Assessing and managing climate change risks in supply chains

A support service led by the Environment Agency
We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people’s lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.
Executive summary

Smart businesses know how to manage supply chain uncertainty. But extreme weather and our changing climate present a new set of uncertainties that threaten old ways of doing business. Little information is currently available on the unique vulnerabilities facing supply chains and how businesses can increase their resilience. This guidance fills this gap, providing information on climate risks and opportunities, and demonstrating how this understanding can be integrated into established business practices for addressing risk across supply chains.

Companies in the UK can no longer ignore the impact of climatic extremes. The costs of extreme weather to business are growing, with flooding in 2012 alone costing the economy over £12 billion. With supply chains increasingly criss-crossing the globe, extreme weather and the impacts of changing climate abroad can be as relevant to your business as flooding at the door. This was clearly seen during the Thai floods in 2011, when suppliers and logistics were disrupted for thousands of companies.

Awareness and experience of past events is quickly turning into action, as leading UK companies large and small begin to address risks and search for opportunities. The benefits of action are clear. Early action can reduce risks and help avoid the costs of disaster. New opportunities are also emerging, for example, in new product design, services offered and the chance to get a step ahead of less resilient competitors.

This guidance presents a five-step framework for all sizes of businesses to understand what a changing climate and extreme weather mean for them. The framework helps businesses to think through and identify new risks and opportunities within their supply chain, and to work out how to respond dynamically to increase resilience. It is relevant to businesses of every size, with special sections to address particular issues for small to medium enterprises (SMEs).

Is your supply chain climate resilient?
Find out and take action in five quick steps.

Is climate change a material issue?
Plan to respond
Assess risks and opportunities
Prioritise and identify actions
Manage your risks

Accompanying the framework are five case studies that illustrate how specific components of the framework can be implemented. They cover UK businesses from different sectors and of very different sizes that have begun to take action to increase the resilience of their supply chains to climate risks. From B&Q to a family-run flower farm in the Isles of Scilly, the risks vary but the impetus is shared: smart businesses across the UK are addressing what a changing climate means for their business now.
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1. Introduction

The supply chains of UK companies, large and small, exploit a world of opportunities. But increasing global exposure comes with an increasing range of risks. UK companies’ complex networks of suppliers and customers are as diverse as the goods and resources they manage. Within the same supply chain, giant multinational companies can sit side-by-side with small to medium enterprises (SMEs). Yet among companies large and small there is growing awareness that extreme weather and a changing climate pose new risks and opportunities to old ways of doing business.

Smart businesses know how to manage uncertainty. As their exposure to extreme weather increases, informed businesses are incorporating the risk of extreme weather into existing risk management. Meanwhile, business continuity planning is growing to embrace the need to think about how a changing climate impacts on business.

Companies in the UK are increasingly aware that their supply chains are exposed to greater weather extremes. International competition and cheap transportation have led to expansive supply chains linked by complex logistics, multiplying risks to business continuity. The Business Continuity Institute’s latest Horizon Scanning Survey, with results from 700 organisations in 62 countries, found 53% of the survey respondents were either ‘extremely concerned’ or ‘concerned’ about the impacts of adverse weather on their businesses (BCI 2013). Business leaders are now urging companies to think about climate change (Business Green, 2013).

Awareness and experience is turning into action, as leading companies large and small begin to respond to risks and opportunities. Yet there is little guidance for companies which see their supply chains might be at risk but aren’t sure how to respond. This guidance aims to help UK companies systematically identify, assess, prioritise and act against risks and to seize opportunities that extreme weather and a changing climate pose to their supply chains. This guidance shows that it doesn’t take a climate expert or lots of time and resources to build resilience. Making targeted changes in supply chain operations can reduce risks and gain a competitive edge.
Why should businesses act?

Our climate is changing and will continue to change into the future. In the UK we are likely to experience more flooding and face warmer, possibly drier summers in future. Other parts of the world face even greater changes in temperature and extreme weather events than the UK does.

The costs of extreme weather to business are growing. Flooding in 2012 alone was reported to have cost the economy £12 billion during the summer and autumn months (Gray 2012). Threats abroad can have significant impacts too. The effects of the Thai floods of 2011 rippled through international supply chains disrupting the supplies and logistics of UK businesses. As well as bringing possible changes to the frequency and severity of extreme weather events, a changing climate is also about longer term incremental changes in average climate. Here, risks and opportunities will materialise over a longer period of time, such as changes in consumer habits and markets, the potential to develop new products and change processes.

Whether or not you act to build resilience, your competitors will. An international Carbon Disclosure Project (CDP) survey focusing on supply chains found that 70% of companies believed that climate change had the potential to affect their revenue significantly (CDP 2013). This risk was said to be intensified by the performance gap between the sustainable business practices of multinational corporations and their suppliers, which may not be following suit in initiatives such as reducing embedded water in goods. The report suggested that in some cases suppliers were significantly less prepared than their customers in responding to a changing climate.

Mapping supply chains in detail helps to identify risks and opportunities and to target investment towards identifying and taking action. For example, some companies which presently rely on overseas agricultural supplies are investing in research into opportunities for improving yields in the UK where a future climate may provide more favourable growing conditions. Switching to domestic suppliers can reduce the risks inherent in long distance transport logistics and supply planning. Some engineering design consultancies are also beginning to respond by taking account of future climate projections in today’s building designs.

Resilient businesses are better positioned to identify new opportunities. Opportunities may come in the form of a company gaining competitive advantage over others by being more resilient, to companies forecasting changes in demand for their goods or bringing to market new products better suited to a changing climate. Smaller businesses that don’t have the same planning horizons, resources or capacity to look at the longer term can benefit from taking small steps that foster resilience against extreme weather events, returning benefits regardless of a changing climate. All businesses that keep up-to-date with industry research and the actions of others in their supply chain will be better placed to respond to risks and opportunities.

CDP supply chain survey responses: potential impacts of changes in precipitation extremes or droughts on business operations

Percentage of respondents:*  
- Reduction/disruption in production capacity (44%)  
- Increased operational costs (31%)  
- Inability to do business (11%)  
- Reduced demand for goods/services (6%)  
- Increased capital costs (4%)  
- Other (3%)  
- Wider social disadvantages (1%)

* Results based on information from 2,415 companies, including 2,363 suppliers and 52 major purchasing organisations that are members of the CDP Supply Chain Program.

Download the survey report (PDF, 2.0 MB) (www.cdproject.net/CDPResults/CDP-Supply-Chain-Report-2013.pdf) for more information.
Exploit opportunities to build resilience into your organisation: an example from the new head office for The Co-operative

The Co-operative needs a building for its new head office in Manchester that is resilient to a changing climate to ensure it can operate in present and future conditions without compromising business continuity. The design brief required a high quality building that could operate to the highest economically viable energy standards and was adapted to future climatic conditions.

The building’s designers, Buro Happold, checked the design against future climate data using both the current and previous generation of climate projections for the UK (UKCP09 and UKCIP02). Analysis indicated a high risk exposure to hotter summers and heatwaves, and increased rainfall intensity in winter. The building is adapted to manage the risk of overheating through the use of a double skin façade and earth tubes. Storm water is managed using a surface water attenuation tank designed to cope with the increased winter rainfall expected in future. This solution has been tested against, and remains resilient to, a 1 in 1,000 year rainfall event. In addition to influencing building design changes, The Co-operative is developing its flexible working policy to help staff when there are heatwaves and rising temperatures.

The work demonstrates how leading design consultants are meeting customer demands for climate resilient design services.

Source: D4FC Factsheet 45: The Co-operative Head Office (TSB 2012)

To find out more about this and other projects in phases 1 and 2 of the ‘Design for Future Climate: Adapting Buildings’ competition, visit the competition’s web page (https://connect.innovateuk.org/web/design-for-future-climate/projects-outputs).

For more information on how the climate of the UK might change visit the United Kingdom Climate Projections 09 (UKCP09) (Jenkins et al 2009) (ukclimateprojections.defra.gov.uk)

Relationships and activities in a supply chain

Mapping the common relationships and activities in supply chains helps to identify where a changing climate and extreme weather will give rise to risks and opportunities. Supply chains have three main relationships, each composed of a set of common activities.

<table>
<thead>
<tr>
<th>Supplier Relationship Management (SRM)</th>
<th>Internal Supply Chain Management (ISCM)</th>
<th>Customer Relationship Management (CRM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement:</td>
<td>Strategic planning</td>
<td>Understanding market demand</td>
</tr>
<tr>
<td>• sourcing</td>
<td>Demand planning</td>
<td>Customer expectations</td>
</tr>
<tr>
<td>• negotiating</td>
<td>Supply planning</td>
<td>Pricing</td>
</tr>
<tr>
<td>• buying</td>
<td>Logistics</td>
<td>Sales</td>
</tr>
<tr>
<td>• pricing</td>
<td>Infrastructure design and upkeep</td>
<td>Order management and fulfilment</td>
</tr>
<tr>
<td>Supply collaboration</td>
<td>Operations</td>
<td>Distribution</td>
</tr>
<tr>
<td>Design collaboration</td>
<td>Health and safety</td>
<td></td>
</tr>
</tbody>
</table>

Supplier  Company  Customer
Supply chains work best when each part works together. But risks in one part can cascade into the others. For example, if procurement of commodities and raw materials from a supplier becomes restricted due to climate-related impacts, the absence of an operational buffer will affect a company’s internal manufacturing operations, placing customer order fulfilment at risk. Following this guidance will help business decision-makers identify how particular activities face particular risks and what to do in response, protecting against such cascading problems.

<table>
<thead>
<tr>
<th>Just in Time (JIT) versus Economic Order Quantity (EOQ) or stockpiling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risks of disruption can vary significantly from company to company within a supply chain. Factors can include:</strong></td>
</tr>
<tr>
<td>- the size of the company</td>
</tr>
<tr>
<td>- its geographical location</td>
</tr>
<tr>
<td>- whether it supplies climatically sensitive materials</td>
</tr>
<tr>
<td>- the distances and type of transport methods used</td>
</tr>
<tr>
<td>- whether it’s a ‘just in time’ or stockpiling type of supplier</td>
</tr>
<tr>
<td><strong>But in a lean supply chain it only takes one weak link to disrupt business for its partner companies, no matter how well prepared they are.</strong></td>
</tr>
<tr>
<td><strong>The JIT supply chain structure provides the minimum inventory required to support operations until the next delivery of supplies. This reduces the inventory held by a business and its carrying costs, at the same time, maximising profits through a lean, efficiency-driven process.</strong></td>
</tr>
<tr>
<td><strong>The EOQ model is typically used when demand for a product is constant and each new order is delivered in full when an inventory reaches a reorder level. It’s aimed at minimising the joint costs of ordering and holding inventory, whereas JIT only minimises the costs of holding inventory.</strong></td>
</tr>
<tr>
<td>Companies operating or reliant on a JIT model are more prone to upstream supply shocks. Impacts on one supplier in the chain can quickly manifest themselves as disruptions to downstream supply chain members. The Thai floods of 2011 represented the insurance industry's highest recorded flood loss event, with business disruption to over 14,000 companies worldwide (Lawton 2011). The floods were reported to have widely disrupted the international supply of motor and consumer electronic parts. In the UK, Honda cut production at its Swindon plant by 50% and delayed the launch of a new model. The Thai floods also raised the issue of reliance on ‘clustered’ industries where similar types of suppliers are grouped in the same region.</td>
</tr>
<tr>
<td>Although in the case of the Thai floods stockpiling in the downstream supply chain may have provided more resilience to upstream shocks, stockpiling itself has its own risks. These include damage to large quantities of stock stored in vulnerable locations. While neither model is fully resilient, businesses need to begin to think through how impacts may differ between these approaches.</td>
</tr>
</tbody>
</table>
2. How to use this document

Start by answering the screening questions set out in Step 1. If you answer ‘yes’ to any of the questions posed, continue to work through Steps 1 to 5 of the guidance, answering the questions as you go.

This document can be printed off (preferably in colour) or used on-line as an interactive resource. Look out for special text boxes and tables throughout the document that highlight particular topics and tailor the guidance to your sector or size of organisation. Examples are given below.

What can smaller businesses do?
Boxes like this one provide streamlined advice and insights specifically geared for SMEs who may not have the time or financial resources that bigger businesses do. Many elements of the guidance are relevant to small businesses – particularly where they need to take account of larger businesses in their supply chain. If you are short of time or resources, focus on these boxes to help you concentrate on the most important issues for your business.

Case study
Boxes like this provide examples of how other businesses are leading the way in building the resilience of their supply chains.

Sector-specific
Boxes like this provide information and resources for specific sectors.

Additional information tables
Supplementary information is provided in small tables like these throughout the document.
3. A five-step framework for building climate resilience

What do all kinds of supply chains, whether large or small, domestic or international, have in common? They are all being exposed to new business risks and opportunities as our climate changes. This framework will help businesses to identify new risks and opportunities within their supply chain and work out how to respond.

Follow the self-assessment questions and good practice advice below to apply the five-step process to your supply chains. The guidance will help you to look at and manage each part of your supply chain in turn: your supplier relationship, your internal supply chains, and your customer relationship.

Case studies in Section 4 show how some UK businesses have begun to build resilience in their supply chains. Specific advice for SMEs is also provided.

Is your supply chain climate resilient? Find out and take action in five quick steps.

- **Step 1:** Is climate change a material issue?
- **Step 2:** Plan to respond
- **Step 3:** Assess risks and opportunities
- **Step 4:** Prioritise and identify actions
- **Step 5:** Manage your risks
Step 1: Is climate change a material issue?

Answer these questions to understand whether unpredictable weather and a changing climate could disrupt your supply chain.

Supply chains work best when each part works together.

But different parts of a supply chain will experience different impacts of a changing climate, with different levels of risk along the supply chain. Look at the three primary relationships below and answer the screening questions to help you decide whether a changing climate and weather events are a material issue within your supply chain.

Answering ‘yes’ to one or more of the questions means you should consider working through the rest of this five-step framework to build the resilience of your supply chain.

Have you answered ‘yes’ to any of the above?

If you have, then you should begin to think differently about risk and opportunities, and about how extreme weather events or a changing climate could affect different parts of your supply chain.

Work through the rest of this resilience framework to help you assess and manage climate risks to each part of your supply chain: your suppliers, your internal supply chains, and your customers.
Supplier relationship management

The complexity of today’s supply chains and reliance on international suppliers mean you have less control over the security of your supplies and the price of goods and raw materials. Some of the risks and opportunities are presented below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Risks</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement</td>
<td>Suppliers located or clustered in vulnerable locations, or unable to recover rapidly from an extreme event</td>
<td>Favourable climate allowing more localised sourcing of commodities</td>
</tr>
<tr>
<td></td>
<td>Changes in price of commodities due to direct and indirect impacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased competition for restricted supplies</td>
<td></td>
</tr>
<tr>
<td>Supply collaboration</td>
<td></td>
<td>Working with suppliers to identify raw materials that are sensitive to climatic conditions, and switching to less sensitive raw materials where possible</td>
</tr>
<tr>
<td>Design collaboration</td>
<td></td>
<td>Working with suppliers to identify new markets and products that may arise from a changed climate</td>
</tr>
</tbody>
</table>

Sourcing agricultural supplies

Agricultural products make up the raw material for countless products in many sectors beyond food and beverage, including retail, cosmetics and textiles. Agricultural production is highly vulnerable to climate disturbances and this is where many of the earliest impacts of climate change are already being felt.

If you source from agriculture, give special attention to how recent weather patterns or disasters have affected your agricultural sourcing. Recent problems are a good indicator that more impacts are likely to come.

What can smaller businesses do?

Issues to consider:

- Are your suppliers in a flood risk area? Are they adequately insured? What continuity plans do they have in place?
- Can you enforce contractual conditions on your suppliers to find alternative supplies? Can you reclaim surcharges on alternative supplies from your contracted supplier or insurer?
- Do you have access to alternative suppliers or contingency contracts in place?
- What are the opportunities for switching to local suppliers?
Internal supply chain management

The climate that businesses typically plan around and operate within is changing, and there is evidence that climate change is increasing the chance of some extreme weather events. These changes may exacerbate existing vulnerabilities or cause operational disruption. Building resilience can gain you a competitive advantage. Below are some examples of risks and opportunities to internal supply chains.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Risks</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic planning</td>
<td>Business models don’t perform as expected with risk to investors and lenders</td>
<td>Favourable climate allowing more localised sourcing of commodities</td>
</tr>
<tr>
<td>Demand and supply planning</td>
<td>Not taking into account how climate change may impact on longer term and shorter term seasonal demand for goods and resources</td>
<td>Anticipating or responding to changes in demand for goods</td>
</tr>
<tr>
<td>Logistics</td>
<td>Disruptions to transport routes from extreme weather events</td>
<td>Working with suppliers to identify new markets and products that may arise from a changed climate</td>
</tr>
<tr>
<td>Infrastructure design and upkeep</td>
<td>Buildings unable to manage heat loads or extreme rainfall events</td>
<td>New buildings resilient to current and future climate, maximising business continuity potential</td>
</tr>
<tr>
<td>Operations</td>
<td>Disruptions to manufacturing due to impacts on suppliers</td>
<td></td>
</tr>
<tr>
<td>Health and safety</td>
<td>Heat-stressed workforce during extreme temperature events</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adverse site conditions during extreme rainfall events leading to accidents</td>
<td></td>
</tr>
</tbody>
</table>

What can smaller businesses do?

Issues to consider:
- Have you or others been affected by weather events? What actions were taken – can you adopt the actions of others?
- Which aspects of weather are most likely to affect you? Examples include temperature, water restrictions and extreme weather events. How could they affect your operations?
- Do you stockpile in vulnerable locations?
- Have you asked your insurer, trade organisation or business support unit for information on how weather can affect business continuity?
Customer relationship management

A historically stable climate allowed forecasting of seasonal demand with a good degree of confidence. Shifting seasonal patterns and extreme events may impact on customer demand and fulfilment of customer orders, as well as leading to changes in demand for goods and services. Examples of associated risks and opportunities are shown below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Risks</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding market demand</td>
<td>Lack of awareness on how weather and climate influence customer demand</td>
<td>Working with customers to investigate the links between weather and climate on demand for goods and services – sharing information with upstream suppliers to build capacity to respond</td>
</tr>
<tr>
<td>Customer expectations</td>
<td>Lack of awareness of a customer’s changing position on climate change, and requirements for more sustainable sourcing throughout their supply chain</td>
<td>Offering customers products and raw materials that use less water and energy; Meeting demand for more climate resilient products, services and raw materials</td>
</tr>
<tr>
<td>Pricing</td>
<td>Short-term fluctuations in demand, longer term changes in consumer markets and habits</td>
<td>Acting as alternative suppliers to those with supply chain restrictions – negotiating higher prices for goods and services</td>
</tr>
<tr>
<td>Sales</td>
<td></td>
<td>Incorporating weather into demand forecasting</td>
</tr>
<tr>
<td>Order management and fulfilment</td>
<td></td>
<td>Identifying, understanding and managing climate risks to supply chain relationships and activities Gaining competitive advantage through increased resilience and business continuity planning</td>
</tr>
<tr>
<td>Distribution</td>
<td>Disruption to transport routes from extreme weather events</td>
<td></td>
</tr>
</tbody>
</table>

What can smaller businesses do?

Issues to consider:
- Do your customers operate Just in Time? What are the knock-on consequences for you if they cannot fulfil their orders?
- What proportion of your revenue is dependent on customers in vulnerable locations? Can these customers continue to accept orders at alternative locations?
- What are your contractual obligations for non-force majeure delays to order fulfilment? Can you delay fulfilment without significant penalties?
- Provided you have sufficient warning of an extreme event, can your customers offer a secure location for temporary stockpiling?
Step 2: Plan to respond

Begin preparations to manage your supply chain risk

- Set goals and develop a strategy to understand and address the climate risks facing your supply chain.
- Gather evidence and information on past experience of weather disruptions to your supply chain.
- Begin raising awareness in your company that climate variability and change may pose material issues to your supply chain.
- Organise a meeting with team members from supply chain management, risk management, customer relations and corporate responsibility.
- Assess current knowledge of climate risks among the team.
- Identify existing processes or management systems that can pick up weather-related risks. Will they be robust in the face of a changing climate?
- Consider which steps of this guidance can be integrated within existing processes and management standards such as:
  - ISO 28000 (supply chain security)
  - ISO 22301 (business continuity)
  - ISO 9001 (quality management)
  - ISO 14001 (environmental management)
  - ISO 18001 (health and safety)
  - Environmental Impact Assessment
  - Auditing and due diligence
- Weigh up the pros and cons of developing a proactive or reactive strategy.
- Identify which supply chain partners, trade organisations or customers should have an active role in your strategy.
- Choose a leader, assign responsibility and set deadlines.
- Assign resources to the team.
Case study

After Cafédirect found out that its suppliers’ crops in Peru were threatened by flooding, the small London-based company knew it couldn’t resolve this alone. Cafédirect partnered with a local growing organisation in Peru, and together they worked with smallholders in the country to understand the threat to their harvests.

Cafédirect funded the project creatively, drawing on external finance schemes that fund reforestation. Reforestation of higher slopes reduced flood risk to vulnerable coffee crops downhill and brought added benefits to the local communities.

Read the whole story in the Case Study section

What can smaller businesses do?

There are several ways SMEs can address the problems facing them without spending scarce time and resources:

- Talk to your trade organisation about climate risks to your sector.
- Reach out to larger companies in your supply chain to understand how you might fit into their climate risk management plan.
- Join a group organised by industry, government or a non-profit organisation that is addressing the impacts of climate change.
- Consider if a reactive or a proactive strategy will be most cost-effective.
Step 3: Assess risks and opportunities

Dig deeper to understand how and where climate variability and change will affect your supply chain.

Successful business leaders already know how to manage risk. The changing climate may pose new risks to supply chains in the UK and abroad, but with the right information, business decision-makers can use familiar corporate tools to assess climate risks and opportunities.

The following sections ask a series of exploratory questions to encourage analysis and discussion on the risks and opportunities presented by a changing climate. Answers collected in this step can be used within a number of standard corporate processes including risk matrices, risk registers, country risk assessments, feasibility studies, Environmental Impact Assessments, due diligence and auditing, and business continuity plans.

Supplier relationship management

**Procurement**
- Who are your suppliers, and who supplies them? Where are they located?
- Are the suppliers you rely on going to be increasingly impacted by weather disasters or a changing climate?

**Sourcing**
- What is your supplier distribution? Are they clustered in a single geographical area and so all vulnerable to the same disasters?
- Have you sought out local suppliers to reduce risks of transport disruption?
- Are the raw materials you rely on susceptible to damage or loss of quality from weather or climate change?
- Have you looked at ways of moving towards multiple sourcing?

**Negotiating**
- What do your supplier contracts say about disruption due to weather events?

**Buying and pricing**
- Are the prices you pay directly or indirectly affected by weather events or climate change?

**Supply collaboration**
- Do you have strong lines of communication for collaboration?
- Do the strategic goals and climate awareness of your suppliers align with your company’s goals and awareness?
- Have you built trust and loyalty with your suppliers to foster collaboration during crises?

**Design collaboration**
- Can you work with suppliers to redesign or develop new products and services to meet changing conditions?
Internal supply chain management

Operations
- What is the reliance of your manufacturing processes or the goods you provide on environmental conditions or resources?

Strategic planning
- Would your long-term investments or plans be affected by a changing climate?
- Have you assessed the costs of holding extra stock to ride out disruptions?
- If your risks are high, have you considered investing in a more detailed risk assessment?

Demand planning
- Which of your product categories are most at risk from weather disruptions and climate change? Are these a large part of your business?
- Will new product categories emerge as a result of a changing climate?

Supply planning
- Have you mapped your supply chain?
- Could your long-term supplier contracts be affected by weather disasters or climate change?
- Have you weighed up the trade-offs between business continuity and cost efficiency?
- Do you have extra capacity or strategic safety stock in place?
- What production could you bring in-house to reduce risk?

Logistics
- How could transport of raw materials or finished goods be disrupted by weather disasters?
- Do you have alternative transport links that allow for flexibility during disruptions?
- Have you surveyed the routes of your material flow, looking for weather hotspots or bottlenecks?

Infrastructure design and upkeep
- Are your corporate offices, retail locations, depots, warehouses or other critical assets located in areas vulnerable to weather events?

Health and safety
- Would your workforce be exposed to heat waves, floods or storms?

Case study
Camira Fabrics knows what it does best – selling high quality, environmentally friendly fabrics manufactured in-house for its global customers with JIT delivery. Camira has introduced targeted actions to build resilience across its supply chain. It nurtures communication about risks and opportunities with its suppliers to reduce the risks of disruption and taken steps to ensure that, when disruptions do happen in one area, they won’t disrupt the whole supply chain. The company also surveys regularly for new risks and looks to capitalise on new opportunities that might enable it to anticipate or sidestep supply chain disruptions before they even happen.

Read the whole story in the Case Study section below
Customer relationship management

Sales
- Are you reliant on a single customer in a single location?
- How could your sales forecast be affected by unpredictable weather?

Pricing
- If your prices rise due to supply chain disruptions, could you be undercut by competitors?

Order management and fulfilment
- What elements of your fulfilment operations could be disrupted by a weather disaster? Can you maintain on-time delivery?

Distribution
- Have your distribution networks been disrupted in the recent past? What might be the impacts of a changing climate on transport routes or distribution hubs?

Understanding market demand
- Is demand for your products and services tied to climate conditions?
- Will a changing climate create new opportunities for products or limit existing lines of business?

Customer expectations
- Is brand association going to be undermined by late orders or a drop in quality?

Sources of information on how the climate may change and potential impacts on sectors

Climate change in the UK
- United Kingdom Climate Projections 09 (UKCP09) (ukclimateprojections.defra.gov.uk)
- Environment Agency’s Climate Ready Support Service (www.environment-agency.gov.uk/research/137557.aspx)
- United Kingdom Climate Impacts Programme (UKCIP) (www.ukcip.org.uk)

Climate change in Europe
- Climate-Adapt (climate-adapt.eea.europa.eu)

Climate change around the world
- Information on observed and projected climate change and its impacts in 24 countries (www.metoffice.gov.uk/climate-change/policy-relevant/obs-projections-impacts)
- For an assessment of the impacts of climate change overseas on the UK see International Threats and Opportunities of Climate Change for the UK, (www.pwc.co.uk/sustainability-climate-change/publications/international-threats-and-opportunities-of-climate-change-to-the-uk.jhtml)
- IPCC Special Report, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) (ipcc-wg2.gov/SREX/)
Manufacturing and supply chain risk

Manufacturers of necessity work closely with their suppliers. A recent survey by EEF, the manufacturers’ organisation for UK manufacturing companies, found that three-quarters of UK manufacturers have faced recent disruptions to their productivity. The most common sources of problems were localised events, keeping employees from accessing facilities, and delays to raw materials and components, as well as knock-on effects from disasters on international suppliers and customers. Some 72% of companies said that these disruptions translated into revenue losses, and nearly as many cited delayed cash flows, order backlogs and customer dissatisfaction.

Read more about how manufacturing in the UK is changing in the EEF report, Be Prepared: Monitoring Supply Chains; Maximising Resilience (PDF, 1.3 MB).

What can smaller businesses do?

Following the advice below will help small and medium sized enterprises to identify risks and opportunities in their supply chains.
- Focus on the short term: what weather disasters have occurred recently? Are they likely to occur again?
- Focus on most disruptive events: what is the most likely disruption to occur to your supply chain?
- Consider your major non-climate risks: how could they be worsened by a weather disaster?
- Review your health and safety arrangements: how would these be affected by a weather disaster?
- Level of preparedness: are your disruption contingency plans in place and up to date?
- Low-hanging fruit: what opportunities are there for rapid, cheap solutions with multiple benefits?
- Take the lead: most SMEs aren’t prepared for managing disruptions to weather disasters. Are you able to make the choices now that will put you in a leading position when disruptions strike?

Go further

BACLIAT (Business Areas Climate Impacts Assessment Tool) is a workshop resource that helps users to identify the potential threats and opportunities of a changing climate on their business. It’s freely available from the Environment Agency’s Climate Ready Support Service and includes special insights for SMEs.

Download BACLIAT (www.environment-agency.gov.uk/research/137639.aspx)
Step 4: Prioritise and identify actions

Think through the best ways to build resilience.

Time is always short and resources are ever in demand. Step 4 will help you identify and prioritise actions that address the risks and seize the opportunities facing your supply chain.

Review and prioritise

- Which supply chain relationship holds the greatest risks? Your internal supply chain, relationships with your suppliers or with your customers?
- Which of the identified risks pose the greatest threat to your supply chain?
- Which opportunities offer the greatest benefit to your company?
- Which opportunities is your company ready to seize?
- What actions are considered good practice in today’s climate and are likely to offer benefits regardless of climate change?
- Have you performed a cost–benefit analysis or similar procedure to prioritise actions?
- Are your priorities aligned with your supply chain partners?
- What can you do to help your crucial supply chain partners? What do you need from them?
- How can you integrate climate resilience into plans for new infrastructure or long-term programmes, and other parts of your core strategy?
- Have you considered adopting ISO 28000 or ISO 22301 standards for supply chain security and business continuity? Consider how your climate risks can be incorporated and managed within these systems.

Case study

Kingfisher supplies timber products to its hundreds of DIY stores around the world. In 2011, the retail giant assessed which of its many properties were vulnerable to climate change and extreme weather. Kingfisher staff identified which of its locations were most vulnerable and used the results to prioritise which properties needed to be made more resilient. With targeted investments, Kingfisher reduced risks across its extensive property portfolio.

Read the whole story in the Case Study section below
What can smaller businesses do?

If you have limited time and resources, there are easy and essential actions that any business can take to help them become Climate Ready:

- Check if you’re insured. Does your insurance cover all loss of earnings and damage to stock? Can you afford uninsured losses?
- Check if your premises are in a flood risk area by looking at the Environment Agency’s Flood Risk Map (www.environment-agency.gov.uk/flood).
- Can you elevate your stock, or move stock to an alternative location in a flooding emergency? Can your customers provide space on their own sites for temporary emergency storage?
- Provide a safe working environment for staff. Brief them on managing heat stress and on-site health and safety in the event of extreme conditions.
- Have a plan for water supply problems – can you harvest water on-site?
- Backup your computer and IT systems – cloud backup critical business files.
- Plan for supplier, logistics and delivery problems.

Source: adapted from Environment Agency and Defra (2013)

Food and drink supply chains

Significant and early impacts of a changing climate are being felt across the food and drink sector. To address the special needs of its members, the Food and Drink Federation (FDF) has compiled advice on sustainable sourcing. Taking action through sustainable sourcing measures can increase the resilience of a supply chain, for example, sourcing commodities that require less water and so are more resilient to drought. The benefits of increased resilience include stimulating innovation, meeting customers and stakeholder expectations, and gaining a competitive edge.

Read more about sustainable sourcing (www.fdf.org.uk/sustainable-sourcing.aspx)

Go further

The ‘value chain’ is a broader concept that expands on supply chains to also look at the communities and ecosystems that businesses rely on for employees, customer and materials. Shareholders expect increasingly more from businesses in terms of corporate social responsibility.

For advice on how to address climate risk across your value chain, read the Oxfam report Value Chain Climate Resilience (www.oxfamamerica.org/publications/prep-value-chain-climate-resilience).
Step 5: Manage your risks and monitor progress

Take action and start building resilience today.

You’re almost there

Climate change is an unfolding challenge. Having identified your actions, it’s now time to implement them. As you take action and manage your climate risk, it’s important to continually monitor your success in reaching the goals you established in Step 2. Also consider how new climate information may affect your pursuit of those goals.

Manage your risks

- Identify periods in the business cycle where it’s opportune to implement actions. Examples might include when designing new facilities, or acquiring new assets and long-lived equipment.
- Assign responsibility to carry out identified actions.
- Assign budget lines to sustain actions.
- Establish mechanisms for recording and sharing successes and shortcomings, be it setting up new systems or modifying existing ones.

Monitor your progress

- Review your goals established in Step 2.
- Monitor the continued relevance, effectiveness and performance of the actions by adopting a continued improvement approach. Design a ‘checklist’ or a monitoring and evaluation plan – ensure lessons learned can inform the ongoing process of ensuring resilience and how the actions may influence future planning and investments.
- Identify whether adjusting actions need to be made.
- Review the impact of actions with your suppliers – what benefits have been realised and why? Were there any dis-benefits and why?
- Consider trade-offs you have made and how these were justified. What were the consequences – were there any negative or positive impacts on the business?
- Determine how your achievements and milestones can be shared with others in your supply chain or your sector.
Share your success

You’re leading the way by addressing risk across your supply chain. Work with your communications department to spread the word.

Share your work with the Environment Agency’s Climate Ready support service (www.environment-agency.gov.uk/138603.aspx).

You could also submit your story to an online compendium of climate resilience case studies run by the UN Framework Convention on Climate Change (UNFCCC). Visit the Private Sector Initiative web page unfccc.int/adaptation/nairobi_work_programme/private_sector_initiative/items/6547.php)

Go further

AdaptME is a resource that can help you monitor and evaluate your progress towards meeting your adaptation goals.

Download the AdaptME toolkit from the UKCIP website (www.ukcip.org.uk/adaptme-toolkit).

Sources of information that can help businesses build resilience to a changing climate

- Environment Agency’s Climate Ready support service (www.environment-agency.gov.uk/research/137557.aspx)
- Climate UK (www.climateuk.net)
The five case studies in this section illustrate how specific components of the framework can be implemented. The cases studies cover UK businesses from different sectors and of very different sizes that have begun to take action to increase the resilience of their supply chains to climate risks.
What can a small company in London do when its suppliers in Peru are in trouble?

Quite a lot, as it turns out. Cafédirect, an SME and alternative trading organisation based in London, sources coffee, tea and cocoa from small producers around the world. The company was a pioneer of Fairtrade and other ethical business standards in the UK. Cafédirect is led today by its ‘Gold Standard’ commitments to its suppliers and to integrated environmental action and accountable business.

Threat to the supply chain (Step 1)

Cafédirect sources coffee from smallholders living in the Andean foothills of Peru. But communities living 2000 metres above the coffee plantations have felled forests for fuel. This affects Cafédirect’s coffee suppliers downhill whenever it rains. Without the forests to absorb the rainfall, water sweeps downhill and causes flooding. This washes away fertilisers and nutrient-rich soil. It also blocks roads and prevents farmers from shipping their coffee out. Heavy rainfall events in recent years has caused more frequent flooding, putting Cafédirect’s supply of high quality coffee at risk.

Adaptive response (Step 2, Step 3, Step 4)

Cafédirect is dedicated to working with its supply chain partners to meet challenges. Working with local growing organisations, Cafédirect began an integrated programme in 2006 called ‘Adaptation to Climate Change for Smallholder Growers’ (AdapCC) to address risks to growers in Peru and in other supplier countries. Beginning with awareness raising and building on an established relationship of dialogue with its farming smallholders, Cafédirect supported a major programme of reforestation of the uplands to reduce the impact of flooding on its suppliers downhill. Cafédirect funded the project by drawing on external carbon finance schemes that provide funding for reforestation and the protection of new forests.

By 2011 the programme had been a huge success, protecting coffee supplies, the livelihoods of 6,600 farmers and bringing much needed income to 348 families uphill. Cafédirect’s close cooperation with the local producer organisations benefitted the company, its suppliers and local communities, protecting the supply and quality of the product, as well as upholding and demonstrating Cafédirect’s ethical commitments.

Working closely with its suppliers, local organisations and relevant financing schemes has helped Cafédirect build resilience in its supply chain to both current weather events and future climate risks.
When your customers look to you to prepare themselves, you need to be prepared

B&Q (and its parent company Kingfisher) has a history of finding innovative ways to source raw materials sustainably. Now the UK-based DIY retailer is going further by finding solutions to climate risks across its supply chain. B&Q knows that, despite some uncertainty and early costs, climate change presents new risks and opportunities to its business. Its approach shows how big companies can think creatively to seize opportunities that are ‘smart business’ and build resilience across the supply chain.

Protecting property (Step 1, Step 3, Step 4)

In 2011 Kingfisher realised that to reduce costs and meet the high expectations of its shareholders and customers, it needed to assess which of its many properties were vulnerable to climate change and extreme weather. The company assessed climate risks to its properties, identifying its most vulnerable sites. It used the results of that assessment to make targeted investments to reduce and anticipate risks across its extensive property portfolio.

Anticipating product demand (Step 1, Step 2, Step 3, Step 5)

B&Q knows that when extreme weather occurs in the UK its customers look to it for the supplies and tools they need to respond. The company is working to have the right goods in stock and to anticipate customers’ needs before crises occur, exploring entire new product lines that may be of use to customers in a changing climate. In addition, B&Q has joined the Environment Agency in a partnership to educate and raise the awareness of customers in England to climate risks. Sharing information on risks isn’t just good corporate citizenship; B&Q is learning about what its consumers need, and educating customers on the techniques and materials available to make their homes more resilient to extreme weather.

Going beyond sustainable sourcing (Step 1, Step 2, Step 4)

Timber is an essential part of Kingfisher’s retail business and used in a third of its products. With 100% of its timber products taken from sustainable sources around the world, B&Q is leading the way within Kingfisher and the UK. While protecting forests is good for business, B&Q is now pushing further to strengthen its supply chain against climate risks. In 2012, Kingfisher launched a new strategic sourcing initiative to enhance the resilience of its timber supply chain by building relationships with local suppliers. It’s seeking to commit to a variety of wood types, increasing its interaction with vendors and providing greater supply chain transparency. B&Q is also working to balance the needs of local communities living in and around woodlands with those of its suppliers. In addition to requiring sustainable use of woodlands by its suppliers, B&Q also encourage local communities to access and use the same woodlands for amenity purposes.

Resources

Net Positive: Timber (www.kingfisher.co.uk/netpositive/index.asp?pageid=185)

Kingfisher Property Network (www.ukcip.org.uk/case-studies/business-case-studies/kingfisher/)

Working with others to anticipate risks
Scent from the Islands

What’s the secret to growing and selling fresh flowers all year round in the UK?

Besides benefitting from a subtropical climate, building resilience at each step of its supply chain is crucial to success for Scent from the Islands – an online retailer that delivers flowers to customers across the UK via Royal Mail. Based in the Isles of Scilly just off the Cornish coast, the small company of 20 employees specialises in scented species grown from bulbs indigenous to the islands.

Transport disruptions (Step 1)
Thanks to the Gulf Stream, the Scillies enjoy a subtropical climate that allows Scent from the Islands to grow flowers outdoors throughout the year. The islands’ mild climate may be helping this unique business to flourish, but its island location presents numerous challenges to its supply chain. The 20-year old company has relied on a variety of options to transport its postal boxes of flowers off the island. However, helicopter flights to Penzance stopped recently and bad weather frequently closes the airport at Land’s End, the Scillies’ main air connection. The company therefore worked closely with the Royal Mail to ensure minimum disruption to its postal services, switching to using sea links to the island and by using Newquay as an alternative airport.

Fix what you can (Step 3, Step 4)
Scent from the Islands is unable to move its operations and leave its unique island climate, but with transport options continually threatened by weather, the company has been forced to find creative ways to manage its supply chain risks where ever possible.

The business buys packaging materials like tissue and cardboard to present and post the flowers. It prefers to work with materials suppliers based in the south-west of England as they are aware of local weather conditions and potential risk to sailings. The company is also working with suppliers to manage transport risks, such as remaining flexible about when deliveries can be shipped and by sharing information on transport risks between companies. By working closely with its suppliers, Scent from the Islands is building trust and developing managing transport risks that are otherwise beyond its control.

Back on the Scillies, Scent from the Islands monitors potential shipping disruptions by communicating with local transport companies. It’s also taking steps to protect its means of production. Indigenous flowers are adapted to the local climate and sensitive to changes in water availability and temperature. The company is reducing its reliance on pumped groundwater by investing in rainwater harvesting, which will enable it to thrive even through periods of reduced summer rainfall.

Small businesses can't always fix every disruption in their supply chain. Scent from the Islands demonstrates some of the small, cost-effective solutions that allow a family-run SME to minimise its risks, build resilience in its supply chain and stay profitable.
How can you build resilience without breaking the bank?

Seizing low-cost, low-risk opportunities, Camira is a progressive Yorkshire-based fabrics company at the top end of the SME scale. From manufacturing facilities in Huddersfield, Nottingham and Lithuania, and design offices in Mirfield, Camira’s staff develop and produce high-quality, environmentally friendly fabrics. The company relies on materials from a global network of large and small suppliers providing natural and man-made fibres, and after production and manufacturing in UK, ships to a global client base.

**Holding the lead (Step 3, Step 4)**

One of Camira’s unique selling points as Just in Time suppliers is that it can fulfil an order request within 24 hours. To maintain this advantage and meet its customers’ high expectations, Camira is taking smart action now across its supply chain to increase its resilience to severe weather impacts.

Camira retains a network of many small suppliers around the world so that it can circumvent impacts that limit production or quality, increasing its resilience to supply chain disruption. Nevertheless, the company works consistently to encourage two-way communications with its suppliers to determine where the market is heading over the medium term and what risks different segments of their supply chain face. Camira keeps up its end of this proactive relationship by offering solutions in attempts to head off disruptions before they arise, for example, through sharing information on standards or changes in market demand and fashion. Camira has even offered storage space on its own site when a supplier’s site is found to be at higher risk from natural disasters.

Camira is conducting a full risk and opportunity assessment of its operations to produce a climate change resilience plan. At the same time, it’s engaging with suppliers and customers, sharing progress on how to build resilience and relaying its expectations to its suppliers.

**Thinking two-steps ahead (Step 3)**

Having observed a growing customer demand for sustainable materials and environmental credentials, Camira is working to ensure its raw materials can be sustainably sourced. Synthetic textiles are popular, so 100% recycled polyester products were developed and are some of the best sellers. However, Camira has also seized an opportunity to shift the balance of its raw material supply toward bast fibres including hemp. Hemp is resilient, fast growing and, as it uses far less water than other raw material processes, its supply is more resilient in periods of drought. Woody ‘shive’ separated from the textile fibre is even used for biodegradable animal bedding, increasing the financial yield. Grown in the UK, hemp allows Camira to source closer to home. Having worked with the Department for Environment, Food and Rural Affairs (Defra) on an innovative hemp project, and now working to educate its customers on the material’s many benefits, Camira isn’t ignoring recent extreme weather events. Reducing its reliance on water-sensitive crops and energy-intensive synthetics, Camira is positioning itself one step ahead of its competitors.
What emergency response options does a retail chain have after a natural disaster?

Many people across the UK rely on Tesco to get the essential produce and foodstuffs they need. When severe floods in Workington, Cumbria devastated bridges over the River Derwent, many local residents and Tesco staff found that their superstore was suddenly inaccessible. To ensure continuity of services to its customers, Tesco looked to Yorkon, an off-site construction specialist that is part of the Portakabin group, to quickly deploy an interim building solution to serve the flood-hit community.

**Deploy a supermarket in record time (Step 4)**

In the hours immediately following the Cumbria floods, Yorkon was commissioned by Tesco to build a 13,300 sq. ft. interim supermarket to serve the cut-off areas of Workington. Yorkon manufactures and fits out complete buildings off-site, allowing for rapid deployment of buildings for emergency as well as permanent situations. Working with Johnson Construction, Yorkon provided a high quality interim supermarket for the local Workington community in record time. The building modules were delivered to a brownfield site in Workington and assembled overnight in just 18 hours. After fitting out and stocking shelves, the store was open to the public in only 13 days.

**Seize new business opportunities (Step 4)**

Modular construction isn’t a new technology, but Yorkon is finding that new approaches and its expertise in the area are increasingly valued as an emergency response option by major retailers and fast food restaurants. Portakabin also offers short-term hire solutions to meet the needs of SMEs to ensure business continuity in emergency and flood situations.

**Resources**

Tesco - Cumbria Floods
(www.yorkon.co.uk/tesco-workington-floods.html)

Video of construction
(www.yorkon.co.uk/tesco-workington.html)
5. References


6. Acknowledgements

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Alliance Boots
B&Q Ltd (part of the Kingfisher Group)
British Retail Consortium
Buro Happold Ltd
Cafédirect plc
Camira Fabrics Ltd
Christie Elite Nurseries Ltd
Federation of Small Businesses
Food and Drink Federation
Forestry Commission
Frugi
Heineken
IGD
Matthew Algie and Company Ltd
National Association of Cider Makers
Scent from the Islands
Society of Motor Manufacturers
Speedo
Tesco plc
Transport for London
The Body Shop International plc
Yorkon Ltd
## 7. Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptation</td>
<td>Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2001).</td>
</tr>
<tr>
<td>Climate</td>
<td>Average weather over a period of time, usually 30 years (UKCIP 2013).</td>
</tr>
<tr>
<td>Climate change</td>
<td>Any change in climate over time, whether due to natural variability or as a result of human activity (IPCC 2001).</td>
</tr>
<tr>
<td>Climate change adaptation</td>
<td>In human systems, the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate (IPCC 2012).</td>
</tr>
<tr>
<td>Climate change risk</td>
<td>Additional risk to investments (such as buildings and infrastructure) and actions, from potential climate change impacts (UKCIP 2013).</td>
</tr>
<tr>
<td>Resilience</td>
<td>The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions (IPCC 2012).</td>
</tr>
<tr>
<td>Robust</td>
<td>The term used to refer to the ability to cope with or recover from a range of inputs and situations in a given environment (UKCIP 2013).</td>
</tr>
<tr>
<td>SME</td>
<td>Small to medium enterprise (10–250 employees).</td>
</tr>
<tr>
<td>Supply chain</td>
<td>The supply chain conceptually covers the entire physical process from ordering and obtaining the raw materials through all process steps until the finished product reaches the end consumer. Most supply chains consist of many separate companies, each linked by virtue of their part in satisfying the specific need of the end consumer (CIPS 2013).</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>An expression of the degree to which a value or relationship is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable (IPCC 2012).</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>The propensity or predisposition to be adversely affected (IPCC 2012).</td>
</tr>
</tbody>
</table>
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