zero-emission vehicles.

Shared mobility will reduce the size of the sector

Beyond 2030, EVs' share of the total market grows dramatically in the UK as government and consumers increasingly scrutinise the sustainability of the OEMs' manufacturing process and recognise that the greenest mile is no mile at all. Stricter city access restrictions accelerate the already burgeoning market for 'micro-mobility' solutions. Shared mobility solutions gain in popularity as owning one car, let alone two or more, is no longer a priority for a whole generation of consumers. Consumers that do own a car are eager to use technology such as over-the-air software updates to extend the life of the vehicle. As a result, EVs and other alternatively fuelled vehicles (i.e. hydrogen) are becoming the only viable option for drivers.

More change will be thrust upon the sector

At the same time that suppliers are exposed to changes in the supply chain, OEMs face downward pressure on revenue. For example, OEMs currently make close to a quarter of their total profit through aftersales. But this figure is likely to be reduced in the 'steady path to sustainability' scenario as EVs grow their market share dramatically and at pace. EVs have fewer moving parts and serviceable items, meaning that the revenue generated through parts sales or per unit servicing is less than for a petrol or diesel equivalent.

Within this scenario, market forces, regulatory pressure and changing consumer behaviour associated with climate issues will force the automotive industry to undergo systemic change. The decline in car ownership, the growth of EVs and the rise of alternative mobility schemes will pose an existential risk to incumbent OEMs and their suppliers. Some well-known brands will likely cease to exist and others will be relegated to the role of 'white label' suppliers. Those that continue to operate will do so under much changed conditions. The industry will face increased consolidation as companies form partnerships to share the cost of developing technology and business models will change fundamentally as organisations are forced to seek alternative revenue streams.

Sectoral implications under Scenario D

Retail



Retailers experiment with low-carbon delivery technology. This evolves from initial investments in electric trucks to the eventual use of drones and autonomous vehicles.



Retailers demand the highest levels of low-carbon compliance from their supply chain. Grocery retailers will not hesitate to fine or end their relationship with a producer if they are found to be in breach of certain criteria around carbon emissions.



Resilient brands continue to engage people through services as well as products.



Major retailers actively reduce their store footprints. Any new retail parks or stores are designed with sustainability in mind. This means more renewable energy.

Consumer goods



Food and clothing carry the equivalent of a 'kite mark' guaranteeing their green credentials to consumers. Food miles are significantly reduced.



Direct to consumer business models flourish as subscription and rental services become increasingly prominent, offering consumers an environmentally friendly alternative to buying products outright.



Fast-fashion almost completely disappears. A number of well known brands fail to adapt to changing consumer demands and ultimately go out of business.



Meat becomes less and less desirable to consumers. Some lab-grown meats prove successful, but companies increasingly focus on improving their plant-based offering.

Automotive



The rate of adoption of EVs increases across all major markets.



The total number of cars sold decreases significantly as consumers adopt shared mobility to reduce their impact on the environment.



The costs of global supply chains become unsustainable, forcing consolidation and an increase in partnerships across the industry.



OEMs diversify their businesses in order to protect against changing profitability levels in their core business.

Travel & Hospitality



Consumers demand experiences that include a shared sense of purpose. As a result, eco-tourism focused on helping regions adversely affected by extreme weather events becomes more commonplace. Certification and eco-labeling programs gain popularity and are seen as the only way to attract and retain consumers.



'Slow tourism' gains popularity. In an attempt to reduce the number of flights they take, consumers take longer breaks and often blend holidays and work together.



'Flight shame' becomes a dominant factor in the travel industry. Local and regional holidays are prioritised over long-haul flights. This results in major restructuring and consolidation of the aviation industry. It also means that destinations previously over-reliant on tourism must diversify their economies.

What organisations need to do next

Getting ahead with climate scenario analysis



Even the most basic scenario analysis exercise is typically illuminating, showing how risks change and opportunities shift in different versions of the future.

Getting ahead with climate scenario analysis

As set out throughout this report, climate change will have a fundamental, permanent and transformational impact on the consumer business sector. Here we share how scenario analysis can help you to get ahead of this impact, and share some guidance for businesses wanting to step up on climate risk and strategy.

Scenario analysis in practice

Even the most basic scenario analysis exercise is typically illuminating, showing how risks change and opportunities shift in different versions of the future. However, more complete, quantitative forms of scenario analysis can help organisations to test the resilience of their business model and strategy, and gain a fuller appreciation of the ways in which they may need to prepare for the future. Some of the more significant benefits are shown in the box (right).

How climate scenario analysis benefits business

- **Fuller assessment of value at risk and future valuation:** scenario analysis can help to pinpoint how climate change could affect revenue and costs going forward, and ultimately help challenge long-held assumptions of future value.
- **More informed strategic decisions and investments:** working out how and where to grow your organisation becomes simpler with the enhanced insights offered by climate scenario analysis.
- **Clearer understanding of future business model:** for consumer businesses, climate change represents significant supply chain risk; scenario analysis can help to pinpoint weak spots and prompt decisions about overall resilience.
- **Drives efficiency and innovation:** by thinking about the potential cost of carbon taxes (likely in more sustainable scenarios), it's easier to take decisions about low-carbon investments, and to explore ways to do business in a smarter way.
- **Enhances stakeholder engagement:** understanding how climate change could affect your organisation can prompt changes in your approach to marketing and communications, from advocacy to advertising.



Six tips to get started

Scenario analysis can feel like an unusual or uncomfortable process for business: it means looking to longer time frames than usual, applying more diverse frames for decision making, and embracing uncertainty. Here are our six tips for companies looking to get started:

- 1. Get creative.** Scenario analysis is a creative, exploratory process. Start with a basis of published reference scenarios, such as the ones in this publication, and run a workshop to explore what they could mean for your business, industry and market. Keep it plausible, but don't be afraid to play.
- 2. Engage across your business.** Bring together a wide range of voices and experiences to build your scenarios. What looks like a risk to some could be an opportunity for others.
- 3. Don't be afraid of tradeoffs.** Scenario analysis is most valuable when used to balance the tradeoffs that will always be necessary to remain resilient to change. Be open to both the pros and the cons that will materialise in each world your scenario analysis explores. Think about nuanced, challenging worlds, not just the best or worst case, to help you weigh the benefits.
- 4. Start simple.** You don't need to quantify every outcome to gain the value of exploring each world. Start with qualitative discussions and build your climate competency over time. By basing your analysis on available reference scenarios you'll stay close to the science and climate data for when you're ready to use it.

5. Iterate. Integrating scenario analysis and climate resilience into your existing strategic decision making process doesn't have to happen all at once. Plan to learn from the process and keep what works, and change what doesn't fit your model.

6. Share your thinking. Scenario analysis has a rich history and many leaders in the field share their work. Open disclosure is doubly effective – it's a clear line of communication to your external stakeholders that you are in it for the long term, and it's a fantastic way to get feedback on improving for your next iteration.

The regulatory drivers for scenario analysis

Undertaking business-specific climate scenario analysis is one of the 11 recommendations included in the TCFD recommendations – recommendations that are designed to connect climate risk with strategic planning and financial value. TCFD-aligned disclosure is increasingly requested by investors, and is set to become a legal requirement for premium-listed UK businesses from 2021. All companies however, stand to benefit from adopting the 11 recommendations, regardless of their status.

Corporate climate action: how your business can step up

Scenario analysis is just one of many things we encourage businesses to consider when it comes to accelerating the transition to a more sustainable, low-carbon economy. Beyond applying the principles set out in this guide, we typically recommend that clients take the following steps:

Apply the existing tools, free up energy to innovate

There is plenty of good advice already in circulation on how to measure your impact, understand risk, and introduce better governance on climate change. In applying this guidance, you'll gain confidence on where to act, and also highlight the areas where investment – of energy, intellect and budget – is required to help develop new and creative responses to climate change.

Connect, inside and out

Climate change can only be addressed through widespread cooperation inside and outside of your organisation. Decarbonising across the lifecycle of products, and the whole value chain of an organisation will require connected thinking from most functions inside the business. Meanwhile, building a network of external stakeholders to bring relevant, up-to-date insights and to drive action will further accelerate progress.

Lead with conviction

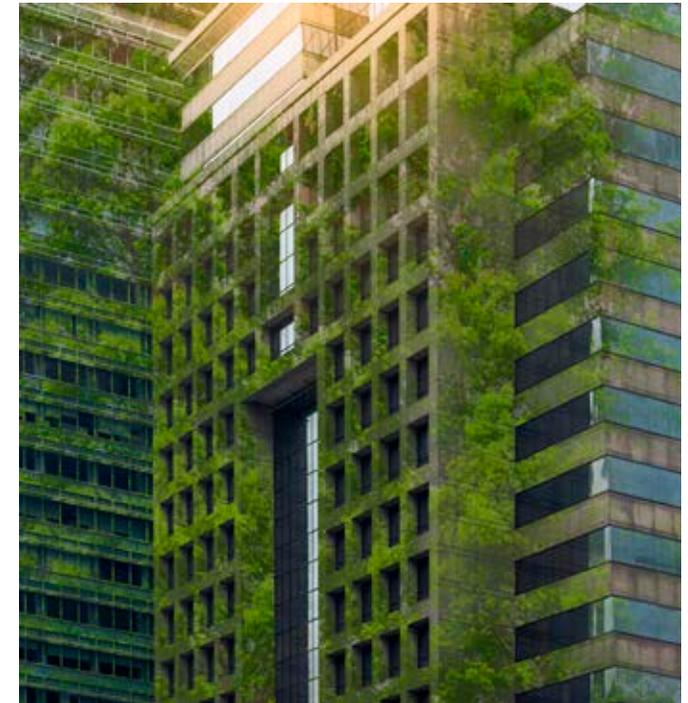
Bold moves are becoming increasingly normalised when it comes to addressing climate change – from school strikes and city occupations, to investors demanding better climate disclosure in mainstream reports. Business needs to find ways to match this boldness, to drive action on climate change, now.

Our checklist for consumer business leaders

In order to develop appropriate adaptive strategies and tactics to cope with the pressures of climate change, business leaders should be asking:

- Do we, individually and collectively, have sufficient knowledge and awareness of climate change to make informed decisions?
- Is someone clearly accountable for managing climate risk and opportunity, and do they have a mandate to drive change at an organisation-wide level?
- Do we understand our duties with regard to climate risk?
- Have we clearly articulated how we think climate change will affect our ability to deliver on our purpose or strategy?
- Are we satisfied that management is considering climate change throughout their decision-making process?
- Are we satisfied that climate risks are sufficiently incorporated into risk management?
- Are we clear how exposed our supply chain is to climate change risks?
- Do we know where our physical assets are most likely to be affected by climate change?

Leading organisations can answer 'yes' to most of these questions – and in doing so, are setting themselves up for success in a less predictable world.



Scenario analysis is just one of many things we encourage businesses to consider when it comes to accelerating the transition to a more sustainable, low-carbon economy.

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Discover more online

Deloitte UK Sustainability and Climate Change services:

<https://www2.deloitte.com/uk/en/pages/risk/solutions/sustainability-services.html>

Met Office Climate Consulting Services:

<https://www.metoffice.gov.uk/services/research-consulting/weather-climate-consultancy>

Deloitte & ICAEW Climate Change resources:

www.deloitte.co.uk/climatechange

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