

# Consultant's Manual

## Developing a Climate Change Adaptation Strategy for Companies



2013



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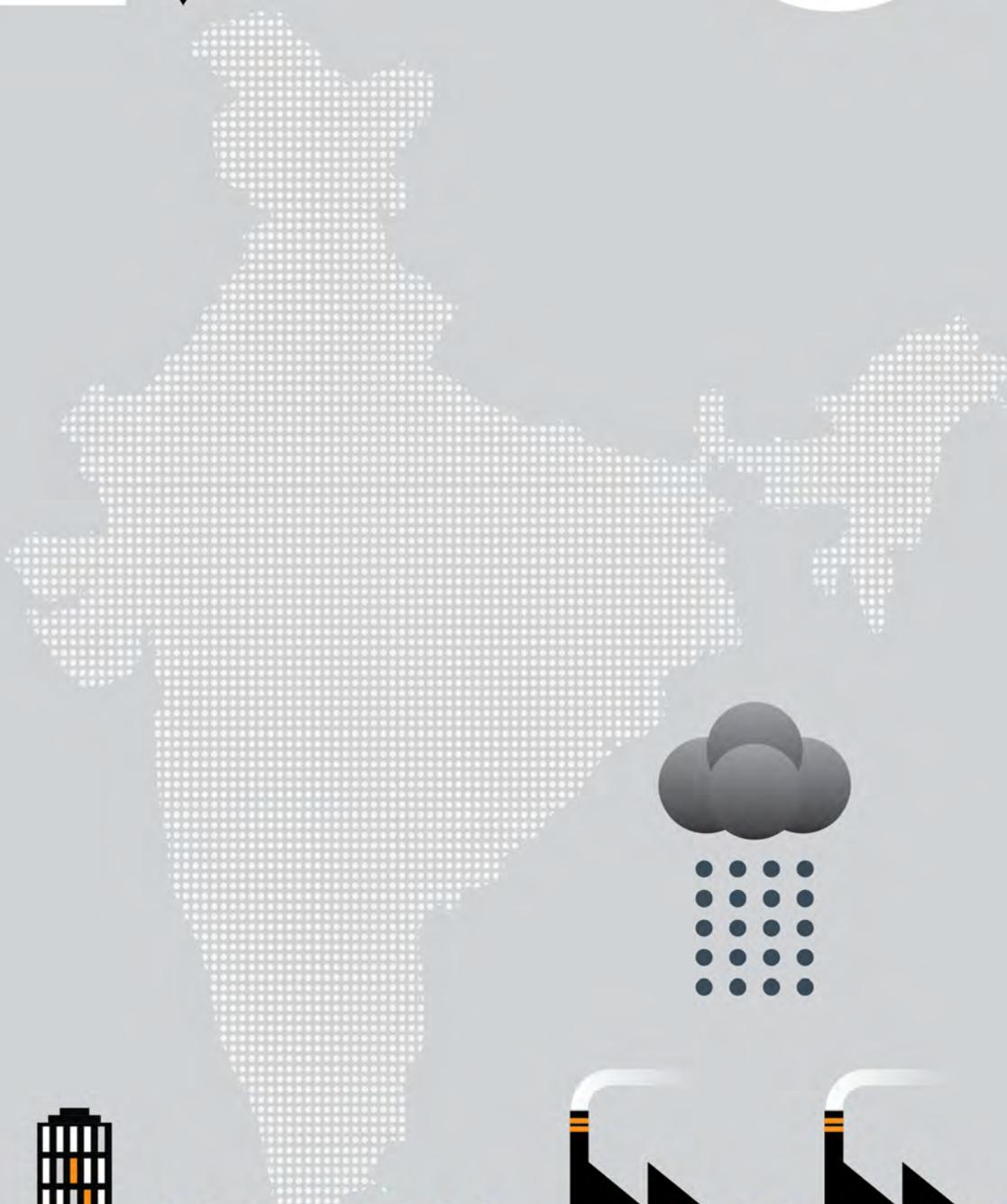
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# 1 Introduction and Overview

## 1.1 Objective of the Consultant's manual

**This Consultant's manual aims to support consultants in the development of a climate change adaptation (CCA) strategy for their client companies.**

The methodology and tools build on the **practice-oriented approach to CCA** developed for the Climate Expert e-learning programme and website ([www.climate-expert.in](http://www.climate-expert.in)) in India, but can be applied in any country context. The Climate Expert seeks to raise the awareness of companies on risks and opportunities caused by climate change impacts and assists in developing a CCA strategy. This strategy allows companies to prepare a structured approach to the challenges posed by climate change, thus reducing exposure and managing risks. It also offers an approach to realise potential business opportunities; both can improve the competitiveness of a company, and ensure its long-term survival and growth.

Given the novelty and complexity of the issue it is expected that companies will need additional training and advisory to successfully carry out CCA strategy development and implementation. Consultants and training institutes can therefore address this gap and develop target-group oriented services for companies. Although related to business development services, this is a **new field in business consultancy and capacity building** and promises many new opportunities for those organisations that take up the topic swiftly and comprehensively.

The perspective used to assess climate change impacts also allows for **analyses and activities regarding the competitiveness of companies**. Many aspects considered here, e.g., on resource efficiency and stakeholder relations, are of high relevance for the survival and growth of companies. Thus there is a **strategic overlap** between **getting a company ready to withstand climate change impacts and increasing its overall competitiveness**, which is a great opportunity for the cross-selling of services by consultants.

In order to grasp the new challenges arising from climate change for companies fully, a structured introduction to the topic is necessary. In addition to the approach, **practical experience** is an important prerequisite for consultancy and training purposes. This **Consultant's manual is designed as a guide and source of reference in the course of building these experiences; it is targeted at trainers and consultants that seek to deepen their knowledge on CCA and CCA strategy development on a case basis**. If the methodology is applied thoroughly, it can be used as a step-by-step guidance to develop a company's adaptation strategy.

The CCA methodology, its tools and the Climate Expert website have been developed within a series of projects on climate change adaptation and SME competitiveness implemented by GIZ and supported by its knowledge partner adelphi. Multiple workshops and site visit assessments lay the ground for the CCA methodology and tools that are at the heart of the Climate Expert website, the training and this Consultant's manual. In addition to these outputs, two studies on climate change risks and adaptation opportunities were developed in the Indian context.



## 1.2 Methodological approach

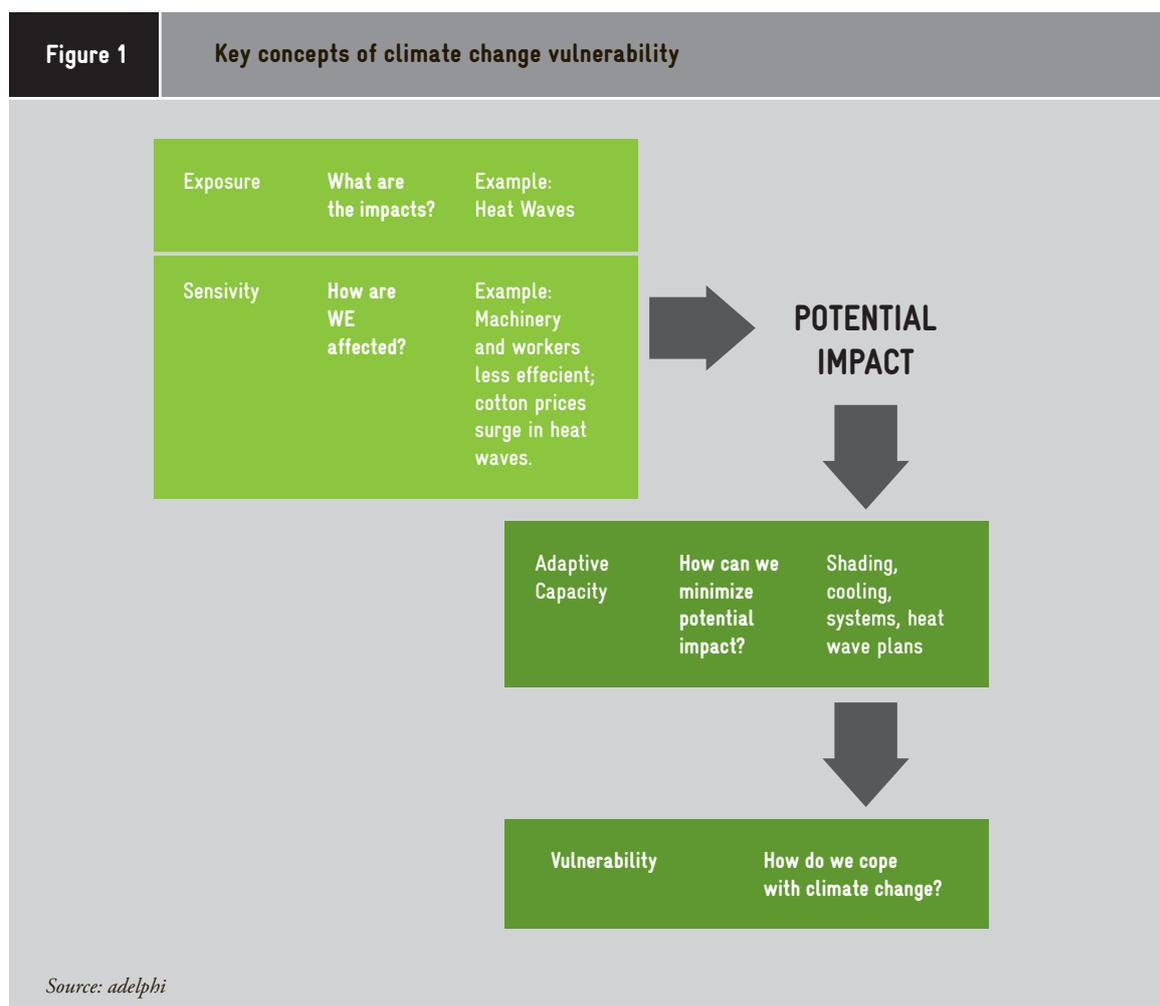
### 1.2.1 Steps and tools for CCA strategy development

The toolkit for CCA strategy development aims to guide and support the development of a CCA strategy for companies. It is designed to **serve consultancies and trainers as a source for developing their advisory services in the field**. It can also be used by company representatives as a guideline and benchmark on the types of analyses and scope of activities necessary to develop an adaptation strategy. For the purpose of this Consultant's manual, we will assume consultancies (and their clients) as the main target group. In the following, we will thus refer to these as addressees.

This Consultant's manual focuses on the **methodology** of CCA strategy development. Please refer to the Climate Expert website and the Trainer's Manual regarding the **relevance** of CCA to companies in general and to Indian companies in particular.

The methodology presented here helps to assess a company's vulnerability to climate change as well as to identify options for reducing this vulnerability. In addition, it allows for the identification of potential opportunities and measures, and the development of a comprehensive strategy.

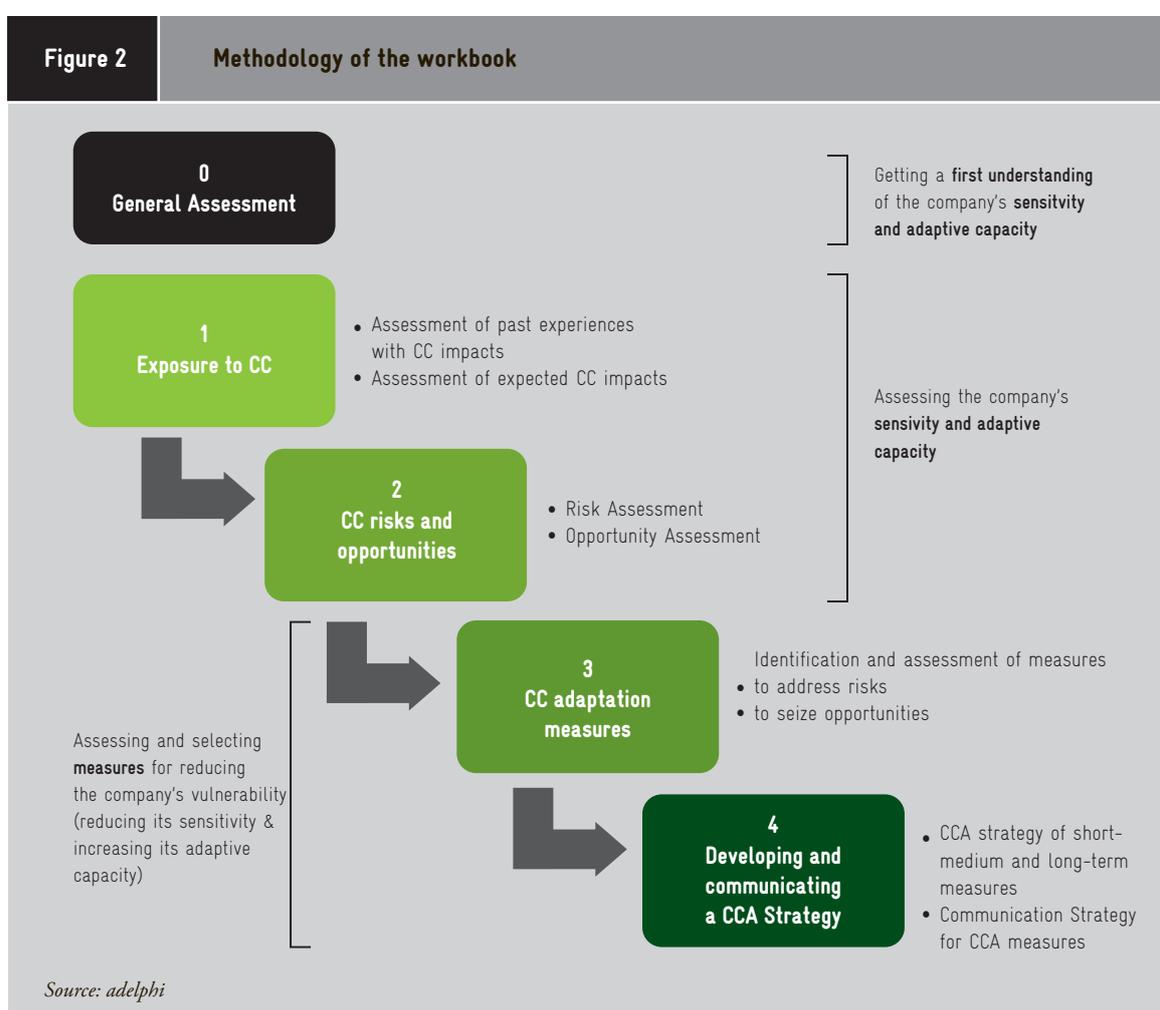
The vulnerability of a company is the result of its sensitivity to climate change impacts (determined by the exposure to CC) and its adaptive capacity. These general concepts are illustrated in the following graph:





The Consultant's manual proposes several distinct steps to assess and reduce vulnerability to climate change. As the target group of the Consultant's manual is mainly consultants, the methodology slightly varies from that of the other tools as proposed by the project, including the Climate Expert website. This is due to the fact that the website facilitates a self-assessment, whereas the Consultant's manual aims to guide consultants in conducting the assessments. The approach is modular, thus the tool from the website could also be used where appropriate.

The approach of this Consultant's manual **breaks down the development of a CCA strategy into four main steps**. These four steps are **preceded by a more general assessment** which is sought to provide you and your client with a first understanding of the company's sensitivity and adaptive capacity. The worksheets that form the basis of discussion for these four steps provide practical pointers for assessing the company's present sensitivity and adaptive capacity as well as for developing measures to reduce its sensitivity and to increase its adaptive capacity regarding future CC developments:



### 1.2.2 Methods for facilitating usage of CCA tools

To effectively support consultants in working with companies on CCA strategy development the guidance provided in this guidebook combines three types of methods:

- An introduction to the **goals and contents of each of the four steps** and the associated worksheets
- **Practical guidance** on how to use the worksheets in consulting assignments with companies'
- A **case study** to illustrate how to use the worksheets



### 1.2.3 How to use this Consultant's manual

In order to make effective use of this Consultant's manual, we recommend you to first familiarise yourself with the **Climate Expert website (www.climate-expert.in)**. Ideally, you should also attend a training course on the topic, and thoroughly read through the training material. Even though the Climate Expert focuses on the Indian case, future trainers from other countries will find it useful to look at the website; it can also serve as a basis for similar tools in other regional contexts.

Thereafter, you should **study the Consultant's manual**; both its texts and the case study give you important references on how the content and the methodology can be applied in practice.

We then recommend you to **find a first assignment** with a company in one of the most affected sectors; for a detailed list of the most affected sectors in India, please refer to the study on climate change risks that can be found on the website. The study also offers a general assessment approach that can facilitate similar assessments in other countries and regions.

You should **start the assignment by using the assessment grid** – this allows findings by conducting a structured interview on past and expected climate change impacts on a company. In the interview, you can refer to the contents of the Climate Expert as well as the case study presented in the Consultant's manual. The information gathered with this worksheet could then be used for conducting the detailed risk assessment of key impacts and the development of adequate adaptation measures. However, before you proceed you should decide together with the company management whether a detailed assessment of sensitivity and adaptive capacity as well as the development of a CCA strategy makes sense for this particular company.

In case that the company management and you perceive the impacts of climate change on the company to be currently high or expect them to increase, thereby threatening its growth or even survival, you should proceed to **conduct the full CCA strategy development**.

After the strategy development is done, it is useful to **keep in close contact** with your first clients both in order to **monitor the implementation of adaptation measures** as well as to **assess the effectiveness and benefits of the CCA strategy** for the company. This will give you strong arguments to engage with new clients and will also allow you to review and improve the CCA strategy development process.

### 1.2.4 Adapting the methodology and worksheets to your consulting assignment

It is important to note that a CC risk and opportunity assessment and the potential development of an adaptation strategy are **specific to each company**. This is due to two factors; first, impacts of climate change are locally specific: while for companies in coastal areas the risk of flooding and saltwater intrusion into groundwater is a key issue, in other areas more severe droughts and resulting challenges for the company might be the key concern. Secondly, climate change impacts vary from company to company; this results from required inputs, the specific value chain of one sector or company, as well as the technology level of each company. Further, the adaptive capacity of companies varies.

Thus, the **CCA strategy must be specific to the geographic location of a company and must consider its value chain, process steps and capacities**. Only then is it possible to accomplish a reduction of the company's vulnerability to future CC impacts.

For example, a company is more vulnerable to heat waves if labour and electricity inputs are high. Thus, the company will have to prioritise the implementation of adaptation measures which are effective to address the related risks. The vulnerability of a company's supply chain to CC impacts can be lower than that of its cluster neighbours of the same sector because it is sourcing from a wider range of suppliers in different locations.



Furthermore, a company with existing organisational structures and internal knowledge regarding CC topics as well as access to financial resources has different capacities for implementing a holistic CCA strategy than companies which do not possess these resources.

Other variables of relevance are purchasers' expectations or government regulations regarding CCA topics. Purchaser's expectations vary depending on the products they provide and markets they serve. For example, Western textile brands are highly aware of environmental challenges and work issues, as consumers are known to question their behaviour. Also, lawmakers (including import regulators) can step in to render environmentally harmful or socially questionable activities illegal; in the most extreme form, entire clusters have been shut down. These aspects differ from industry to industry and depend on the location of the final sales market. The respective company needs to be able to adapt to the specific expectations and standards in order to have a license to operate and to keep running the business.

Accordingly, **the methodology and worksheets can be further tailored to the needs and capacities of the particular company:**

- Adjust the worksheets to make them well-suited to the needs of the target company, taking into consideration the industry sector, company characteristics, and its value chain. A company that does not require a significant input of water, for example, does not need to assess this factor. A company which struggles with workers' and community issues should have a closer look at how its stakeholder relationships will be affected by climate change.
- Adjust the depth of the assessment to the interest, capacities as well as financial resources of the client. After each step in the assessment, it is possible to narrow down the points to be addressed in the next step, e.g., selecting only the most relevant climate change phenomena for the risk assessment or focusing only on the most important impact areas. More detailed indications on how to reduce the scope of the assessment is provided in the guidance and case study below.

### 1.3 Background information on the case study company

The case study used in this Consultant's manual illustrates each step in the process of developing an adaptation strategy for companies. It helps consultants understand the purpose, content and resulting output of each assessment step. The case company called "IndTex" is based on experiences gained during various site visits of textile companies. Its profile, existing and expected CC impacts and adaptation measures outlined below are built on numerous discussions and assessments with Indian textile MSMEs in the NCR. Thus, the case study represents a realistic example of an Indian company confronted with tackling CC risks and realising business opportunities.

The case study focuses on adaptation to one key climate change phenomenon, i.e., the increasing frequency and intensity of heat waves. This selection was done to reduce the complexity of the worksheets; in reality, several other phenomena would have needed to be covered.

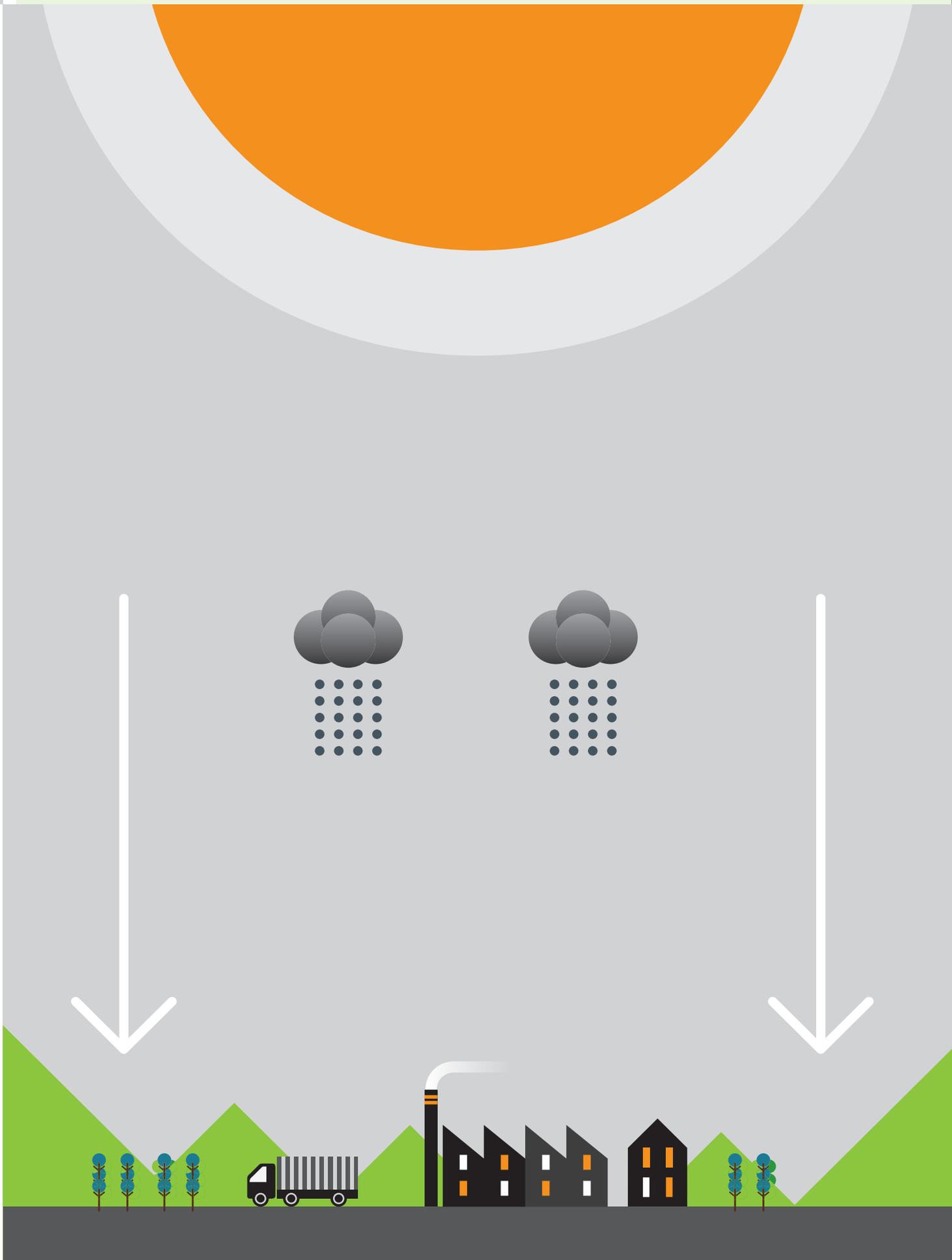
For gaining a more specific understanding of the case company's features and relating challenges, you can find its basic data below.



Table 1	Company profile of IndTex
<b>Location</b>	Industrial cluster near Delhi, Haryana (NCR)
<b>Employees</b>	200
<b>Products and clients</b>	Simple apparel (women's, men's, children's), knitwear, decorated apparel Sold directly to European and Canadian retailers (including Next, FCUK)
<b>Capacity</b>	10 hour shifts, 7 days per week Up to 700.000 garments per month 70 days from design to delivery (approx. 15 days transport)
<b>Technology level</b>	Medium: Partially automated production processes Machinery used: 70 sewing machines (various types / functions), 15 ironing boards, 1 steamer, 1 packaging machine
<b>Supply chain</b>	<p><b>Upstream supply chain</b>  <b>Supplied material:</b> Ready-woven and printed fabric from cotton.</p> <p><b>Purchase of yarn:</b> Cotton yarn is purchased from a range of suppliers in India, Pakistan and China; the transport of the yarn to the dyeing units is conducted by ship and/or truck and is administered by the supplier companies.</p> <p><b>Dyeing of woven yarn:</b> The cotton yarn is dyed in units based in Tirupur, Tamil Nadu; the transport to the fabric processing units is conducted by truck and is administered by the case company (duration: up to 15 days).</p> <p><b>Fabric processing:</b> The processing of the woven yarn into fabric takes place in units in Ahmedabad, Gujarat; transport to the case company in Faridabad, Haryana is conducted by truck and is administered by the case company (duration: up to 8 days).</p> <p><b>Management of upstream supply chain:</b> To ensure timely delivery and competitive pricing, the company has diversified its raw material suppliers in recent years, now sourcing from India, Pakistan and China. To ensure compliance with environmental standards, particularly regarding water use, effluent treatment and level of toxins in dyed apparel, the company has increased its control over the dyeing unit: the dyeing process is directly administered by the company.</p> <p><b>Stock</b>  <b>Storing of fabricated and packed garments:</b> The company has 1 general storage room and 1 small storage room with air-conditioning for special garments which cannot tolerate inside temperatures above 34°C (problem of stains from handling).</p> <p><b>Downstream supply chain</b>  <b>Transport within India:</b> The fabricated garments are transported to the warehouse at Delhi airport; transport is by truck and is administered by the case company. The cluster is located directly at the 2-lane asphalt main road leading to Delhi.</p>



	<p>Traffic jams are extremely frequent as the Faridabad region has been booming as an industrial cluster in recent years, while the transport infrastructure was not extended to match this growth.</p> <p><b>Transport to export markets:</b> The garments are shipped to destinations in Europe and Canada; inter-continental transport is by airplane and is administered by an export trading company.</p>
<p><b>Location and buildings</b></p>	<p><b>Infrastructure at location</b></p> <p>Inside the cluster, road quality is very poor in most parts; while a few asphalt main roads exist most lanes have a very uneven non-asphalt surface. The sewerage system frequently fails to capture the rains during monsoon periods. All units in the cluster are connected to the public electricity and water grid. No independent energy supply is provided at cluster level.</p> <p><b>Factory buildings – outside and inside</b></p> <p>The factory has two buildings: building A is a two-storey building with one fabrication room on each floor and one drying room for washed clothing. Here, the garment washing, stitching, finishing and packaging take place. Building B is a two-storey building hosting 6 office rooms and the two storage rooms.</p> <p>Facilities and premises are old, but sufficient to withstand common climate irregularities. The condition of buildings is controlled on an annual basis.</p> <p>The company has installed fans and a basic ventilation system to regulate inside temperatures. The smaller storage room reserved for delicate clothing is equipped with air conditioning to avoid handling stains. Two air-conditioned office rooms also exist.</p>
<p><b>Process chain</b></p>	<p>The process chain within the manufacturing plant involves five distinct steps: cutting, stitching, finishing (quality control, pre-finalisation), washing and packaging.</p> <p>All process steps are predominantly conducted using manual labour. For stitching, finishing and packaging, workers use sewing machines, ironing machines and packaging machines.</p> <p>Production is organised in process lines with relatively high efficiency.</p>
<p><b>Inputs</b></p>	<p>Electricity is used for running of all machinery, for lighting and for ventilation / air-conditioning. Electricity is supplied from a) the grid and b) a company-owned diesel-generator for covering shortages in the grid.</p> <p>Water is used for a) the washing of garments at two steps in the process chain: before starting the stitching and after finishing the garment, b) the plating of garments, c) the cleaning of facilities, and d) as drinking water for staff. Water is supplied via the local water pipe system and via ground water. Polluted unusable water is coarsely treated and discharged.</p>

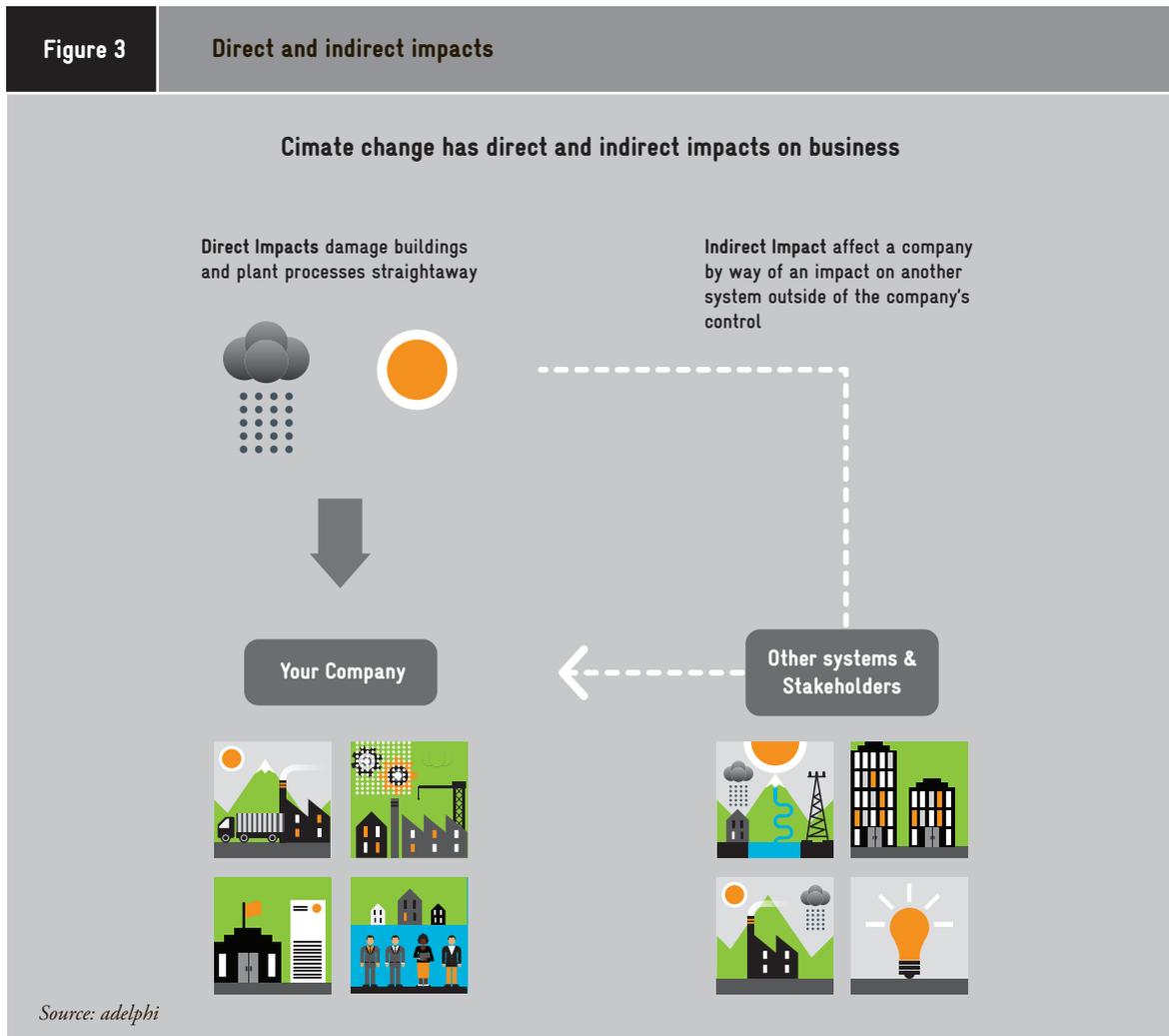




# 2 Sensitivity and adaptive capacity to climate change: Assessing impacts on the company - STEP 0

Impacts of climate change are different for each company. Impacts depend on the location as well as the production processes of a company.

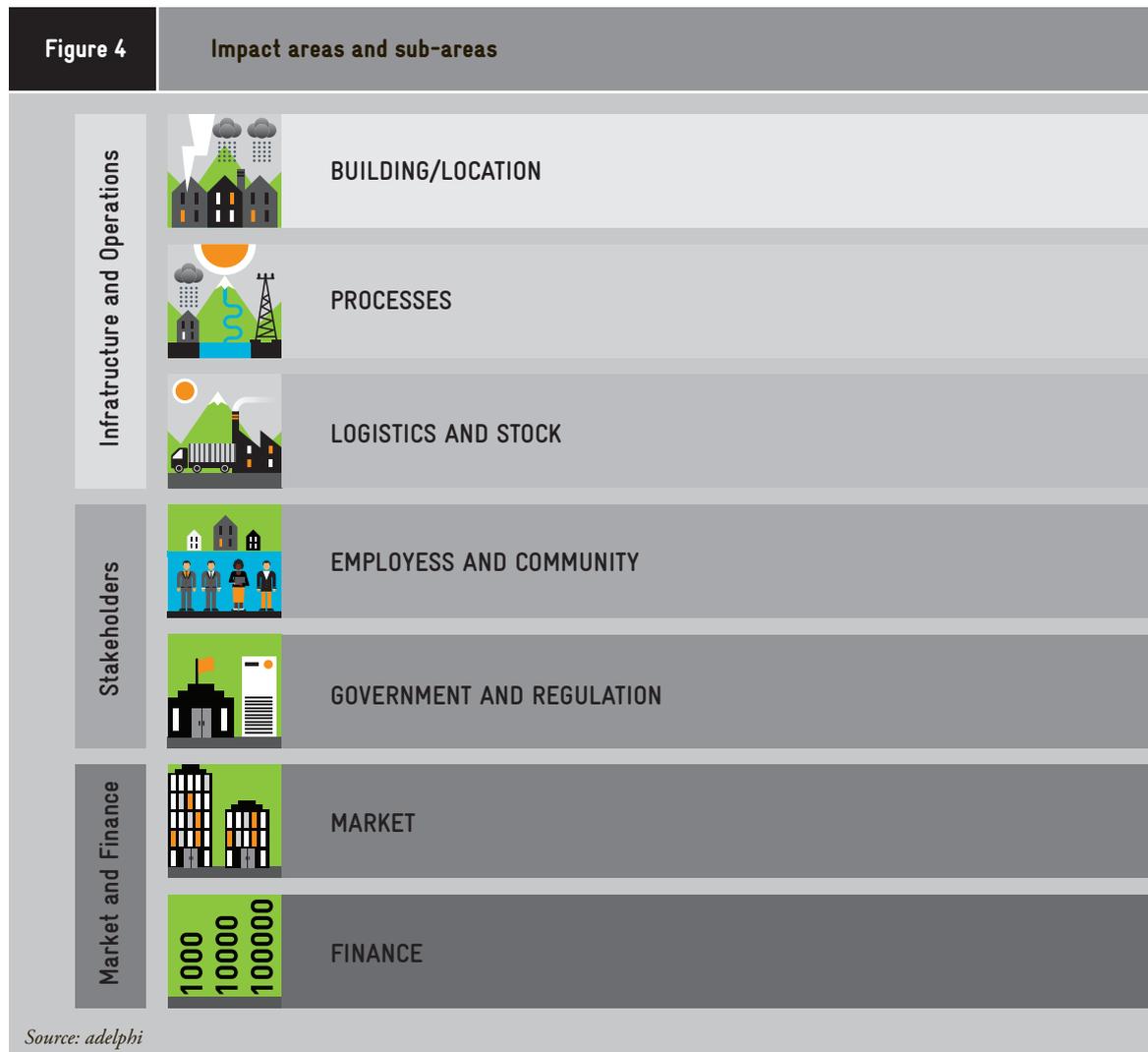
Impacts can be classified as either direct or indirect: direct impacts damage buildings, and plant processes. Machinery and raw materials may be damaged and workers may be less productive during heat waves. Indirect impacts affect a company through changes in supply and demand, logistics, regulations, impacts on wider stakeholders, such as the surrounding community, and financing. Many impacts result in reduced profitability. For example, prices for materials may rise or delivery of materials may be delayed. Other impacts may not be related to profitability. For example, in response to climate change, regulations may make entire processes illegal. Or banks may only offer credit at a higher premium in particularly affected regions.





To some people it might come as a surprise that indirect impacts can matter more for a company. This is due to the fact that while a company's own production site(s) may not be greatly affected by climate change, other important stakeholders, such as customers, suppliers or local/national governments, are. Both direct and indirect impacts need to be taken into account to assess the sensitivity of a company to climate change, improve its adaptive capacity and thus reduce its vulnerability (see the explanation of these concepts above).

When assessing a company's vulnerability, there are three broad impact areas of climate change that can be distinguished: "Infrastructure and operations", "Stakeholders" and "Finance and Market". These areas are further divided into the following sub-areas:



Distinguishing between these areas allows for a structured and comprehensive assessment of climate change impacts on a company. Such an analysis then lays the basis for comprehensively identifying resulting risks and opportunities for a business and addressing these through adequate adaptation measures.

**These impact areas will be discussed in detail and illustrated by the case company in step 0 by way of the "assessment grid".**

You can find a printable version in the Annex and as an Excel table on the Climate Expert website.



## 2.1 Assessment grid **0**

### 2.1.1 Purpose and content of the worksheet

The goal of this worksheet is to get a first understanding of the sensitivity and adaptive capacity of the client company to the impacts of climate change. It can be used as a first step to raise the awareness of a potential client on climate change impacts. For this purpose the company is asked several questions for assessing its sensitivity and adaptive capacity regarding the different impact areas of a company.

The questions allow to list and analyse climate change impacts on the company. Subsequently, the company can develop first ideas for countermeasures and also sketch out business opportunities.

Aim and scope of this worksheet are limited to serve as an introduction to the topic and provide an overview over sensitive areas. Used jointly with the other tools presented within the following sections it offers a very comprehensive approach to assess companies' past, existing and future exposure to climate change.

#### **Important categories:**

**Impact area:** This column is divided into the three impact areas and seven sub-areas which have already been described in Figure 4. These areas provide the basis for the assessment.

**Critical points:** For each impact area, specific questions have been developed that are important to consider when assessing the sensitivity and adaptive capacity of the company.

**Assessment:** Based on the "critical points" the sensitivity and adaptive capacity of each impact area is assessed. Each question from this column should be answered in a succinct yet comprehensive way. However, this sheet is only the starting point for the more detailed assessments in step 1 and results do not have to be developed to perfection.

**In case of risk:** This column is based on the assessment you have made within the previous column. It needs to specify to what degree the company is sensitive to a specific climate change impact or does not have the necessary adaptive capacity to tackle it. In the following, it becomes necessary to assess the extent of the risk – this is done by considering how grave losses or damages to the company will be and how likely it is that the impact will occur.

**Potential loss or damage** can be

- **"Low":** Loss or damage occurs but is limited and does not interrupt production process / value chain or endanger stakeholder relationships.
- **"Medium":** Loss or damage occurs and interrupts production process / value chain or endangers stakeholder relationships; countermeasures can be taken swiftly and easily and the company's survival is not at stake.
- **"High":** Loss or damage occurs, interrupts production process / value chain or endangers stakeholder relationships; countermeasures are difficult to take up or are not effective immediately. After this impact occurs, the company's survival is in question.

The **likelihood** that the climate change impact will occur in the future can be

- **"Not likely":** Impact occurs only in case of specific circumstances, probably not within the next 1-2 years, and has not yet occurred in the past.
- **"Likely":** Impact has occurred in the past and is likely to occur again, but it is not anticipated to be very probable in the next 1-2 years.
- **"Very likely":** The impact is highly likely or even certain and occurs in the next 1-2 years.



Where possible, the answers should be qualified, and any additional information necessary for the accurate assessment of probability and loss and damage stated.

**Ideas on measures for addressing risk / opportunity:** Following the assessment of risks, first ideas on how these can be minimised are collected. Because climate change not only poses risks to the company but can also open opportunities, this should also be noted in this column. Overall, considerations should include what has been done in the past, and what competitors have done.

## 2.1.2 How and when to use this worksheet

### Time required

Preparation: 0.5 days to familiarise yourself with the company

Assessment: 1.5 h, followed by company visit

Documentation: 3h

You should plan for at least 1.5 h of discussion to cover all areas as described in the assessment grid. After the assessment, it is recommended to take a guided tour through the company, in the best case accompanied by the participants of the meeting. If you have any additional observations concerning the sensitivity and adaptive capacity you should note them as well.

### Participants

Top management, representatives of key departments; alternatively, lead engineer.

The information and knowledge needed for the assessment is likely to be found across different departments of the company. Thus, conducting the assessment would ideally take place in a workshop-type meeting with representatives from the top management and the technical, sales and HR department; alternatively, one lead engineer and/or one representative of the top management suffice.

### Aim of the consulting session

This worksheet is the first step in your consulting assignment and can help you to get to know the characteristics and challenges of the client company at a glance. You can also use it as a discussion guideline before formally engaging with the company to raise their awareness on the issue of climate change impacts. Answering the worksheet's questions can be an "eye-opener" to the company; often, companies are already planning and/or implementing adaptation measures without identifying them as such.

### Your task

The worksheet should be used to guide your conversation with company representatives; thus, you do not need to use every single question if you deem it irrelevant to the company. However, you should definitely cover all impact areas. Sometimes it might be helpful to ask a non-specific, "open" question – e.g., "What are the main concerns for your employees?" – to gather relevant information. As a consultant, it is your job to listen closely and make the connections to potential climate change impacts which might not be apparent to the company. Also, in case that there is an issue within one of the impact areas that you find is not detailed enough on the worksheet, you should add your observations and points of discussion accordingly.

After the assessment, you should summarise your findings in written form and discuss these in case your client has any questions or doubts.

## 2.1.3 Results from the case study

To illustrate the assessment you can find below the summary and, in the grid, the sample answers to all assessment questions by the case company. While in the later worksheets we focus on the impact of heat waves,



here, we have taken a range of climate change phenomena into account.

### Summary

Climate impacts regularly **worsen the productivity and profitability of the company**. The frequency of their occurrence will increase. Overall, there are various areas of IndTex which are vulnerable to climate change impacts, particularly regarding impacts on **processes and logistics**. These are in part directly **relevant to its growth and survival**. Few measures have been taken to reduce the sensitivity or increase the adaptive capacity of the company. In terms of opportunities, IndTex could profit from **a structured approach to climate-responsive product development** as well as regarding its **relationship with buyers**.



Table 2		Assessment grid on sensitivity and adaptive capacity			
Impact Area		Critical Points	Assessment		
Infrastructure and operations	Building/Location	1	Are existing buildings resistant enough to withstand climate change impacts (changing climate, extreme weather events)?	<p>Facilities and premises are 20 years old, but sufficient to withstand common climate irregularities.</p> <p>Outside walls have not shown particular signs of deterioration or instability during or resulting from periods with extremely hot temperatures or flooding.</p> <p>The condition of buildings is controlled by civil engineers annually.</p>	
		2	How sensitive is the company location regarding climate change impacts?	<p>The location and buildings of the company are vulnerable to flooding in times of intense rain, especially because of congested sewerage systems. This situation is aggravated by the trickling of water into the dry soil caused by generally rising temperatures.</p> <p>Flooding did occur in the past with considerable damage on facilities and temporary production stoppages.</p>	
		3	Is infrastructure in direct proximity of the premises resilient regarding changing climate and extreme weather events?	<p>Inside the cluster, road quality is in most parts very poor; few asphalt main roads exist, most lanes have a very uneven non-asphalt surface. The sewerage system frequently fails to capture the rain during monsoon periods.</p> <p>Deteriorating road conditions occur regularly in case of heat waves (cracks in asphalt) and intense rain (flooding and/or erosion of streets) which lead to delays in upstream and downstream supply chains.</p>	
		4	How linked is the company with neighbouring companies? (resources, infrastructure, joint efforts)	<p>The company is part of a typical cluster and depends on a common grid for energy, water supply, and sewerage. In times of high energy demand, blackouts occur; in case of flooding, sewerage system overflows.</p>	
		5	How linked is the company with the community? (resources, infrastructure, joint efforts)	<p>Majority of employees live within surrounding communities. The overflow of the sewers may lead to low water quality in times of flooding; during heat waves, the cluster and the community are in rivalry for water use.</p>	



	In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)	Ideas on measures for addressing risk / opportunity
	(not vulnerable; potential change)	Increase frequency of building condition controls to bi-annual checks
	Medium / The occurrence of flooding during monsoon season in the future is likely	Build up dykes on the company property; build water tanks for overflowing water; greening of premises/ground where possible to increase water-absorption
	Low if no extreme case of heat or flooding occurs; otherwise damage can be high due to contract penalties or loss of business	Cluster-level action regarding road improvement; stocking up on raw materials; plan with buffer days for delivery, especially during monsoon season / summer
	Medium / likely	Initiate joint efforts regarding energy supply, e.g., cluster plant; joint building of overflow tanks.
	Medium / happens occasionally (likely)	Initiate community engagement through employee representatives on various issues, including water risk assessment.



Impact Area		Critical Points	Assessment		
Infrastructure and operations	Processes	6	<p>How sensitive are manufacturing processes in terms of uncertain energy and water supply?</p>	<p>All process steps are predominantly conducted using manual labour. For stitching, finishing and packaging, workers use sewing machines, ironing machines and packaging machines.</p> <p>Electricity is used for the running of all machinery, for lighting and for ventilation / air-conditioning. Electricity is supplied from a) the grid and b) a company-owned diesel-generator for covering energy shortages in the grid. Especially in times of heat waves, cuts in energy supply lead to frequent halts in production.</p> <p>Lack of water for washing and ironing is also problematic in times of heat waves; also, water quality is lower and a filtering system needs to be used; otherwise, water trucks have to be ordered, delaying availability of water and making it more costly. Drinking water becomes more costly, which has negative impacts on employees' well-being and productivity.</p> <p>Penalties of purchasers or loss of business are likely to occur in case of delivery delays.</p>	
		7	<p>Is the availability of water supply secure?</p>	<p>No, especially in times of high temperatures/ heat waves, cuts in water supply from grid occur because of increasing demand within the cluster. This leads to production stoppages and causes obstacles for on-time delivery.</p>	
		8	<p>Is the availability of energy supply secure?</p>	<p>No, especially in times of high temperatures/ heat waves, cuts in energy supply from grid occur because of increasing demand within the cluster. This leads to production stoppages and causes obstacles for on-time delivery.</p>	
		9	<p>How sensitive are manufacturing processes to higher temperatures?</p>	<p>In addition to the issues described above, increased inside temperatures during heat waves also cause more frequent failing of machinery due to overheating, especially of older sewing machines and the plating machine. Penalties of purchasers or loss of business are likely in case of production delays.</p>	



	<b>In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)</b>	<b>Ideas on measures for addressing risk / opportunity</b>
	High / very likely	Increase number of diesel generators and fuel; build storage facilities for water; diversify water sources. Build in delivery buffers especially in monsoon season / summer.
	See above (6)	See above (6)
	See above (6)	See above (6)
	Medium / very likely	Increasing ventilation and installation of air conditioning to keep inside temperature below extremes.



Impact Area		Critical Points	Assessment		
Infrastructure and operations	Processes	10	How sensitive are manufacturing processes in case of extreme weather events?	Extreme weather events in the region are mainly floods, droughts and heat waves. Impacts are described above (6).	
		11	Is it possible to reduce water and / or energy consumption?	State of the art machinery would require less energy; also, a water recycling system for the pressing / ironing and finishing wash could be installed.	
		12	Are there any measures to provide the processes with energy in case of energy supply outage?	The diesel generator is able to partly fill in these gaps but at considerably higher costs. Also, the amount of electricity which can be provided by the generator is limited.  More frequent production stoppages with negative impacts for on-time delivery are likely etc.	
		13	Are there any safety measures to prevent outflow of dangerous or pollutant substances?	The waste water of the pre-processing wash of the fabric contains some toxic residues; it is collected in tanks and then transported to a recycling plant. In case of flooding, the tank could leak. No measures taken so far.	
	Logistics and Stock	14	Is the availability of raw material and auxiliary material affected by climate change impacts?	Cotton prices rise during heat waves. Prices for supplied fabric increase in times of heat waves, droughts or flooding and greater uncertainty in purchasing decisions of customers occurs. Higher input costs have a negative impact on competitiveness.  However, the company has a range of suppliers and is therefore somewhat immune to extreme weather events affecting harvests locally. The company seeks to further diversify its sources, thus securing supply by sourcing cotton from different geographic regions in India, Pakistan and China.	
15		Is there enough flexibility in transport and delivery of goods in case of climate change impacts?	The flexibility is limited since most transport happens overland via trucks.  Road quality can deteriorate during heat waves, particularly in case of non-asphalt roads, drivers need more frequent breaks, and alertness might be reduced, thus increasing the risk of accidents.  Transport in upstream supply chains might be delayed resulting in production delays, thus endangering on-		



	In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)	Ideas on measures for addressing risk / opportunity
	High / likely	See above (6)
	N/A	Modernise equipment.
	See above	See above
	Medium / not very likely	Make tank flood-resistant.
	Medium / likely	Increase of storage volume for input materials. Diversification of suppliers and identification of less vulnerable regions of suppliers.
	Medium/ likely	Build in buffer days for delivery times; increase storage volume for materials; change to alternative ways of transport (train).



Impact Area		Critical Points	Assessment		
Infrastructure and operations	Logistics and Stock		<p>time delivery.</p> <p>Deteriorating road conditions in downstream logistics slightly increase the probability of delivery delays, too.</p>		
		16	<p>Is there any possibility to reduce raw material and product miles and/or reduce complexity of value chain?</p>	<p>Difficult, as some of the most reliable suppliers are located far away.</p>	
		17	<p>Is the storage of goods secure in case of changing conditions (e.g., higher temperature) or other climate change impacts (e.g., flooding)?</p>	<p>Equipment, input and stock is stored inside buildings; thus, there is no risk that intense sunshine directly damages them. Some garments are particularly sensitive to stains from handling, which more frequently occur if employees work in hot temperatures. This is why particularly sensitive garments are processed in a processing storage room with air-conditioning. In times of heat, dust is prevalent and fabric needs to be washed often to avoid dustiness. Further, finished items need to be packaged securely to avoid soiling.</p> <p>If intense rain leads to flooded facilities, the stock materials like fabric materials and garments are endangered of soiling as well. This has negative consequences for the product quality, leads to the need of rewashing and / or causes delivery delays. Equipment is hardly affected if flooding occurs. During monsoon the moisture is very high. This can affect the garments negatively.</p>	
Stakeholders	Employees and community	18	<p>Do working conditions deteriorate due to climate change impacts?</p>	<p>Worker's productivity drops considerably once the outside temperature rises above 35°C. When the temperature is higher than 38°C it drops as low as 30 % of regular productivity. Also, the number of accidents rises during heat waves, as workers have trouble keeping up full alertness.</p> <p>As production is mainly done by hand using automated sewing machines, the productivity drop directly translates into profit losses. The company monitors room temperatures and has a small set of response strategies in periods of extreme heat: staff is informed about how to behave during heat waves and drinking water is provided to the work places directly and frequently.</p>	



	<b>In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)</b>	<b>Ideas on measures for addressing risk / opportunity</b>
	N/A	Seek reliable suppliers in closer proximity; integration of some processes in-house.
	Low/ likely  Medium/ likely during monsoon season	Company has already implemented adequate measures.  Build up dykes on the company property; dehumidifying.
	Medium/ likely	Increase number of ventilators and install air conditioning within production facilities.



Impact Area		Critical Points	Assessment		
Stakeholders	Employees and community	19	Do living conditions of workers deteriorate due to climate change impacts?	<p>Workers mainly live in surrounding communities; there are no living quarters on company premises. Impacts of heat waves on communities are felt indirectly by the company, namely in terms of the number of employees on sick-leave, resulting from deteriorating hygienic conditions in the communities. The same applies in times of flooding.</p> <p>During periods of extreme heat, supply with energy and water is extremely scattered in surrounding communities where the workers live. The cool storing of fresh food becomes difficult and the number of incidences of food-related illness rises. Similarly, water-borne diseases occur more frequently during heat waves as water quality degenerates and water purifiers cannot be sufficiently run due to the gaps in energy supply. Altogether, there is a considerable risk of employees not attending work in times of extreme weather events.</p>	
		20	Are there any impacts on productivity caused by temperature rise or extreme weather?	Employee productivity, see above (18); machinery overheating may occur; productivity is generally lower.	
		21	Has the community been affected by climate change and / or the company's actions in the past?	Water table has sunk and is particularly low in summer. In times of flooding, water quality deteriorates, in part also because of waste water overflow in the cluster. Also, bad road conditions and low harvest rates in times of flood and drought lead to food supply shortages in the community.	
		22	How severely is the community (estate population and surrounding communities) affected by climate change, and by the company's adaptation or maladaptation?	Water has been a contentious issue between the community and the cluster in the past; in case of heat waves, the resulting increase of energy and water usage of the cluster indirectly decreases the availability of those goods for the surrounding communities. There is a risk that this resource conflict could escalate, especially if food supply is also problematic.	
		23	Are there any possibilities to help adapt and / or raise stability of energy/water supply in the community (estate population and surrounding communities) in a joint effort (PPP)?	This would be possible; cluster level action is important regarding this issue, as the company is only one of 50 companies contributing to the problems.	



	<b>In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)</b>	<b>Ideas on measures for addressing risk / opportunity</b>
	Medium/ likely	Hire part-time employees when needed; engage with communities of workers to enlist backup workers from their families; installation of houses on the factory premise.
	Medium / likely	Install air conditioning or ventilation system; heat-proof machinery, e.g., through water cooling.
	N/A	N/A
	Medium / likely	Engage with community on various issues on a cluster level, including water, road conditions, etc.
	N/A	N/A



Impact Area		Critical Points	Assessment		
Stakeholders	Government and regulation	24	Have past direct climate change impacts already affected regulations that your company has to comply with?	In the context of energy efficiency programmes and regulation, companies already face more stringent expectations regarding the insulation of buildings; and these can be expected to become more mandatory in the future. The Energy Conservation Building Code (ECBC) of 2007 details and strengthens requirements of the National Building Code regarding the insulation of buildings, including requirements on insulation materials, fenestration, roofs, ventilation and air conditioning. While the code is currently voluntary, the Department of Renewable Energy, Government of Haryana, started to implement its requirements for buildings and industry; also, the code is planned to become mandatory in the future. Improved insulation, amongst others targeted at reducing heat build-up inside buildings, is a key component of governmental energy efficiency programmes at national and state levels.	
		25	Do projected climate change impacts affect existing regulations?	<p>Currently, no specific requirements exist for companies located in Delhi-NCR or Haryana on how to prepare for or behave during heat waves. Given the expected intensification of the heat wave challenge in the region and increasing governmental action on heat waves in other states and cities, for instance Ahmedabad, governmental programmes and requirements can be expected to intensify in the future.</p> <p>The company is regularly informed about changes in regulatory requirements and upcoming government programmes in areas like energy efficiency by its associations (cluster association, regional textile association). However, the ability to respond to changing expectations is limited, as the costs of acquiring the necessary expertise and technologies are high.</p> <p>Increasing costs because of penalties/ fines in case of non-compliance in the future are possible.</p>	
		26	Are there any regulations that you anticipate or expect to become more stringent in the future?	See above (25)	



	<b>In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)</b>	<b>Ideas on measures for addressing risk / opportunity</b>
	High/ likely	Prepare for the requirements to become mandatory.
	Medium/ likely	Top management to join the task force on regulation of the cluster association.
	See above (25)	See above (25)



Impact Area		Critical Points	Assessment		
Stakeholders	Government and regulation	27	Is your company affected by any existing government programmes (e.g., National Missions) or funding streams?	No, but the company is aware of the existence of discounted energy efficiency loans by public banks.	
		28	Are there any government programmes regarding adaptation to be anticipated, or that your company could lobby for?	Most prominently, initiatives of the Bureau of Energy Efficiency (BEE) provide support to SMEs for improving their energy efficiency.	
Finance and Market	Market	29	Is there any falling or rising demand of company's products caused by climate change?	<p>The growing frequency and intensity of heat waves in various parts of the globe increases the demand for very light clothing (through light fabrics and tailored designs) as well as for clothing with cooling properties. Given the design and production capacities of the company, particularly the growing demand for very light clothing, offers market opportunities for the company.</p> <p>Concerning changes in market demand, the company is well positioned to respond to these changes. The company is used to flexibly and quickly responding to changing demands concerning clothing design and fabric properties.</p>	
		30	Are there increasing expectations / standards of purchasers and / or end-consumers in terms of climate change adaptation efforts (and is compliance referring to this aggravated by the vulnerability of the company)?	<p>There is no pressure yet from the company's buyers in Europe and Canada concerning adaptation efforts. However, buyers have started to look into the vulnerability of their supply chains to climate change impacts and the company assumes that expectations concerning the management of risks from climate change impacts will increase in the near future. Already today its buyers require the company to prove compliance with environmental and social standards, including on issues like energy and water efficiency; and health and safety of employees.</p> <p>The company is strongly dependent on keeping up good business relations with existent buyers as competition is extremely high. Thus non-compliance with rising expectations is not an option.</p>	



	<b>In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)</b>	<b>Ideas on measures for addressing risk / opportunity</b>
	N/A	Need to seek out ways to be more informed about existing programmes.
	N/A	As member of the task force, the company could become more involved.
	Opportunity, gains: medium/ occurrence is very likely	Further market research
	Medium/ likely	Inform buyers about CCA strategy after its development.



Impact Area		Critical Points	Assessment		
Finance and Market		31	Are there any impacts on product accessibility?	The company uses shipping and air transport to deliver its goods to the buyers; so far, no problems have occurred. Air delivery is also used as a fallback option in case of production lags, but makes the goods unprofitable.	
		32	Is there any opportunity to extend or adapt product portfolio to climate change impacts?	See above (29)	
	Finance	33	Are there any problems regarding short-term cash-flow and financing caused by climate change impacts?	<p>In case of extreme weather events which lead to environmental disasters like flooding, damages on the company's property, buildings and machines will result in high repair costs and thus cuts in cash-flow.</p> <p>As well, higher adaptation standards for buildings and property set by insurance companies are likely and will increase insurance costs in case of non-compliance.</p> <p>The same issue applies for expectations of credit institutes resulting in higher financing costs or non-availability of financial resources in case of non-compliance.</p>	
		34	Are there any problems caused for long-term investments by climate change impacts?	N/A	
		35	Is it likely that your company's liabilities increase due to climate change impacts? (e.g., flooding resulting in toxic discharge)	Yes, this is the case as the surrounding communities are located very closely to the cluster; also, higher liability risks could result from deteriorating work conditions during heat waves and higher likelihood of accidents.	
		36	Are insurance premiums likely to be raised due to climate change impacts and / or are the existing insurances still adequate?	Insurance needs to be obtained for flooding, as risks have increased; all other CCA related risks faced by the company cannot be insured.	



	<b>In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)</b>	<b>Ideas on measures for addressing risk / opportunity</b>
	Medium/ very likely	Air delivery is already used in case of problems.
	See above (29)	See above (29)
	Medium/ likely	No ideas offered by the case company.
	N/A	N/A
	High / not very likely	Initiate engagement with the community; heat-proof production facilities and emphasise OHS procedures.
	Being underinsured: High / not very likely	No adequate offer on CC insurance as of yet; keep informed about it.





# 3 Deciding on the development of a CCA strategy

## 3.1 Purpose

Following the structured discussion with the company representatives based on the assessment sheet, it is advisable to decide whether to develop a CCA strategy as a next step. It is very important to come to this decision jointly with the company. In case you proceed to do the CCA strategy development, the company needs to invest considerable resources. This will only happen if its top management is convinced of the necessity and urgency to act, as well as the benefits resulting from it.

## 3.2 Important considerations

In order to do this in a transparent way, we recommend you to explain the assessment and decision process to the company, as well as provide details on the strategy development process before you do the assessment with the company. Even if the company is already convinced that a CCA strategy is advisable we still recommend you to first use the assessment grid interview. This allows your client to get a better understanding of the issues tackled during the CCA strategy development.

After you have done the assessment, you should write up all the information gathered and share this with the company. We recommend you to present the information in the grid as well as to summarise them in a short report. This report should analyse the findings focusing on the most relevant impact areas or sub-areas (see above “Preliminary analysis of the climate change vulnerability of IndTex”). You should also make a recommendation on whether a detailed assessment is necessary or whether the measures identified during the assessment are sufficient for meaningful action towards reducing vulnerability.

In the discussion with the company on whether to develop the CCA strategy you should raise the following issues:

- **Required time**  
Around 1-2 days of at least one top management representative/technical expert is required.
- **Required resources**  
You need to be able to work on the company premises for at least two days; ideally, you are granted full access.
- **Potential benefits by reducing risks / realising opportunities**  
You have already gathered a lot of information on this issue in the assessment grid; it is important to make the company understand that the full strategy development entails a more comprehensive approach to risks and opportunities, also considering impacts that were not discussed during the assessment.
- **Financial abilities**  
Adaptation measures can involve significant investments; before starting out on the CCA strategy development, you need to discuss the company’s ability to finance potential measures; in case it is very low, maybe it makes



sense to postpone the CCA strategy development.

- **Your consultancy offer, including implementation support**

Your offer should include at least 2 days of research before the joint strategy development; you will need this additional amount of time in order to accurately identify the climate change impacts faced by the company. The impacts are locally specific, but once you have data available for one region, you only need to verify it for the specific company. In addition, you should guide the strategy development process as a consultant (2 days of interactive work, 2 days of documentation and analysis, 0,5 days of presentation) and offer implementation support (up to 4 days per year).

- **Any additional services**

After conducting your first assignments, you will have a good understanding of the types of services that are in demand in this field; use this to develop corresponding services and link up with partners that may bring in additional knowledge, e.g., in the field of energy efficiency.

- **Your consultancy fee**

Your fee should reflect the experience you have in guiding CCA strategies.

### 3.3 Results from the case study

For the case company, the decision was taken considering the following factors:

- Risks and opportunities as stated in the assessment grid
- Discussions with top management regarding resources, benefits, and the financial abilities of the company as well as the services offered by the consultancy.

The following decision was made:

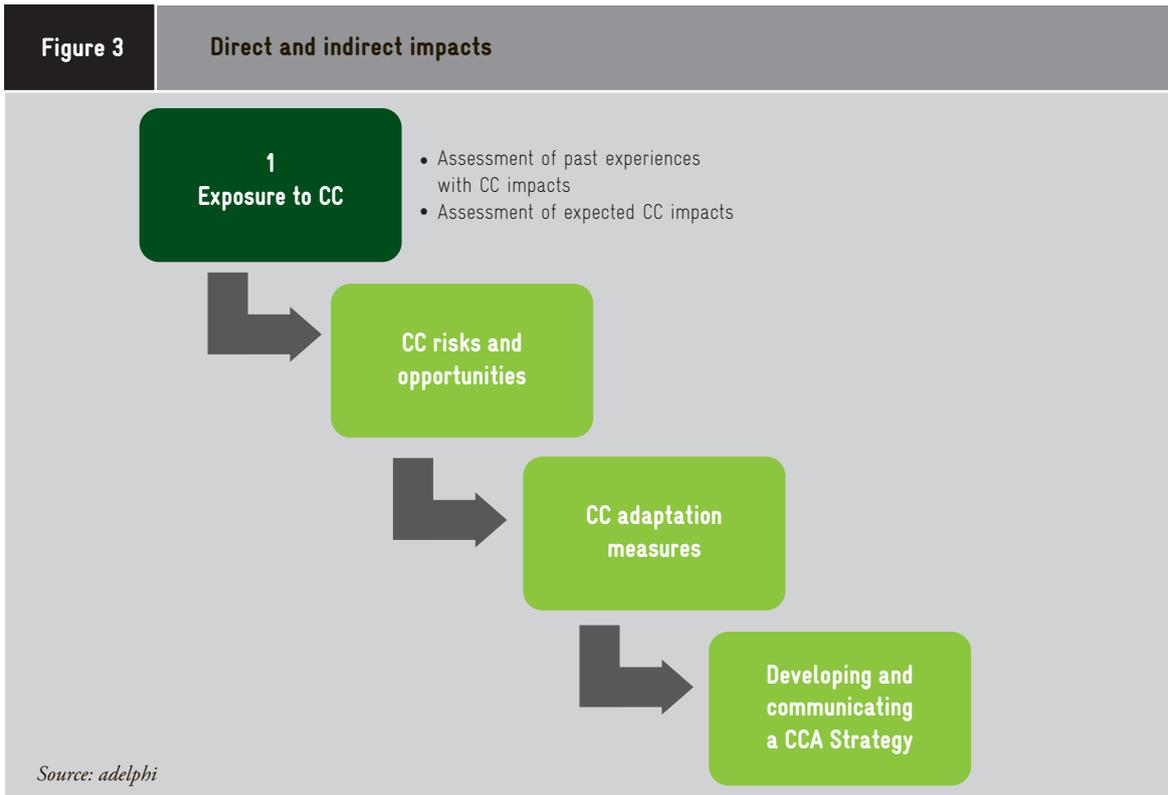
A detailed risk and opportunity assessment as well as a structured development of effective adaptation measures offers **benefits that outweigh the costs of engaging with CCA consultants**. The company is also willing and able to finance potential adaptation measures, especially those that bring additional benefits in terms of resource efficiency. **The development of a CCA strategy is thus recommended.**







# 4 Exposure to climate change: Assessing past experiences and expected changes – STEP 1



The first step in working with your client on an adaptation strategy is to identify CC challenges to which the company is exposed. This is the ideal occasion to raise awareness about CC impacts on the company and underline the importance of implementing CCA measures or a full-fledged CCA strategy. As a first step in the assessment you ask your client to reflect about past climate change events and impacts on his or her company regarding the above mentioned impact areas. If you have started with the assessment grid, you already have discussed many points. You can prepare the worksheet accordingly. Subsequently to the discussion of this worksheet, you present the expected changes in the areas relevant to the company and encourage reflection about negative and positive consequences for the company. This information you need to gather beforehand. In case you have discussed the past impacts thoroughly during the assessment grid interview, you can skip this step.

## 4.1 Past climate change and impacts on the company **1**

### 4.1.1 Purpose and content of the worksheet

This part serves as a first occasion for your client to consciously deal with climate change as a relevant variable for his / her business. The goal is to raise awareness about the relevance of dealing with CCA by means of reflecting on past climate change events which caused a positive / negative impact on your client's company.



### Important categories:

- **Climate phenomenon:** In this column, all climate change phenomena that have been observed in the past are stated. Examples are “gradual increase of average temperature”, “increasing frequency and intensity of heat waves”, “droughts”, “increasing intensity of rainfalls” and “rise in sea levels”. These phenomena are then evaluated with the help of the following columns.
- **Point in time:** In order to evaluate the impact of the climate change phenomenon on the company, it is first of all important to specify the time of occurrence or duration of each climate phenomenon. This could be, for example, formulated as “observed over the past four years during May, June and July”, “has intensified in the last decade”, etc.
- **Impact area:** In this column it is marked which one of the three different impact areas of the client's company is affected by the respective climate phenomenon. At least one needs to be selected for each identified impact. However, each climate change phenomenon can have several impacts on the company, e.g., the climate change phenomenon “Increasing frequency and intensity of heat waves” causes “Decreasing productivity of employees” which is referring to the impact area “Stakeholders” as well as causes “More frequent production stoppages resulting from overheating of machinery” as one example of the impact area “Infrastructure and operations”
- **Description of phenomenon:** This column describes in more detail the climate phenomenon.
- **Resulting disadvantages:** The column refers to “disadvantages” resulting from the respective climate change phenomenon, e.g., “Decreasing productivity of employees” or “More frequent production stops resulting from overheating of machinery”
- **Resulting benefits:** Similar to the last column, this column refers to “benefits” for your client's company resulting from the respective climate change phenomenon, e.g., “New market opportunities because of changing customer preferences”
- **Subsequent measures taken:** The final column asks for measures which were implemented as a response to identified CC impacts, e.g., “Increasing use of ventilation and AC” as a response to “Decreasing productivity of employees” which was caused by the climate (weather) phenomenon “Increasing frequency and intensity of heat waves”

The outcome of this worksheet is a first overview for you of your client's perception of climate change, his or her perceived exposure and consequently initiated adaptation measures thus far. Accordingly, it is a first starting point for you to estimate the knowledge and needs of your client as well as to evaluate the sensitivity to climate change and the present adaptive capacity of your client's company.

### 4.1.2 How and when to use this worksheet

#### Time required

Preparation: 2 days of climate data research and analysis

Assessment: 1h (less if assessment grid results have been transferred by you)

Documentation: 2h

#### Participants

Top management, lead engineer



### Aim of the consulting session

The worksheet is of high relevance to familiarise your client with the connections between CC, its impacts on the company and resulting disadvantages and benefits. Reflecting on adaptation measures already undertaken helps the discussion partners understand, that it is very likely that their company is already adapting to the impacts of CC.

**Your task** is to **guide and support your client in the process of identifying past CC impacts**. You can assist them in completing the worksheet by asking several questions according to your research about past climate change and extreme weather events in the relevant region, e.g., rising average temperatures, increasing frequency and intensity of heat waves, increasing intensity of rainfall, rising sea levels, etc. Thus before this step, **it is your task to inform yourself and search for significant data material about the relevant climate change phenomena** which occurred in the geographical region of your client's company, its value chain as well at the sales markets. You can use supporting materials such as IPCC reports, state level action plans or the information provided on the Climate Expert website to identify climate change issues relevant for various regions in your country. You can apply your knowledge as well as the case study to explain and illustrate resulting disadvantages and benefits of the identified climate change impacts on those different areas.

However, at this stage of the assessment it is not yet necessary that your client thoroughly identifies all impacts on the company, as this will be done in the next worksheet. Rather, the discussion helps you to better understand which CC impacts have been most important for the company so far.

In concluding the assessment you can point out that the company **has already started to adapt to the impacts of climate change**. However, you need to point out that so far, this adaptation has been reactive. Now you will work jointly on a more **proactive response to CC challenges, allowing the company to address risks before damages** occur, and seize additional **opportunities for the company**.

### 4.1.3 Results from the case study

The following worksheet states how the case company responded to the assessment of past impacts. The only selected climate change phenomenon is “Increasing frequency and intensity of heat waves” as a common CC phenomenon in India. Obviously, this is not the only relevant past CC phenomenon in India but simply serves as illustration how to apply the worksheet. The case company identified **two impact areas as vulnerable to past heat waves**. Concerning “**Stakeholders**” the case company identified negative effects on the productivity of employees as a disadvantage of heat waves. The applied measure to cope with this impact is to improve ventilation and air conditioning to keep the inside temperature low. Regarding “**Infrastructure and operations**” the case company identified interruptions in production due to cuts in energy and water supply as well as more frequent production stoppages resulting from overheating of machinery as disadvantages. Regarding the first disadvantage the case company did not implement any measure to cope with the negative impacts of heat waves. To prevent the overheating of machinery they applied the same measure as mentioned before: **increasing use of ventilation and air conditioning** to keep the inside temperature low.



Table 3 Past climate change and impacts on the company								
Past Impacts			Impact Area					
	Climate Phenomenon	Point in Time	Infrastructure & operations	Stakeholders	Finance & market	Description of Phenomenon	Resulting impacts (Disadvantages /Benefits)	Subsequent measures taken
1	Increasing frequency and intensity of heat waves	Last 10 years		X		On several consecutive days temperatures beyond 30°C have been noted in the city centre; at night it hardly cooled down	Decreasing productivity of employees	Increasing use of ventilation and AC
2			X				Interruptions in production due to cuts in energy supply and water supply	
3			X				More frequent production stoppages resulting from overheating of machinery	Increasing use of ventilation and AC

## 4.2 Expected climate change and impacts on the company 1

### 4.2.1 Purpose and content of the worksheet

This worksheet focuses on expected climate change impacts which might affect different areas of a company. The idea is to further complement the list of expected climate change phenomena with further sources and available background information. Thus, the level of uncertainty regarding expected climate change impacts can be decreased as a scientific basis for the sources of CC impacts is given.

The next step within this worksheet is to specify the affected areas, to describe the resulting negative and positive impacts as well as to state its threshold values. Since this section needs to be considered as the preliminary step before conducting an assessment of CC impacts, it is important to familiarise the participating company with causalities in the field of climate change phenomena and resulting impacts.

**Important categories:**

**Variable:** In this column, it is stated what climate variable is affected by climate change. For example, this can be temperature or rainfall.

**Climate phenomenon:** Here, all climate change phenomena that are expected to occur in the future are to be stated. These can be, for example, “gradual increase of average temperature”, “increasing frequency and intensity of heat waves”, “droughts”, “increasing intensity of rainfalls” or “rise in sea levels”. It is likely that some of these impacts have already been felt in the past and were therefore identified in the previous worksheet. However, these impacts might change or further impacts could occur. Both worksheets are important for the development of a comprehensive CCA strategy.

**Trend direction, expected changes:** For each climate phenomenon the direction of the trend is stated (increasing, decreasing) and expected changes are described in more detail than in the previous column.

**Period of time (in comparison with):** How fast has change occurred in the past? How fast is change expected? In the brackets, it is stated which time period serves as a reference or baseline for the observed changes.

**Source:** In this step, it is noted where information on climate change trends come from.

**Notes on source or scenario:** Consequently, it is assessed how reliable the source is and at what point in time an update can be expected. Since adaptation measures will be developed according to the expected climate phenomena it is important that information is as up-to-date and accurate as possible. If sources are not yet fully reliable or are not regularly updated they should be used with caution and further research should be planned and conducted regularly.

**Impact area:** In this column it is marked which one of the three different impact areas of the client’s company is affected by the respective climate phenomenon. While at least one impact area needs to be selected per impact, each climate change phenomenon can also have several impacts on the company.

**Description of impact and its critical threshold value:** Based on which impact area is affected, it is described what the expected impacts are and evaluated how much these impacts affect the company. It is possible that climate change only starts affecting the company once it crosses a critical threshold. While a general increase in rain intensity might, for example, cause higher humidity and therefore mould infestation, road flooding can only be expected if the water level climbs past a certain amount of centimetres per square metre in a specific time. Both this threshold value and the timing should be quantified where possible.

**Notes and comments:** Finally, notes and comments are written down in order not to forget critical points that do not necessarily fit into this assessment grid but are important to consider.

## 4.2.2 How and when to use this worksheet

**Time required**

Preparation: 2 days of climate data research and analysis (same work as for the past impacts worksheet)

Assessment: 2 h (less if assessment grid results have been transferred and reviewed by you)

Documentation: 1 h

**Participants**

Top management, lead engineer



### Aim of the consulting session

This step is important to further familiarise your client with the connections between CC, its impacts for the company and resulting disadvantages and benefits. If the worksheet is filled in completely, the result is a list of different identified climate phenomena and their potential impacts on the company. Reflecting on adaptation measures already undertaken helps the discussion partners understand that in all likelihood their company is already (reactively) adapting to the impacts of CC. Your client should realise that to face risks and seize opportunities resulting from CC, a proactive instead of a reactive approach to CCA needs to be taken.

**Your task** as a consultant is to guide your client in identifying relevant CC phenomena which can occur in the future. You are also supposed to provide reliable data and scientific sources (e.g., from IPCC reports, national and regional research institutes etc.) to identify relevant CC phenomena and future projections. Moreover, you need to provide threshold values for CC impacts from reliable sources. If the threshold values are company specific (e.g., increasing inside temperature depending on isolation material; vulnerability for flooding depending on location and type of building), it is your task to identify these threshold values in the discussion with your client.

Altogether, it is of high relevance for companies to base future decisions regarding risk management, implementation of CCA measures and strategy development on reliable data. In this regard, it is your task to support your client in developing sensitivity as well as capabilities to cope with uncertainty regarding CC and its impacts. Ideally you also enable your client to update the information regularly or when new information sources are available.

### 4.2.3 Results from the case study

The worksheet shown below illustrates the different impacts of one climate change phenomenon which is expected to affect the case company.

The case company is going to face various climate impacts, yet as in subsequent worksheets of the case company the **assessment focuses on the climate phenomenon of “increasing frequency and intensity of heat waves”**. Already, such events have occurred more frequently in the past. In the next 3-5 years their occurrence is expected to rise slightly, and after that a more drastic rise is projected (2020-2030). This has various negative and a few positive impacts for the case company. As negative consequences of the mentioned climate phenomenon, the company detects a lower productivity of their employees due to deteriorating work conditions and health reasons. Moreover, the company will be faced with interruptions in their production due to cuts in energy and water supply, and higher costs due to more extensive use of diesel generators to cover gaps in energy supply and to satisfy increased energy demand for air-conditioning and ventilation. Machinery can be affected by heat, as there is little opportunity for cooling down. Furthermore, the company is faced with potentially increasing quality standards for buildings set by insurance companies resulting in higher insurance costs if no adaptation measures are taken by the company.

As a positive impact of the climate phenomenon, the company identifies the opportunity of new demand patterns for light garments in India which opens up business opportunities to enter the Indian market as a first-mover.





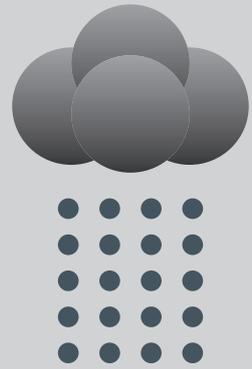
**Table 4**

**Expected climate change and impacts on the company**

	Variable	Climate Phenomenon	Trend direction, expected changes	Period of time (in comparison with)	Source	Notes on source or scenario	
1	Temperature	Increasing frequency and intensity of heat waves	Up to 7 heat waves in the short term, higher frequency possible	2012-2017: slight increase; 2020-2030: considerable increase (2001-2011)	Data provided by consultant (e.g., IPCC report)	Need to update assessment according to next report (2013)	
2							
3							
4							
5							



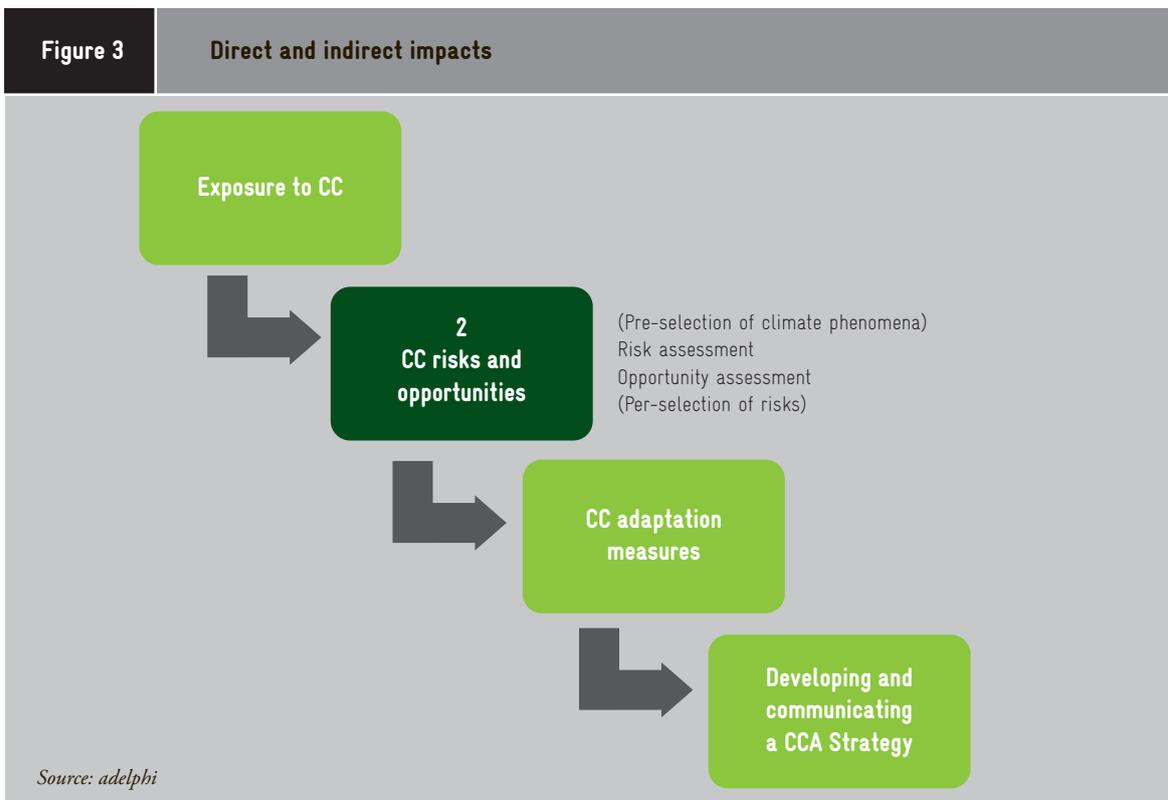
Impact Area				Description of impact and its critical threshold value	Notes and comments
Infrastructure & operations	Stakeholders	Finance and Market			
		X		Negative impacts on employees' efficiency and health if workspaces' inside temperature exceeds 34°C.	How high must the outside temperature be and for how long until the inside temperature is higher than 34°C?
X				An interruption in production due to cuts in energy supply and cuts in water supply if heat waves last for several days.	Try to collect data of past events and observed threshold values.
X				Higher costs due to more extensive use of diesel generator to cover gaps in energy supply and to satisfy increased energy demand for air-conditioning and ventilation if outside temperature exceeds 35°C.	
			X	Increasing quality standards for buildings etc. set by insurance companies. If no compliance, insurance costs will rise.	
			X	Positive impact: New demand patterns for light garments in India due to rising temperatures open up business opportunities to enter the Indian market.	Market research necessary.





# 5 Climate change risks and opportunities – STEP 2

## 5.1 Laying the ground for the risk and opportunity assessment



In the first step, exposure to CC was determined based on the experiences of the company and on an analysis of scientific evidence and projections. In Step 2, risks and opportunities are developed for the most relevant climate phenomena.

A number of climate change phenomena will occur in the regions where the company, its suppliers and markets are located. A comprehensive assessment of climate change impacts, risks and adaptation measures for all relevant climate change phenomena can be quite demanding in terms of staff and financial resources. If resources are limited or organisational buy-in is still low, focusing on one or few challenges could be recommended.

Pre-selection should be done jointly, according to the following criteria:

- Past occurrences of phenomenon and degree of damage
- Likelihood of increase in occurrences / impacts
- Expected timing of increase in occurrences / impacts
- Relevance of expected damages to growth / survival of the company



This allows to focus on the most urgent and relevant phenomena for the company; after the assessment of these issues, it is recommended to also consider – albeit less extensively – the less urgent ones for assessment.

## 5.2 Risk assessment **2**

### 5.2.1 Purpose and content of the worksheet

This section supports the company to evaluate, rate and prioritise the identified and anticipated CC impacts of the previous section and formulate them as risks. This is the pivotal step to develop suitable adaptive measures and a CCA strategy.

During the consultation, first the various risks are collected for each climate phenomenon. Then, the risk matrix is used as a visual tool to classify risks according to their probability of occurrence and the extent of expected loss or damage to the company. The outcome of this assessment is a clustering of impacts in three different priority categories, namely A, B and C. This prioritisation implies the urgency for initiating adaptation measures. The most urgent risks (priority score level “A”) are considered first in the next step which is the development of CCA measures.

#### **Important categories:**

**Climate phenomenon:** All climate change phenomena that are presently experienced and expected to occur in the future are stated. These have been identified with the help of worksheets 4.1 “Past climate change and impacts on the company” and 4.2 “Expected climate change and impacts on the company” and should be used as the basis of the risk assessment.

**Impact area:** In this column it is marked which one of the three different impact areas of the client’s company is affected by the respective climate phenomenon. It is used to structure the assessment process. In order to achieve a comprehensive list it is recommended that you use the list of sub-areas as a guideline for the assessment.

**Resulting risk:** The resulting risk column seeks to describe which risk the climate phenomenon poses. Risks occur whenever climate change has or threatens to have a negative impact on the company, e.g. by increasing costs, reducing productivity or damaging the company’s image. Risks could be, for example, “delays in supply and delivery”, “more frequent production stops” or “deteriorating health situation of employees”.

**Description:** In this column it is explained how the climate phenomenon leads to the expected risk. The risk “delay in supply” could, for example, be caused by the deterioration of road conditions which, in turn, can be a consequence of a heat wave.

**Expected time frame:** Here you state whether the risks are already affecting the respective impact area and, if yes, within which time frame. If no, it should be considered how likely it is that the risk will occur and within which time frame. A risk is very likely to occur if the climate change phenomenon is expected to cross relevant thresholds in the future or if the company is indirectly affected (e.g. when climate change negatively affects the company’s stakeholders).

**How probable is it that the impact will occur? What is the expected loss or damage?** Both this and the next column work with a scoring system that helps assess future events by means of a numerical value (1-5). A simpler version of this scoring system has been used in worksheet 2.1 “Assessment grid on sensitivity and adaptive capacity” that uses terms, such as “likely” or “damage is low” instead of numbers. At this point it is, however, more helpful to assign numerical scores in order to be able to connect several probabilities with each other and to assign overall priorities. Whenever this scoring system is used, the rule applies that high scores express a strong probability or impact in the respective categories.



The column is used for assessing **how probable it is that the risk actually becomes a negative impact for the company**. This probability has three aspects, namely

- The **likelihood of the climate phenomenon**: How likely is it that the climate phenomenon occurs?
- The **timeframe of the climate phenomenon**: What is the timeframe for its occurrence?
- The **likelihood of the impact**: How likely is it that the impact occurs once the climate phenomenon occurs?

Of course, the answers to these questions will be subjective. But by this point, enough information is gathered to base these answers in facts rather than only intuition.

Probability of 1

- The occurrence of the climate phenomenon is not very likely
- It has not occurred in the past and is not expected to occur in the next 1-2 years
- Once the climate phenomenon occurs, the impact does not follow directly and/or other circumstances are important for the impact to follow

Probability of 3

- The occurrence of the climate phenomenon is deemed possible
- It has occurred in the past and /or it is expected to occur but not in the next 1-2 years
- Once the climate phenomenon occurs, the impact follows with only little delay and/or circumstances are not important for it to occur

Probability of 5

- The occurrence of the climate phenomenon is deemed likely
- It has occurred in the past and/or it is expected to occur in the next 1-2 years
- Once the climate phenomenon occurs, the impact follows directly and immediately after

The in-between scores of 2 and 4 should be given if in comparison with other risks the probability is deemed higher or lower or if not all three of the respectively higher probability criteria are fulfilled.

Please note that in this section it is not possible to rate either likelihood of occurrence or damage with 0. This results from the fact that only actual and relevant risks are considered. Any situation that has no likelihood to occur or causes no damage does not qualify as a risk and thus should be dropped from the list.

The next column is used for assessing the **potential loss or damage** of the impact to the company. In contrast to the assessment grid, here we only focus on the loss or damage, not on the feasibility of countermeasures, which will be assessed in more detail later.

Three aspects are of importance:

- Extent of loss or damage
- Affectedness of production processes or value chain
- Affectedness of stakeholder relations

Potential loss or damage of 1:

- Loss or damage occurs but its effect on the bottom line is limited
- Production processes and/or value chain are not interrupted
- Stakeholder relations are not affected

Potential loss or damage of 3:

- Loss or damage occurs and has a significant effect on the bottom line, endangering its growth potential
- Production processes or value chain are interrupted



- Stakeholder relations are affected and necessitate countermeasures

Potential loss or damage of 5:

- Loss or damage occurs and endangers the survival of the company
- Production processes and value chain are interrupted
- Stakeholder relations are endangered and the licence to operate is in question

As damages or losses may exist which are to be avoided by all means, the damage of this particular risk could again be multiplied by a weighting factor.

**Risk (probability × extent of damage):** Based on the scores of two previous columns, the overall risk score of the phenomenon is calculated by **multiplying** the probability with the degree of loss or damage. As long as no multiplication factor for certain damages is used, each risk will score between 1 and 25 points.

**Priority:** Based on the risk score, a priority category is given to each risk. Most urgent risks are categorised “A”, least urgent “C”. Prioritization should follow the general rule “the higher the risk score, the higher the priority”. However, specific thresholds between priority areas A, B and C have to be defined by you and the company.

## 5.2.2 How and when to use this worksheet

### Time required

Preparation: 0.5 days of risk accounting

Assessment: 2.5 h (less if assessment grid results have been transferred and reviewed by you)

Documentation: 3 h; plus 2-3h of review of risk prioritisation with other key staff

### Participants

Top management, lead engineer

### Aim of the consulting session

The consulting session should make clear to the participants that risk assessment is not an accurate science, but that it rather uses existing knowledge and information to project the likelihood and severity of impacts in the future. It is nevertheless an important step towards a CCA strategy, as resources need to be directed to those impact areas that are most likely to affect the company's growth and survival.

**Your task** as the consultant is to support your client in classifying the climate change phenomena in terms of the affected areas of the company. Likewise, you need to guide your client in figuring out the “probability of impact occurrence” and the “extent of damage” for the company.

We propose to collect the risks per climate change phenomenon first in the table, then assess and calculate their relative score and then use the risk matrix to visualise the risk level of the impacts. The matrix allows for a simple comparison between the different risks in terms of their likelihood of occurrence and impact on the company. You need to find out the relevant information for assessing the probability and impact by drawing on your information and analyses from observing the company's infrastructure and business operations as well as by asking your client further questions regarding the sensitivity of the company. In combination with your knowledge about the different climate change projections and local CC impacts, it is possible for your client to specify a score for each identified risk in terms of both probability and impact. It is recommended to then test and discuss the prioritisation that you have jointly done with other key staff.

Following our recommendation, you should begin the risk assessment by filling in the assessment table with risks for each single phenomenon.



### 5.2.3 Results from the case study

**Weighting factor used:** None

**Grading of priority:**

**Risk A:** 14-25

**Risk B:** 8-13

**Risk C:** 1-12

The risk assessment for the case company proceeds by analysing the probability and impact of risks related to the climate change phenomenon “Increasing frequency and intensity of heat waves”. The prioritisation seeks to achieve a viable basis for **effectively allocating resources to the most urgent and impact-relevant issues**. This means that for the development and implementation of adaptation measures, the identified risks with a priority score level “A” will be tackled first.

For the case company the most important risks are:

- Quicker overheating of machinery which leads to more frequent production stops
- Increasing frequency of power-cuts from grid which leads to production stops or increasing need of diesel-generators
- Decreasing alertness of employees which leads to more frequent accidents and greater rate of garments with mistakes
- More frequent production delays at suppliers with high water, energy and labour inputs
- Increasing frequency of heat-related health problems of employees



Table 5		Risk table for heat waves						
	Climate phenomenon	Impact Area			Resulting risk	Description	Expected time frame	
		Infrastructure & operations	Stakeholders	Finance and Market				
1	Increasing frequency and intensity of heat waves	X			Deteriorating road conditions on site lead to delays in supply and delivery	Due to high outside temperature several days in a row, streets can crack	Already occurring from April – June	
2	Increasing frequency and intensity of heat wave	X			Quicker overheating of machinery leads to more frequent production stops	Due to increasing inside temperatures, machines can overheat	Already occurring from April - July	
3	Increasing frequency and intensity of heat waves	X			Increasing frequency of power-cuts from grid leads to production stops or an increasing need of diesel-generators (higher costs)	High temperatures lead to an increasing energy demand (AC, ventilation etc.) for the entire cluster resulting in power-cuts	Already occurring from April - July	
4	Increasing frequency and intensity of heat waves	X			Increasing dust occurrence	Increasing dust occurrence leads to the necessity of rewashing clothes more often which in turn increases water consumption	Already occurring year round (except for July-August, monsoon)	
5	Increasing frequency and intensity of heat waves	X			More frequent production delays at suppliers with high water, energy and labour inputs	Due to high temperatures employees sweat more during physical work which leads to handling stains and finally to an increasing necessity of rewashing produced garments (increasing water demand)	Already occurring except in winter months	



	How probable is it that the impact will occur?	How extensive is the expected loss or damage of the impact, when it occurs?	Risk (probability x extent of damage)	Prio
	3	2	6	C
	4	4	16	A
	5	4	20	A
	5	2	10	B
	5	2	10	B



Table 5		Risk table for heat waves						
	Climate phenomenon	Impact Area			Resulting risk	Description	Expected time frame	
		Infrastructure & operations	Stakeholders	Finance and Market				
6	Increasing frequency and intensity of heat waves	X			More frequent production delays at suppliers with high water, energy and labour inputs	Heat waves lead to cuts in water and energy supply at suppliers as well as negative impacts on productivity / health of their employees. Delivery delays slow down production at company's facilities with further negative impacts.	Occurs occasionally; no safety net in place if it happens	
7	Increasing frequency and intensity of heat waves	X			Rising costs for energy, water, and labour inputs at suppliers	Rising costs at suppliers can lead to rising prices for supplied fabric	Occurs occasionally, is expected to continue	
8	Increasing frequency and intensity of heat waves	X			Increased heat stress for drivers from suppliers to factory	Heat stress leads to more frequent breaks of drivers and / or can lead to more frequent driving accidents due to lack of alertness	Possible, but has not occurred yet	
9	Increasing frequency and intensity of heat waves		X		Limited productivity of employees leads to less output and can end in delivery delays	Due to high inside temperatures employees feel uncomfortable and are less productive	Already occurring from April - July	
10	Increasing frequency and intensity of heat waves		X		Increasing frequency of heat-related health problems of employees	Health issues (e.g., heat stress) lead to an increasing number of staff on sick-leave, reputational losses among potential employees and in the community and more frequent losses of business due to non-compliance with buyer expectations	Already occurring from April - July	



	How probable is it that the impact will occur?	How extensive is the expected loss or damage of the impact, when it occurs?	Risk (probability x extent of damage)	Prio
	4	4	16	A
	3	3	9	B
	3	2	6	C
	4	3	12	B
	4	4	16	A



Table 5		Risk table for heat waves						
	Climate phenomenon	Impact Area			Resulting risk	Description	Expected time frame	
		Infrastructure & operations	Stakeholders	Finance and Market				
11	Increasing frequency and intensity of heat waves		X		Decreasing alertness of employees	Due to high inside temperatures employees' alertness decreases which leads to more frequent breaks, more frequent accidents and a greater rate of garments with mistakes	Already occurring from April - July	
12	Increasing frequency and intensity of heat waves		X		Increasing need of drinking water for employees	Heat stress increases the need for drinking water which leads to quicker running out of drinking water (with negative health impacts etc.) and / or increasing costs for provision	Already occurring from April - July	
13	Increasing frequency and intensity of heat waves		X		Increasing heat-stress of people in communities leads to an increasing amount of employees on sick-leave	As part of their communities employees are exposed to heat waves all day which has a negative health impact	Already occurring from April - July	
14	Increasing frequency and intensity of heat waves		X		Decreasing availability and quality of water at community level	During heat waves the demand of companies and community members for water increases which leads to lacks in water supply from grid. This causes a growing frequency of dehydration-related health problems of community members, reduced possibilities for personal hygiene	Already occurring from April - July	



	How probable is it that the impact will occur?	How extensive is the expected loss or damage of the impact, when it occurs?	Risk (probability x extent of damage)	Prio
	4	4	16	A
	4	3	12	B
	3	4	12	B
	4	3	12	B



Table 5		Risk table for heat waves						
	Climate phenomenon	Impact Area			Resulting risk	Description	Expected time frame	
		Infrastructure & operations	Stakeholders	Finance and Market				
						and leads to a growing frequency of water-borne diseases at community level.		
15	Increasing frequency and intensity of heat waves		X		More stringent standards for insulation of buildings as part of government regulations which can result in penalties or plant closure in case of non-compliance.	As a response to heat waves as a CC phenomenon, governments will increase regulations to secure employees' health and to comply to energy efficiency standards	Not yet occurred; but somewhat likely	
16	Increasing frequency and intensity of heat waves			X	Reduction of capital base due to increasing costs	Several impacts of heat waves such as increasing energy demand, hiring of temporary employees and compliance to new regulations increase the expenditures for companies	Already occurring	
17	Increasing frequency and intensity of heat waves			X	Growing environmental, social and risk management expectations of investors and financial institutions	These expectations require investments to achieve compliance in the respective areas or results in increasing costs for obtaining finance or even a lack of financial resources in case of non-compliance	Not yet occurred, but somewhat likely	



	How probable is it that the impact will occur?	How extensive is the expected loss or damage of the impact, when it occurs?	Risk (probability x extent of damage)	Prio
	3	4	12	B
	4	3	12	B
	3	3	9	B



Table 5		Risk table for heat waves						
	Climate phenomenon	Impact Area			Resulting risk	Description	Expected time frame	
		Infrastructure & operations	Stakeholders	Finance and Market				
18	Increasing frequency and intensity of heat waves			X	Increasing insurance costs for buildings and infrastructure	Since extreme weather events such as heat waves can have negative impacts on the conditions of buildings and infrastructure, insurance companies respond with higher rates	Not yet occurred, but somewhat likely	
19	Increasing frequency and intensity of heat waves			X	Increasing expectation of purchasers regarding employees' health	If purchasers are aware of CC events in their suppliers' countries, they are keen on ensuring a responsible supply chain.	Have been questioned once in the past after late delivery	
20	Increasing frequency and intensity of heat waves			X	Increased expectations of buyers to have very light clothing in product portfolio	This expectation leads to more frequent losses of contracts if the portfolio is not appropriately adapted.	Not yet occurred, but somewhat likely	



	How probable is it that the impact will occur?	How extensive is the expected loss or damage of the impact, when it occurs?	Risk (probability x extent of damage)	Prio
	3	4	12	B
	3	3	9	B
	2	3	6	C



In our example, priorities are given based on the risk matrix depicted in table 6 “Risk matrix for heat waves”. In addition to the prioritization of risks this matrix allows summarizing all expected risks at one glance. It is also possible to assign the sub-area of impact to each risk, i.e., 1 = Location & Buildings | 2 = Processes | 3 = Logistics & Stocks | 4 = Employees & Community | 5 = Government & Regulation | 6 = Market | 7 = Finance

Table 6		Risk matrix for heat waves			
DEGREE OF LOSS OR DAMAGE	5 - Very high				
	4 - High			<ul style="list-style-type: none"> <li>Increasing heat-stress for people in communities (4)</li> <li>More stringent standards for insulation of buildings (5)</li> <li>Increasing insurance costs for buildings and infrastructure (7)</li> </ul>	
	3 - Medium		<ul style="list-style-type: none"> <li>Increased expectations of buyers to have very light clothing in product portfolio (6)</li> </ul>	<ul style="list-style-type: none"> <li>Increasing expectation of purchasers regarding employees' health (6)</li> <li>Growing environmental, social and risk management expectations of investors and financial institutions (7)</li> <li>Rising costs for energy, water, and labour inputs at suppliers (3)</li> </ul>	
	2 - low			<ul style="list-style-type: none"> <li>Deteriorating road conditions on site lead to delays in supply and delivery (1)</li> <li>Increased heat stress for drivers from suppliers to factory (3)</li> </ul>	
	1 - Very low				
		1 - Very low	2 - Low	3 - Medium	
		PROBABILITY			

## 5.3 Assessment of new opportunities 2

This worksheet seeks to identify business opportunities with regards to the impacts identified before. Climate change can reinforce existing needs of customers but also create new ones. Accordingly, it is the goal to identify market opportunities resulting from climate change impacts on purchasers and / or end consumers which in turn is going to affect the strategic focus of the assessed company.

### 5.3.1 Purpose and content of the worksheet

The worksheet helps your client to systematically assess new market opportunities resulting from various climate change phenomena which have been identified within step 1 of the methodology. Whereas previous



	<ul style="list-style-type: none"> <li>• Quicker overheating of machinery (2)</li> <li>• Decreasing alertness of employees (4)</li> <li>• More frequent production delays at suppliers with high water, energy and labour inputs (3)</li> <li>• Increasing frequency of heat-related health problems of employees (4)</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing frequency of power-cuts from grid (2)</li> </ul>
	<ul style="list-style-type: none"> <li>• Limited productivity of employees (4)</li> <li>• Reduction of capital base due to increasing costs (7)</li> <li>• Decreasing availability and quality of water at community level (4)</li> <li>• Increasing need of drinking water for employees (4)</li> </ul>	
		<ul style="list-style-type: none"> <li>• Increasing dust occurrence (2)</li> <li>• More frequent handling stains on sensitive garments (3)</li> </ul>
	<b>4 - High</b>	<b>5 - Very High</b>
<b>PROBABILITY</b>		

steps focussed on risks and how to avoid negative impacts of climate change on the company, in the following worksheet the opportunities arising from a changing climate are analysed.

Therefore, each opportunity is first listed both by the triggering climate change phenomenon and regarding the geographical region of the arising market and then assessed by several criteria.

**Important categories:**

**Climate phenomenon:** All climate phenomena that are presently experienced and expected to occur in the future within the respective regions of the company’s markets / customers are stated. They might be similar to those phenomena identified for the client’s company during the risk assessment. However, depending on



the company's target market, the climate phenomena could also be completely different and therefore could make a whole new identification process necessary. If this is the case, you should first list out the target markets (next column) and then focus on the most likely climate phenomena in these regions. If necessary, a more comprehensive analysis of target regions can be conducted.

**Target market /customers:** The company's most important target markets and/or customers are stated. In order to make the next step – defining the impacts of climate change on these actors – possible, they can be grouped roughly into regions that belong to the same climate zone and/or the main type of products they purchase in order to avoid duplication.

**Expected market changes:** Which impacts is climate change expected to have on the company's markets and/or customers? Changes could include the demand for new or specialised products or the increase / decrease of purchasing power.

**Timing / urgency:** How soon could expected changes occur? With the help of this aspect the company's decision-makers understand how fast adaptation processes have to be initiated in order to maximise positive results.

**Potential product / service / innovation:** Based on expected market changes and their timing, it is assessed which potential products, service or innovation the company can offer its customers.

**Type of service / product / innovation:** It is marked whether the company's new or adapted products, service or innovation help the customers lower their climate vulnerability or adapt to climate change (CCA). Other types could have, for example, a climate change mitigation function.

**Challenges / Solutions:** In this column, challenges that are connected to the development or adaptation of products and services are described. Consequently, solutions to these challenges are outlined. For example, while it could be a challenge to include new products into the production line without sufficient technical capacity, the solution could be to hire additional staff with the required skills.

**Benefits:** Benefits from the development or adaptation of products and services are described. These could, for example, relate to the company's reputation or revenues.

**Timing of the measure / comments:** The last column is used to set the time frame for the company's reaction to market changes and to note comments.

### 5.3.2 How and when to use this worksheet

#### Time required

Preparation: 2 h desk research on broad and climate-relevant trends in the client's market

Assessment: 2.5 h

Documentation: 2 h

#### Participants

Top management; marketing department; customer relations/sales department

#### Aim of the consulting session

Expected market changes can occur very quickly. Thus it is important to anticipate the timing or urgency of a potential demand change and adapt or develop a product / service as a response to the changing market conditions. Challenges and solutions as well as benefits are to be documented and the timing of the opportunity



and strategic implications discussed.

**Your task** as the consultant is to support your client in completing this opportunity assessment as accurately as possible. Depending on the knowledge and capacity of your client your tasks may comprise the specific identification of market opportunities due to changing demand patterns and the advancement of suitable products / services based on your knowledge and research about the respective industry, your observations of the capabilities and capacities of your client's company and former answers. Further tasks range from evaluating characteristics of the identified products / services / innovations, to supporting your client to assess the challenges and benefits for each opportunity.

### 5.3.3 Results from the case study

The case company has identified market opportunities in terms of new garment products. Instead of “Increasing frequency and intensity of heat waves” it was decided to assess the situation of “Increasing number of hot days” as an accompanying effect; this could be an opportunity for the case company to take advantage of already recognisable **changes in customer preferences**. One of them would be the preference of light, loose clothing. Another opportunity can be identified in changed **purchasing behaviour**; seasonal purchases, including spring or autumn wear, are less frequent as hot days become more prevalent. Retailers try to counter this behaviour by adding more sales cycles to the usual seasonal ones; thus the company identified the option to add **more inter-seasonal sales cycles** with retailers. Both opportunities cannot be realised by the current company staff only but would likely require the support of a marketing agency. Another opportunity is arising in terms of an increasing demand for apparel made from fabrics with cooling effects. This trend is especially significant for markets in Europe and Canada but requires more in-depth market research in those regions before investing in research and development activities.



Table 7		Assessment of new opportunities				
	Climate phenomenon	Target market / customers	Expected market changes	Timing / urgency	Potential product / service /innovation	
1	Increasing number of hot days	India, retailers	Increased demand for light clothing	Already noticeable, continuous growth expected	Apparel designs with high ventilation properties (loose cuts, thin fabrics, room for air circulation); advertise them to retailers as responsive to CC trend	
2		India, retailers	Shorter winter season and increase in hot days leading to less necessity to vary items of clothing, thus less purchases	Already noticeable	Connect with retailers on CC driven consumer trends; Innovation: increase of variety of items per season (pre-season, 2 seasonal collections, after-season)	
3		Europe, Canada, brands	Increased demand for apparel made from fabrics with cooling effects	Notable today particularly in the sports apparel market; expected to take up momentum in general apparel market in next 5 years	Build up apparel line with cooling fabrics	

## 5.4 Preselecting risks for the development of measures 2

This summarising step serves as an explicit pre-selection for identified risks based on the former assessment. This pre-selection is valuable for your client as the overall goal for efficient and effective resource management necessitates a prioritised course of action. This is particularly relevant in the case of limited resources and capacities. Accordingly, the pre-selection enables your client to pursue and address the most vulnerable areas of their company in terms of developing appropriate measures for the most urgent risks.

Most important are the “A” prioritised risks from the Risk Matrix. It is your task to ensure the appropriate selection and to examine whether an impact area of the company is especially vulnerable and requires specific attention.

In case of sufficient resources and capacities, your client is encouraged to select and address risks with a lower priority level as well in order to develop a holistic CCA strategy within the following steps of this assessment process. In this regard, it is suggested to select risks of lower priority within highly vulnerable impact areas,



	Type of service / product / innovation			Challenges / Solutions	Benefits	Timing of the measure / comments
	Lower climate vulnerability	CCA	Other			
		X		New role for company, shaping demand of retailers; potentially cooperate with marketing agency	First-mover advantage; potential to turn into a brand-name manufacturer of functional clothing	Long-term strategic orientation
			X	Convincing retailers that higher number of variety is necessary for boost in purchases; potentially cooperate with marketing agency	Lessens the market risk of decreased purchases	Possible in short-term
		X		New role for company, shaping demand of retailers; product development and technical capacity not present in the company; necessary to hire the required staff	First-mover advantage; potential to turn into a brand-name manufacturer of functional clothing	More information needed on market developments and technical state of the art

thereby decreasing the company’s overall vulnerability.

The same approach could be done to assess the most promising opportunities; however, as the identification of opportunities will likely lead to a much smaller number of items, this step is normally unnecessary. The methodology would be completely transferrable from the risk pre-selection methodology.

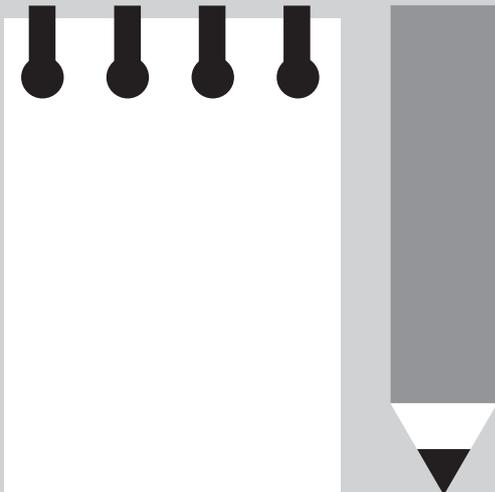
**Results from the case study:**

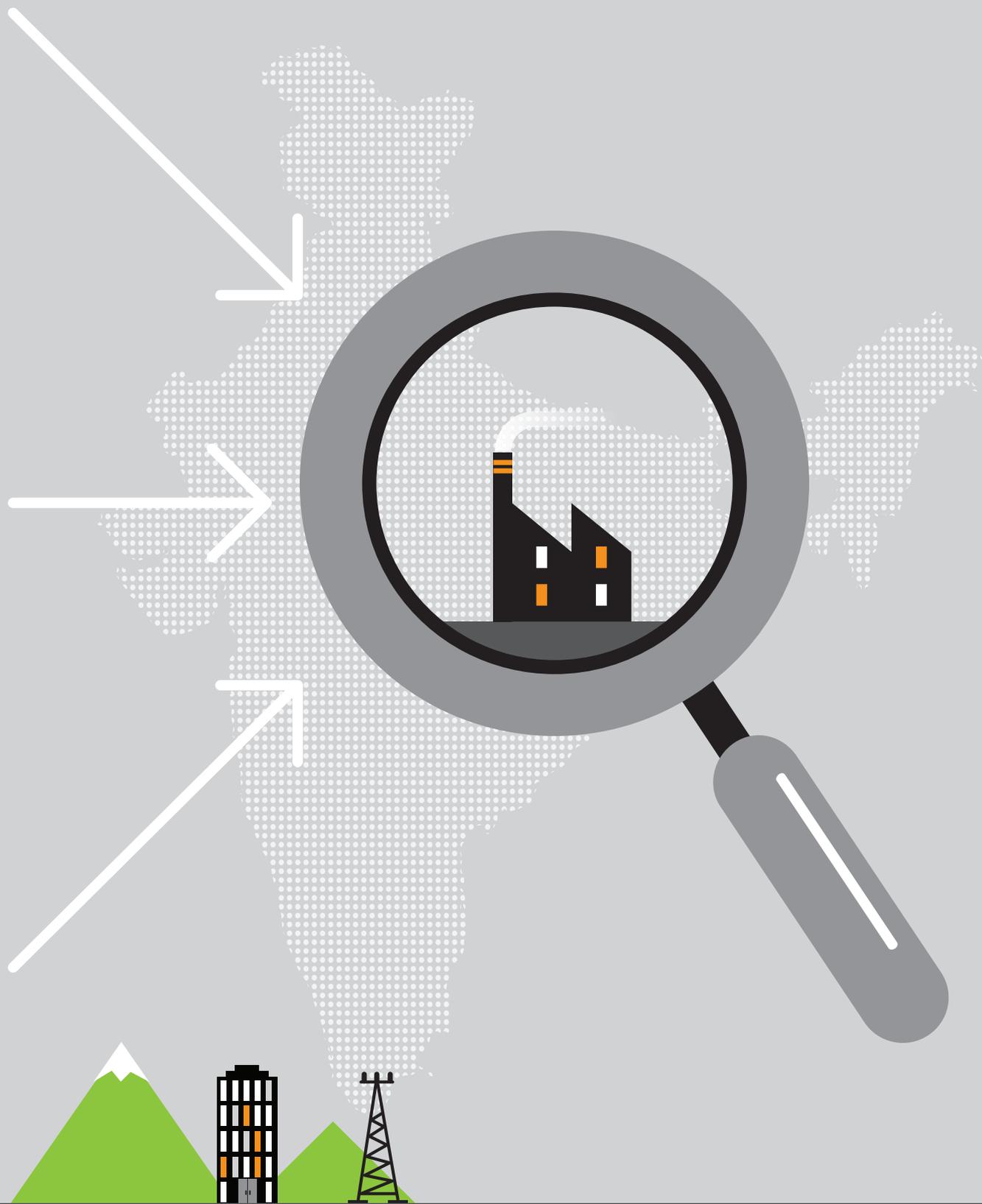
You can find an overview chart for the case company’s risks resulting from an “Increasing frequency and intensity of heat waves” below which results in **“Processes”, “Logistic & Stocks” and “Employees & Community” being the most vulnerable impact areas**. Risks with a “Priority Level A” are identified in these impact areas and will be addressed within the following steps of developing a CCA strategy for the case company.

Still, in case of sufficient resources and capacities risks with a “Priority Level B” can be selected as well for the measures step. In this respect, the impact area “Finance” occurs to be of relevance for the case company as well.



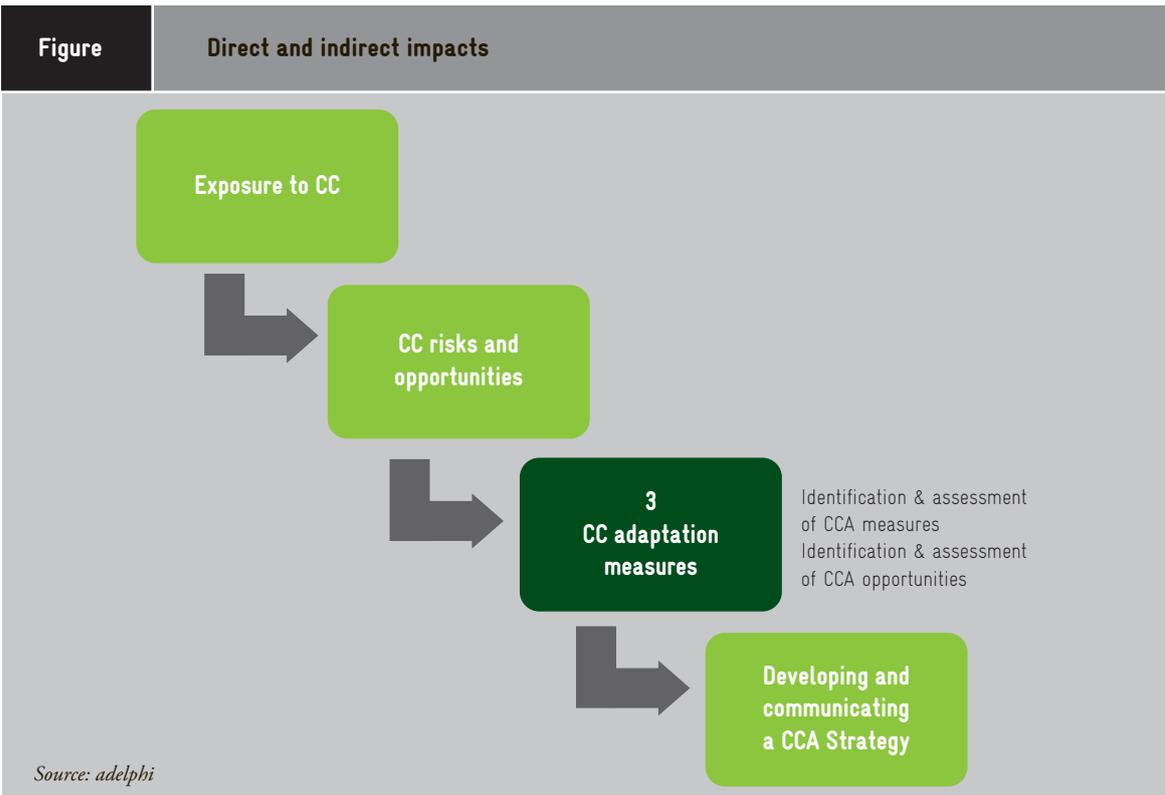
Table 8	Prioritised risks for the CC phenomenon "Heat Waves"
Priority Level A	<ul style="list-style-type: none"> <li>• Quicker overheating of machinery (2)</li> <li>• Increasing frequency of power-cuts from grid (2)</li> <li>• More frequent production delays at suppliers with high water, energy and labour inputs (3)</li> <li>• Decreasing alertness of employees (4)</li> <li>• Increasing frequency of heat-related health problems of employees (4)</li> </ul>
Priority Level B	<ul style="list-style-type: none"> <li>• Increasing dust occurrence (2)</li> <li>• Rising costs for energy, water, and labour inputs at suppliers (3)</li> <li>• Increased heat stress for drivers from suppliers to factory (3)</li> <li>• More frequent handling stains on sensitive garments (3)</li> <li>• Increasing heat-stress of people in communities (4)</li> <li>• Limited productivity of employees (4)</li> <li>• Decreasing availability and quality of water at community level (4)</li> <li>• Increasing need of drinking water for employees (4)</li> <li>• More stringent standards for insulation of buildings (5)</li> <li>• Increasing expectation of purchasers regarding employees' health (6)</li> <li>• Increasing insurance costs for buildings and infrastructure (7)</li> <li>• Growing environmental, social and risk management expectations of investors and financial institutions (7)</li> <li>• Reduction of capital base due to increasing costs (7)</li> </ul>
Priority Level C	<ul style="list-style-type: none"> <li>• Deteriorating road conditions on site (1)</li> <li>• Increased expectations of buyers to have very light clothing in product portfolio (6)</li> </ul>
<p>(1 = Location &amp; Buildings   2 = Processes   3 = Logistics &amp; Stocks   4 = Employees &amp; Community   5 = Government &amp; Regulation   6 = Market   7 = Finance)</p>	







# 6 Climate Change Adaptation Measures – STEP 3



## 6.1 Measures for addressing risks **3**

This section builds upon the risk assessment and pre-selection of risks and develops CCA measures for the prioritised risks in order to reduce the company’s vulnerability of affected impact areas by climate change phenomena. Your client is asked to first define and then to rate CCA measures in different categories in order to specify a priority level and formulate next steps.

### 6.1.1 Purpose and content of the worksheet

The purpose of this worksheet is to provide assistance for your client in choosing appropriate CCA measures to be implemented as part of designing a CCA strategy. Hence, the worksheet is designed to enable your client in assessing identified CCA measures in terms of their effectiveness, feasibility and concerning their side effects. As a result, your client has a comprehensive base for prioritising CCA measures and to conclude which next steps should be taken.

#### Important categories

**Risk:** The risk which was identified in Step 2 “Risk assessment” is stated.



**Priority:** The priority of addressing the risk is noted. Again, the priority can be filled in directly using the results from Step 2.

**Adaptation measure:** In this column all possible adaptation measures that can lower the respective risk are noted. This is an important step and should include adaptation measures of various types and time frames. As these adaptation measures will be assessed afterwards, you should not hesitate to also write down measures which do not have a clearly positive impact on first sight. During the assessment phase it could turn out that certain measures are more appropriate for other risks or that they offer more opportunities than was expected before.

**Technology level:** After stating the CC risk, its priority level and the addressing CCA measure, the first assessment step is to rate the technology level of the CCA measure. For example, a ventilation system can be low-tech (improving the ventilation through wind shafts) as well as high tech (installing automatic ventilators and air conditioners).

**Effectiveness:** How effectively does the measure reduce the risk? (×2 in case study): The next steps of the assessment include rating the measure's effectiveness for risk reduction, feasibility and positive and negative side effects. In order to do so, we once again make use of a scoring system similar to the one used in the worksheet "Risk assessment". Again the rule applies that the higher the score the stronger the agreement with the respective category ("5" would represent, for example, "high effectiveness", "high feasibility", "many positive side effects" or "many negative side effects"). In this case, it is important to rate the respective categories relative to each other; thus, it may be necessary to adjust all assessments in a final step. For example, if you assessed the effectiveness of a measure as "5/very high" but it turns out that several other measures will be more effective, this particular measure's effectiveness could be downgraded to a "4".

With the help of this particular column it is decided how effectively the measure reduces the risk. **Since effectiveness of risk reduction is the main objective of the measure and accordingly of high relevance for its priority level we propose to multiply the score by 2.** As mentioned before, it is up to your and the company's discretion to adapt the relative weighting of each criterion.

**Feasibility:** The next stage is to assess the feasibility of the CCA measure which determines the level of difficulty of its implementation.

- **Technical feasibility:** assesses the company's knowledge and ability to implement the measure using own technical means.
- **Organisational feasibility:** examines the company's internal capacities and resources to implement and maintain the measure independently and to integrate its realisation into existing processes without the necessity of acquiring or building up new capacities.
- **Financial feasibility:** the three categories of financial feasibility refer to financial figures in order to consider the investments and running costs of the implementation as well as its expected amortisation period. The amortisation period is mainly relevant for those measures that have positive side effects, e.g., increase of energy efficiency. If production stops can be reduced considerably, then it is the avoided costs resulting from this measure that should be figured in.

**Positive side effects:** The next two categories assess the degree of positive and negative side effects of the respective CCA measure. "Potential for reducing costs" refers to cost reductions for the company (e.g., reduced energy costs due to better insulation or more energy efficient machines). "Synergies with other CCA measures" refers to the realization of synergy effects from the implementation of more than one measure leading to lower investment and running costs than implementation of a single measure only. "Contributing to climate protection" evaluates the positive side effect of CCA measures regarding mitigation (e.g., reduction of GHG). "Contributing to other sustainability goals" considers positive side effects for topics like biodiversity conservation, the assurance of decent working conditions, contributions to increasing living standards within

communities and improvement of ecological and social standards within the whole supply chain. The category “reversibility / flexibility” refers to the required expenses for reversing or changing a CCA measure once it has been implemented.

As above, your client has the opportunity to add additional categories to supplement the assessment by adding additional positive side effects. For example, you could add the categories “contribution to reputation management” and “skill development” (as we will assess in the opportunities sections). In this respect, it is important to decide on a scaling and determine the relevance of the additional category for the ultimate priority level.

**Negative side effects:** Negative side effects of implementing a CCA measure relate to “negative social / community impacts” which can result in difficulties for implementation (e.g. by limiting the community’s access to resources). Further categories are “Negative environmental impacts” (e.g., increasing GHG emissions due to increasing use of air conditioning) and “Negative impacts on existing approaches” (e.g., increasing use of ventilation and air conditioning during heat waves increases the probability of power cuts from grid) caused by the implementation of the respective CCA measure. Additional categories can be added by your client (for considerations in this respect see above at additional measures for positive side effects).

#### **Conclusion:**

- **Sum:** the points assigned for “effectiveness”, “feasibility” and “positive side effects” are added up. The points for “negative side effects” are subtracted.
- **Priority:** Each adaptation measure is prioritised according to the sum of points it has reached. While “A” indicates the highest priority, “C” is the lowest. You need to decide the exact scaling of this prioritisation as it would vary if you added further assessment criteria. This would also need to be adjusted if you changed the weighting of each criterion for the final score.

**Notes and comments:** Finally, notes and comments are written down in order not to forget critical points that do not necessarily fit into this assessment grid but are important to consider.

Additionally, it is possible to multiply those categories that are of special importance for the company by a weighting factor (e.g. 1.5 or 2). It is up to your and the company’s discretion to adapt the relative weighting of each criterion. It is important to realise that the table that you are developing jointly should not be treated as a final result but as a result for a structured discussion that needs to be verified and repeated regularly.

### **6.1.2 How and when to use this worksheet**

The worksheet below supports your client to assess all the above mentioned characteristics and side effects of identified adaptation measures.

#### **Time required**

Preparation: 2 days of climate data research and analysis (same work as for the past impacts worksheet)

Assessment: 2 h (less if assessment grid results have been transferred and reviewed by you)

Documentation: 3 h

#### **Participants**

Top management, lead engineer

#### **Aim of the consulting session**

The consulting session aims to identify the most appropriate measures according to a set of criteria; the criteria suggested here can be used for a general assessment, but also adapted to each company. Furthermore, the criteria can be weighed differently if they vary strongly in importance or relevance for the company.



**Your task:** The first step and a task of high importance for you is to support your client in identifying adaptation measures. In order to receive a comprehensive set of adaptation measures you need to build upon your experience and knowledge regarding generic and / or industry-specific CCA measures. In addition, you need to consider the client-specific conditions regarding the exposure to CC as well as its sensitivity and adaptive capacity. Therefore, it is valuable to make use of the former assessment steps and develop CCA measures in close collaboration with your client.

After stating the CC risk, its priority level and the addressing CCA measure, the first assessment step is to rate the technology level of the CCA measure; this is done to characterise the measure's technological complexity. For example, a ventilation system can be low-tech (improving the ventilation through wind shafts) as well as high tech (installing automatic ventilators and air conditioners). The next step is to rate the measure's "effectiveness for risk reduction" which is supposed to be the main objective of the measure and accordingly of high relevance for its priority level.

In the end, the prioritisation is conducted by adding the different assessment results while subtracting negative impacts. In the end, this comprehensive assessment enables your client to define a priority level for the considered CCA measure as well as to decide on a starting point for implementation.

### 6.1.3 Results from the case study

**Weighting factor used:** Effectiveness is doubled

**Priority grading:**

**Risk A:** 35-60    **Risk B:** 26-34    **Risk C:** 0-26

The CCA measures addressing the "A" prioritised risks resulting from the CC phenomena "Increasing frequency and intensity of heat waves" are stated below.

After assessing all potential CCA measures, the following were evaluated with the **priority level "A"** and accordingly are: "Improve building **insulation**" in response to the overheating of machinery, "Installation of **solar panels**" as effective in responding to power cuts and, "**Diversify suppliers** / identify less vulnerable regions" with regard to problems in the supply chain due to heat wave occurrence.

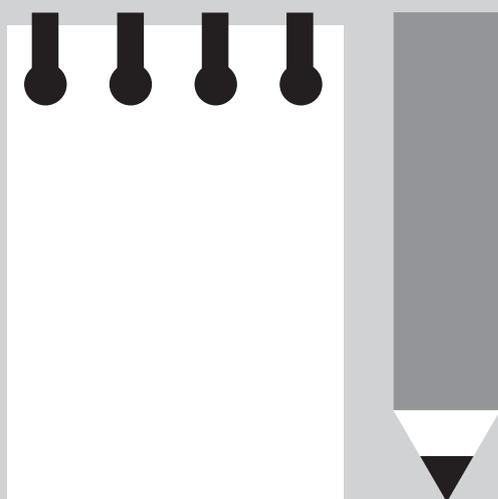




Table 9		List of measures for addressing risks										
Risk	Prio	Adaptation measure	Technology Level			Effectiveness (x2)	Feasibility*					
			Low-tech	Mid-tech	High-tech		Technical feasibility	Organisational feasibility	Financial feasibility: investment	Financial feasibility: Running costs	Financial feasibility: amortisation period	
Quicker overheating of machinery	A	Improve building insulation	X			5	5	5	3	5	2	
		Ventilation during night times	X			3	5	5	2	1	4	
		Facade and roof greening	X			1	3	3	2	2	1	
		Purchase of new sewing machines/ packaging machine which are more heat-resistant		X		4	4	1	1	3	3	
		Install air conditioning system		X		5	4	1	2	1	2	
Increasing frequency of power-cuts from grid	A	Increase number of diesel generators		X		3	5	4	1	1	2	
		Installation of solar panels			X	3	1	3	1	3	4	
More frequent production delays at suppliers with high water, energy and labour inputs	A	Increase the storage volume for input materials	X			3	4	4	3	3	3	
		Diversify suppliers/ identify less vulnerable regions	X			3	5	3	5	5	0	



											Notes and Comments
	Positive side effects*					Negative side effects*					
	Potential for reducing costs	Synergies with other CCA measures	Contributing to climate protection	Contributing to other sustainability goals	Reversibility/flexibility	Negative social / community impacts	Negative environmental impacts	Negative impacts on existing measures	Sum	Prio	
	3	0	2	1	0	0	0	0	36	A	Make full cost-benefit calculation before deciding
	0	1	2	0	2	0	0	0	28	B	Effective but costly
	0	0	1	2	1	0	0	0	17	C	Effectiveness not clear
	4	4	1	0	0	0	0	0	29	B	Relatively effective but organisational challenge, as employees need to train on new machines; additional energy consumption likely
	0	2	0	0	2	0	0	0	24	C	Very costly investment and running costs
	0	0	0	0	3	0	-2	0	20	C	Easy to implement and relatively effective but negative environmental impacts
	4	4	4	4	2	0	0	0	36	A	Effective; decreasing grid energy consumption. High investment costs; need to assure technical feasibility
	4	2	0	0	1	0	0	0	30	B	Easy to implement and relatively effective; potential for cost cutting through hedging and bulk purchases
	4	2	0	0	5	0	0	0	35	A	Easy to implement and relatively effective; potential for additional cost cutting through stronger negotiation standpoint



## 6.2 Measures for seizing opportunities / new markets **3**

### 6.2.1 Purpose and content of the worksheet

The worksheet is helping your client to systematically assess new opportunities resulting from various climate change phenomena which have been identified within the assessment grid of step 0.

#### **Important categories:**

**Climate phenomenon:** All climate change phenomena that are presently experienced and expected to occur in the future within the respective regions of the company's markets / customers are stated. The information for this and the following 4 columns can be derived from worksheet "Assessment of new opportunities".

**Target market:** Most important target markets and/or customers are stated. They should be grouped roughly into regions that belong to the same climate zone and/or the main type of products that they purchase.

**Expected market changes:** Which impacts is climate change expected to have on the company's markets / customers? Changes could include the demand for new or specialised products or the increase / decrease of purchasing power.

**Timing / urgency:** How soon could expected changes occur?

**Potential product / service / innovation:** Based on expected market changes and their timing, it is assessed which potential products, service or innovation the company can offer its customers.

The next steps of the assessment include rating the measure's effectiveness, feasibility and positive and negative side effects. In order to do so, once again a scoring system similar to the one used in the worksheets of Step 2 is used. Again the rule applies that the higher the score the higher the agreement in the respective category. As mentioned before, it is up to your and the company's discretion to adapt the relative weighting of each criterion.

**Expected revenue generation / Current market demand (×2 in case study):** Within this first step the effectiveness of a product, service or innovation is rated. This assessment has two aspects

- Additional revenue that can be generated by realising the opportunity
- Likely demand for the product, service or innovation

#### **Revenue / Market demand of 1**

- The revenue would only be of marginal interest to the company
- The market demand for the product, service or innovation does not yet exist

#### **Revenue / Market demand of 3**

- The revenue generated would be relevant for the company
- The market demand for the product, service or innovation already exists

#### **Revenue / Market demand of 5**

- The revenue generated would be important and could shift the core business of the company
- The market demand for the product, service or innovation is already strong

The in-between scores of 2 and 4 should be given if in comparison with other opportunities revenue or market demand is deemed higher or lower or if only one criterion of the higher score is fulfilled.

Please note that in this section it is not possible to rate with 0. This results from the fact that only actual and



relevant opportunities are considered. Any situation that has no revenue relevance or no market demand does not qualify as an opportunity and thus should be dropped from the list.

In the next three columns the technical, organisational and financial feasibility of the innovation are assessed.

**Technical feasibility:** Technical feasibility examines the company's knowledge and ability to realise the innovation using its own technical means.

**Organisational feasibility:** This aspect assesses the company's capacities and resources to realise and further develop the innovation independently and to integrate it into existing processes without the necessity of new capacities.

**Financial feasibility:** This column considers the investments and running costs of the implementation as well as its expected amortisation period and whether the company can finance the product development, production and marketing.

**Sum:** Here, the results from the previous columns are added up.

**Prio:** Each adaptation measure is prioritised according to the sum of points it has received. This would need to be adapted according to the number of assessment criteria and in view of weighting factors.

**Conclusion:** The outcome of this assessment can be summarised in a conclusion. According to whether priority and feasibility are high, the adaptation measure should be adopted, further developed or delayed in favour of other, more important adaptation measures.

Again, it is possible to multiply those categories that are of special importance for the company by a weighting factor (e.g. 1.5 or 2). It is up to your and the company's discretion to adapt the relative weighting of each criterion. It is important to realise that the table that you are developing jointly should not be treated as a final result but as a result for a structured discussion that needs to be verified and repeated regularly.

### 6.2.2 How and when to use this worksheet

In addition to the measures that can lower the identified risks, your client should also be enabled to identify and realise opportunities. Therefore, each opportunity identified before is assessed by several categories, starting from the geographical region regarding the arising market opportunity as well as referring to the triggering climate change phenomenon.

#### Time required

Preparation: Documentation of the opportunities assessment; research on the various opportunities – app. 3 h

Assessment: 2 h

Documentation: 2 h

#### Participants

Top management, lead engineer, marketing department, customer relations/sales department

#### Aim of the consulting session

It is asked to specify the expected market change, the urgency and the potential product / service as a response to the changing market conditions. Also, the technical feasibility is assessed as well as a rough financial feasibility and the internal / organisational feasibility. These assessments combined with the outlook of the potential product / service / innovation assist in making a sound decision on opportunities and help comparing the costs and benefits of the different options.



**Your task** as the consultant is to support your client in completing this opportunity assessment as accurately as possible. As a result, the approximate probability of realising benefits when seizing the market opportunities should be stated by your client. In the end, each opportunity is to be prioritised in one of three categories (A, B, C) regarding the analysis, resulting from all the categories assessed before. This prioritisation is followed by a discussion on how to implement measures to achieve the identified market opportunity. It is likely that further market research is necessary to verify the assessment. Your task may be to assist your client in doing further market research and obtaining data.

### 6.2.3 Results from the case study

**Weighting factor used:** Effectiveness/ likelihood of business is doubled.

**Priority grading:** A 20 - 25            B 13-20            C 3-12

The case company being situated in the textile industry has identified market opportunities in the development of new garments. "Increasing frequency and intensity of heat waves" as an accompanying effect of overall rising temperatures in India provides an opportunity for the case company to take advantage of already recognisable changes in customer preferences for lighter clothing. Another opportunity is arising in terms of an increasing demand for apparel made from fabrics with cooling effects. This trend is especially significant for markets in Europe and Canada but requires more in-depth market research in those regions before investing in research and development activities.



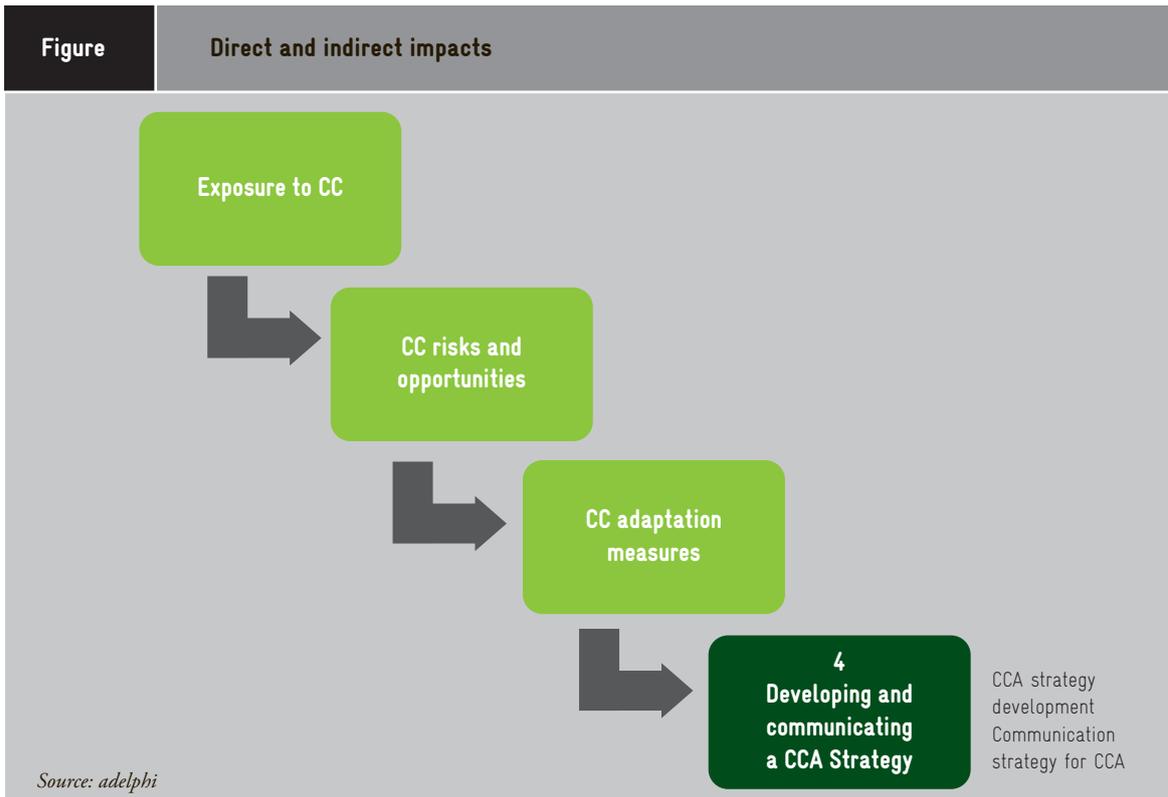
Table 10		Measures for seizing opportunities / new markets									
Climate phenomenon	Target market	Expected market changes	Timing /urgency	Potential product / service / innovation	Revenue /Market (x2)	TF*	OF*	FF*	Sum	Prio	Notes and comments
Increasing number of hot days	India, retailers	Increased demand for light clothing	Already noticeable, continuous growth expected	Apparel designs with high ventilation properties (loose cuts, thin fabrics); advertise them to retailers as responsive to CC trend	5	5	4	3	22	A	Develop product; identify innovative ways to market, e.g., clusters
	India, retailers	Shorter winter season and increase in hot days decrease necessity to vary items of clothing, thus less purchases; trend to increase variety of items and sales circles per season	Already noticeable	Connect with retailers on CC driven consumer trends; join already existing trend to increase the variety of items per season (pre-season, 2 seasonal collections, after-season); production peak in winter	2	5	4	5	15	B	Identify retailers that have already serviced the trend; market products to them.
	Europe, Canada, brands	Increased demand for apparel made from fabrics with cooling effects	Notable today particularly in the sports apparel market; next 5 years	Build up apparel line with cooling fabrics	5	2	3	2	17	B	Explore cost of new material, machinery, etc.

TF: Technical Feasibility, OF: Organisational Feasibility, FF: Financial Feasibility  
 \* 0= non-existent // 1 = very low // 2 = low // 3 = medium // 4 = high, // 5 = very high





# 7 Developing and communicating an adaptation strategy – STEP 4



This final section is designed to assist your client in developing and communicating a full-fledged CCA strategy. It builds on the identified and assessed adaptation measures as well as the preselected opportunities from the last section.

## 7.1 Developing an adaptation strategy 4

### 7.1.1 Purpose and content of the worksheet

The worksheet below supports the company in developing and communicating the CCA strategy. It aims to guide the company in comprehensively managing risks as well as seizing opportunities from climate change.

**Important categories:**

#: State whether the measure is a Risk (R) or Opportunity (Op) and enumerate them per short-, medium- or long-term.

**Adaptation measure:** First of all, the adaptation measures that have been identified with the help of the two previous worksheets on “Measures for addressing risks” and “Measures for seizing opportunities / new markets” are filled into this column.



**Risk addressed:** Subsequently, it is described which risk the specific measure tackles. Even though this relationship has already been identified in the worksheet “Measures for addressing risks” it is important to repeat it and make it as clear as possible in order for all stakeholders to understand the logic behind the CCA strategy. If it is understood why certain measures are implemented they will receive greater support.

**Additional advantages:** Following the addressed risks, the advantages that can be derived from a certain adaptation measure are described. The resulting additional advantages are likely to be “reducing costs”, “securing production flow”, “improving the company’s image”, etc.

**Type of measure:** In this column it is stated what type the measure is; among the options to choose from are the following: grey (technological or infrastructure measures), green (ecosystem-based measures) and soft (organisational and stakeholder-focussed measures). This allows you and your client to assure that a variety of types is used to create synergetic effects throughout the organisation.

**Affected area:** Here it is stated which of the 7 impact areas is addressed by the adaptation measure. Just to remind you: these can “Building & Location”, “Processes”, “Logistics & Stock”, “Employees & Community”, “Finance” and “Market”. One adaptation measure can of course be applicable to more than one impact area. Again, this creates an overview of the variety of methods chosen which is important to achieve a multi-pronged approach to adaptation.

**Synergies and conflicts:** While in the previous column only the main impact area which is addressed by the adaptation measure was noted, this column can be used to highlight the positive and negative impacts the adaptation measure can have on the other 6 impact areas. “Synergies” have (unintended) positive effects for two or more impact areas. “Conflicts”, on the other hand, point out that improvements within one impact area lead to a deterioration of the situation within one or more of the other areas.

**Integration possibility:** This column is meant for reflecting on existing possibilities to integrate the various measures into the objectives, projects and activities of the company. Thus, questions like “Which projects exist into which individual measures could be integrated?” and “How can the topic of adaptation be put on the agenda of existing planning processes?” need to be answered.

**Potential barriers:** Several issues are raised in the column “potential barriers”. Usually, there are numerous potential barriers for integrating and implementing adaptation measures. These include financial, technological, political, social and institutional aspects. One of the major impediments to the timely implementation of adaptation measures is related to the short-term planning horizon of companies. Other barriers exist due to a lack of problem awareness, uncertainty, lack of information and temporal misjudgement. Accordingly, the company is asked to reflect on potential problems in the process of implementing measures for an adaptation strategy and document them into the worksheet.

**Ideas for overcoming barriers:** Subsequently, in this column appropriate solutions for overcoming the identified barriers are noted.

**Success indicators / Monitoring activities:** Success indicators or other means to assess each measure are identified or developed. This enables the company to measure the performance and progress of implementing adaptation measures.

**Notes and comments:** Finally, notes and comments are written down in order not to forget critical points that do not necessarily fit into this assessment grid but are important to consider.



### 7.1.2 How and when to use this worksheet

After both CCA measures and opportunities are identified and assessed, it is time to consider the development of a CCA strategy. This strategy is designed to assure that measures are implemented in a coordinated and effective way and are long-term oriented. Before this final step, it is recommended to share all the documentation with your client and instruct them to already develop first thoughts on the strategic approach.

#### Time required

Preparation: Documentation and analysis of all assessments – app.4h

Assessment: 2h

Documentation: 2 h

#### Participants

Top management, lead engineer

#### Aim of the consulting session

The aim of the session is to raise the awareness of the company regarding the importance of a coordinated and structured approach towards CCA and define first steps as well as a review procedure. Furthermore, the aim is to sort the measures according to the time horizon of their implementation (short-, medium- or long-term).

**Your task** is to **guide the company** in selecting the measures which address the risks of highest priority and have scored well in the assessments of the last section. It is suggested to consider measures of medium or low priority as well if they can be implemented easily and cost-effectively. These “quick-wins” need not have scored very highly on effectiveness, for example, if they can be easily implemented and have additional benefits.

For assessing which measure to implement in the **short-, medium- and long-term**, you need to discuss in depth with the top management and engineers. Here a scoring system would be too simplistic, as a **multitude of factors needs to be taken into account**. Generally speaking, two criteria should be used to assess the appropriateness of measures in a given time, namely the urgency to tackle the risk and the **costs of the measure in question**. Like for other investment decisions of the company, a return of investment calculation should be made and the amortisation period should be assessed.

### 7.1.3 Results from the case study

The different columns of the worksheet are illustrated by selected adaptation measures of the case company below.

In addition to the adaptation measures mentioned above for illustrative purposes, there are some more comprehensive measures listed here. The following measures have been identified as suitable for implementation **immediately** in response to the higher frequency and longer duration of heat waves: to increase the **storage volume** for input materials, to **diversify suppliers/** identify less vulnerable regions, and to produce and market apparel designs and materials with **high ventilation** properties. As measures that require some more planning and financing, the following have been identified as suitable for **medium-term implementation**: the **insulation of the administrative building, facade and roof greening** and the **installation of solar panels**. Lastly, the following measures have been identified as **long-term adaptation options**: the **construction of a climate-proof plant** in non-affected area and the **build-up of an apparel line with cooling fabrics**. Both require a long-term view and planning process and need to be integrated into the strategic decision-making of the company.



**Table 11**

**Developing an adaptation strategy**

**Short-term adaptation measures to be implemented (implementation period: immediately)**

	<b>Adaptation measure</b>	<b>Risk / market opportunity addressed</b>	<b>Additional advantages</b>	<b>Type of measure</b>	<b>Impact area</b>	<b>Synergies and conflicts</b>	
<b>R1</b>	Increase the storage volume for input materials	More frequent production delays at suppliers with high water, energy and labour inputs	Hedging against rise in market price of input material	Grey	Building	None	
<b>R2</b>	Diversify suppliers/ identify less vulnerable regions	(Same as above)	Better negotiation position	Soft	Logistics	None	
<b>O1</b>	Apparel designs and materials with high ventilation properties	Change in demand due higher number of hot days	Increased revenue generation and higher market share	Soft	Market	None	

**Medium-term adaptation measures to be implemented (implementation period: years 2-3)**

	<b>Adaptation measure</b>	<b>Risk / market opportunity addressed</b>	<b>Additional advantages</b>	<b>Type of measure</b>	<b>Impact area</b>	<b>Synergies and conflicts</b>	
<b>R1</b>	Insulation of the administrative building	Reduced productivity during heat waves	Cost-reduction through reduced requirements for cooling	Grey	Employees	Synergies with energy-saving concept and positive impacts on processes (risk of overheating of machinery reduced); conflicts: disturbs work for substantial period of time (constructions, noise etc.); construction	



	<b>Integration possibility</b>	<b>Potential barriers</b>	<b>Ideas for overcoming barriers</b>	<b>Success indicators / Monitoring activities</b>	<b>Notes &amp; comments</b>
	Heat-proof the additional storage space	Land acquisition / building permit	Refurbish existing underused buildings / rent or share storage space	Amount of storage space used for supplies  Frequency of production stops or delays because of supply lack of input material	
	Make suppliers aware of CC risks and thus strengthen relationship	High identification costs; trust building with new suppliers	Approach business chambers; build new relationships slowly	Number of suppliers / input material  Frequency of production stops or delays because of supply lack of input material	
	Make buyers aware of CC risks and thus strengthen relationship	Lack of design capacities; difficulty to get buyers to pay attention	Cooperate with local buyers first to create strong relationship; use the thusly developed products as showcase	Number of products that take heat into account  Number of requests for cooperation	

	<b>Integration possibility</b>	<b>Potential barriers</b>	<b>Ideas for overcoming barriers</b>	<b>Success indicators / Monitoring activities</b>	<b>Notes &amp; comments</b>
	Integration of measure into energy-saving concept	High costs	Insulation in three phases: <ul style="list-style-type: none"> <li>• Most heat prone rooms with workplaces for staff;</li> <li>• Other office rooms with workplaces for staff;</li> <li>• Other rooms without workplaces for staff (e.g. storage rooms)</li> </ul>	Severity of heat stress in administrative buildings <ul style="list-style-type: none"> <li>• Definition: number of days per year on which maximum inside temperature exceeds 26°C</li> <li>• Measurement: monthly data compilation and</li> </ul>	



**Medium-term adaptation measures to be implemented (implementation period: years 2-3)**

	Adaptation measure	Risk / market opportunity addressed	Additional advantages	Type of measure	Impact area	Synergies and conflicts	
						workers need to be hired because of limited know-how within the company.	
R2	Facade and roof greening	Quicker overheating of machinery and production stop during heat waves	Reduction of energy costs through reduced requirements for cooling. Fewer break-downs of machines.	Green	Building	Positive effects on working conditions (lower inside temperatures); positive environmental impacts. Conflicts: no internal know-how + time-consuming implementation if no experiences	
R3	Install solar panels	Frequent power cuts during heat waves and production stops	Reduction of energy costs; less strain on machinery due to frequent power cuts	Grey	Processes	Climate change mitigation through renewable energy generation	

**Long-term adaptation measures to be implemented (implementation period: years 4-8)**

	Adaptation measure	Risk / market opportunity addressed	Additional advantages	Type of measure	Impact area	Synergies and conflicts	
R1	Construct climate-proof plant in non-affected area	Loss of productivity due to heat waves (and other risks)	Construct plant according to energy efficiency standards for cost saving effect	Grey	Building, Logistics, Processes, Market	Climate change mitigation through energy efficiency; integrate solar panels	
O1	Build up apparel line with cooling fabrics	Change in demand due to higher number of hot days	Increased revenue generation and higher market share	Soft	Market	None	



	Integration possibility	Potential barriers	Ideas for overcoming barriers	Success indicators / Monitoring activities	Notes & comments
				annual reporting by Head of operations • Target: zero days of heat stress per year	
	Could be integrated in marketing material or sustainability strategy	Technical issues, i.e., sun exposure and watering of plants	Cooperate with gardening firm on plant selection and train employees; use recycled water	Severity of heat stress in administrative buildings	
	Could be integrated in marketing material or sustainability strategy	Financing; maintenance	Seek renewable energy credit line; consider feed-in-tariff as option; build internal expertise for maintenance	kWh generated by solar panels  Number of disruptive power cuts	

	Integration possibility	Potential barriers	Ideas for overcoming barriers	Success indicators / Monitoring activities	Notes & comments
	To be integrated into marketing strategy towards buyers	Financing	Seek energy efficiency and renewable credit line	Plant built; plant profitability in comparison to others	
	To be integrated into marketing strategy towards buyers	Expertise in material design and use lacking	Cooperate with innovative companies	Number of products that use innovative materials	



## 7.2 Communicating the adaptation strategy 4

### 7.2.1 Purpose and content of the worksheet

An implemented CCA strategy has additional value for your client when it is communicated to internal and external stakeholders adequately. The worksheet within this section supports your client systematically in achieving this potential.

The internal communication (target audience: employees) aims at achieving the following aspects:

- Increases the internal knowledge about CCA measures/ strategy (awareness raising)
- Builds capacity and ownership for implementation (support, commitment and participation)
- Improves internal reputation
- Generates ideas for developing and improving the CCA strategy

The latter potential can be enhanced by advertising internal contests for new and innovative CCA measures as well as awards for exemplary performance. In order to generate internal acceptance for CCA and to ensure organisation-wide CCA efforts, a strategic CCA team can be implemented.

External communication addresses diverse stakeholders such as (end-) customers, purchasers, communities, investors, political authorities and non-governmental organisations. It is important for your client to recognise that external communication needs to be stakeholder-specific since different stakeholders do have different levels of knowledge, expectations and interests towards the company and its performance regarding climate change topics.

For instance, if your client communicates its efforts to the wider public, part of the audience might not yet know a lot about climate change and its impacts. In order to successfully communicate climate change impacts and the company's efforts to this audience, it is helpful to start out with examples from everyday life such as droughts or water cuts.

On a general basis, external communication aims at achieving the following aspects:

- Opportunity to promote the success of implementation efforts and acquire a pioneer status
- Improvement of external reputation towards diverse external stakeholders
- Potential to trigger collaboration in adaptation efforts, e.g., on cluster level, in cooperation with communities, supporting programmes by governments, Public Private Partnerships, etc.

#### **Important categories:**

**Issue/message:** In this category you list which issue(s) to communicate and what the message would be. These could be related to the CCA strategy in general or to specific measures or clusters of measures.

**Target group:** This category necessitates defining a target group to whom to deliver the message to. Also, several target groups can be targeted with the communication of one issue, but usually, the aims and means of communication would vary for each group.

**Aim:** In this section, it is stated what the aim of communicating a particular issue would be, and why delivering this message is relevant to the company. Aims could be related to relationship or reputation building, or to actively deflect perceived communication risks, e.g., in the area of water risk.

**Means of communication:** Here, different media are listed that can be used for communicating a certain issue.

**Timing and frequency:** In this category, timing and frequency of the message communication are determined.

**Point department:** Various departments can be responsible for communicating a message; often, this would need to be assisted and coordinated by the PR or marketing department.

### 7.2.2 How and when to use this worksheet

A suitable and transparent communication of implemented CCA measures/ the fully-fledged CCA strategy is a valuable undertaking for enhancing the internal acceptance of the company's CCA strategy and to increase the employees' commitment for and identification with their employer. Furthermore, a holistic communication strategy including external stakeholders can improve external relations and the reputation of your client's company.

#### Time required

Preparation: 1h

Assessment: 2h

Documentation: 1 h

#### Participants

Top management, HR department, marketing department

#### Aim of the consulting session

The aim of the session is to raise the awareness of the company that communication is an important factor for the success of the CCA strategy; both internal and external communication are of relevance. Internal communication can happen via internal training programmes, quarterly meetings, company magazine, newsletters or the intranet. External communication can be accomplished by means of different communication channels such as company website, newsletters or social media as well as direct communication with purchasers.

In this regard, **your task** is to support your client in selecting which issues to communicate and to whom this communication should be directed at, setting specific goals of communication, choosing suitable communication tools and channels, drafting a time schedule and allocating responsibilities. This procedure applies for internal and external communication. Altogether, it is important for your client to integrate communication activities regarding CCA into existing processes / strategies in order to achieve a transparent, consistent and credible communication strategy. In this regard, it can be recommended to integrate CCA efforts into strategy documents (Sustainability and/or Climate Change strategy), handbooks, guidelines, software tools, security plans and process manuals as well as to determine specific responsibilities. One key strategy in CCA communication is to not only focus on climate risks but also on arising opportunities. In this context, it might be useful to propose a long-term vision, for instance a vision of a climate resilient region to which your client company could proactively contribute by means of its own adaptation strategy and its support to affected communities. Your client could also relate their company's adaptation efforts to its wider commitments in climate protection and environmental sustainability.

Your client should not hesitate to communicate uncertainties and limits of his / her current strategy. This enhances transparency and credibility of CCA efforts and enables an open debate about potential improvements.

### 7.2.3 Results from the case study

The **internal communication** priorities of the case company include the **promotion of workforce-related CCA measures** in general in order to improve the standing of the company among its employees. Other internal issues aim at sharpening the profile of the company as an innovator and thus seek to improve reputation, and generate additional adaptation ideas. **External communication** focuses on strengthening the company's image as a sustainable and long-term oriented player and trigger **collaboration** in adaptation efforts with other companies or organisations; therefore, an important way of communicating is the participation in conferences regarding risk and climate change.



<b>Table 12</b>		<b>Communication plan</b>				
<b>Internal communication</b>						
	<b>Issue / Message</b>	<b>Target group</b>	<b>Aim</b>	<b>Means of communication?</b>	<b>Timing / frequency</b>	<b>Point department</b>
1	CCA measures (new building insulation, energy-efficient air conditioning, Installation of health supervisors) will be implemented in order to secure acceptable working conditions	Employees	Increase the standing of the company among its employees. Prove that employees are a valuable resource (internal reputation).	Assembly, word of mouth, newsletter	One time, for each additional measure	HR department
2	Implementation of emergency plan/warning system for heat-related health problems of employees	Employees	Awareness raising for heat wave related health risks. Process optimisation and increasing alertness for risks in case of heat wave occurrence. Proof of the company's awareness and ability to act.	Newsletter, Security Plan, documentation for behaviour in case of emergencies	Updating, especially in times of risk	HR department
3	CCA measures (new building insulation, increasing storage volume, diversification of suppliers) to ensure smooth and efficient processes are implemented	Employees	Employees served by optimal process conditions. Increases the internal knowledge about CCA measures/ strategy.	Assembly, word of mouth, newsletter	One time, for each additional measure	HR department
4	Investments in product development (for seizing market opportunities)	Employees	Improve identification with the company and CCA topics. Proof for investments into future topics (job security).	Assembly, word of mouth, newsletter	Updates about efforts and success	HR department



Table 12		Communication plan				
External communication						
	Issue / Message	Target group	Aim	Means of communication?	Timing / frequency	Point department
1	CCA strategy is implemented in order to assure customer satisfaction, punctuality of delivery, acceptable work conditions	Purchasers/ customers, local government	Prove compliance to purchaser's expectation (and beyond). Improve company reputation.	Newsletters, Company homepage, conference (as case study), print media (as op-ed?)	When decision is made, again when measure is completed; use in company material	PR/ Marketing manager
2	Solar panel installation is planned	All stakeholders, including community, business associations etc.	Improves company reputation regarding sustainability efforts.			
3	Facade/ Roof greening is planned	All stakeholders, including community, business associations etc.	Improves company reputation regarding sustainability efforts.			



# 8 Annex - Worksheets

Table 13		Assessment grid on sensitivity and adaptive capacity			
Impact Area		Critical Points	Assessment		
Infrastructure and operations	Building/Location	1	Are existing buildings resistant enough to withstand climate change impacts (changing climate, extreme weather events)?		
		2	How sensitive is the company location regarding climate change impacts?		
		3	Is infrastructure in direct proximity of the premises resilient regarding changing climate and extreme weather events?		
		4	How linked is the company with neighbouring companies? (resources, infrastructure, joint efforts)		
		5	How linked is the company with the community? (resources, infrastructure, joint efforts)		
	Processes	6	How sensitive are manufacturing processes in terms of uncertain energy and water supply?		
		7	Is the availability of water supply secure?		
		8	Is the availability of energy supply secure?		
		9	How sensitive are manufacturing processes to higher temperatures?		
		10	How sensitive are manufacturing processes in case of extreme weather events?		





Table 13		Assessment grid on sensitivity and adaptive capacity			
Impact Area		Critical Points	Assessment		
Infrastructure and operations	Processes	11	Is it possible to reduce water and / or energy consumption?		
		12	Are there any measures to provide the processes with energy in case of energy supply outage?		
		13	Are there any safety measures to prevent outflow of dangerous or pollutant substances?		
	Logistics and stock	14	Is the availability of raw material and auxiliary material affected by climate change impacts?		
		15	Is there enough flexibility in transport and delivery of goods in case of climate change impacts?		
		16	Is there any possibility to reduce raw material and product miles and/or reduce complexity of value chain?		
		17	Is the storage of goods secure in case of changing conditions (e.g., higher temperature) or other climate change impacts (e.g., flooding)?		
Stakeholders	Employees and community	18	Do working conditions deteriorate due to climate change impacts?		
		19	Do living conditions of workers deteriorate due to climate change impacts?		
		20	Are there any impacts on productivity caused by temperature rise or extreme weather?		
		21	Has the community been affected by climate change and / or the company's actions in the past?		
		22	How severely is the community (estate population and surrounding communities) affected by climate change, and by the company's adaptation or maladaptation?		





**Table 13**

**Assessment grid on sensitivity and adaptive capacity**

Impact Area		Critical Points	Assessment		
Infrastructure and operations	Government and Regulation	23	Are there any possibilities to help adapt and / or raise stability of energy/water supply in the community (estate population and surrounding communities) in a joint effort (PPP)?		
		24	Have past direct climate change impacts already affected regulations that your company has to comply with?		
		25	Do projected climate change impacts affect existing regulations?		
		26	Are there any regulations that you anticipate or expect to become more stringent in the future?		
		27	Is your company affected by any existing government programmes (e.g., National Missions) or funding streams?		
		28	Are there any government programmes regarding adaptation to be anticipated, or that your company could lobby for?		
		Finance and market	Market	29	Is there any falling or rising demand of company's products caused by climate change?
30	Are there increasing expectations / standards of purchasers and / or end-consumers in terms of climate change adaptation efforts (and is compliance referring to this aggravated by the vulnerability of the company)?				
31	Are there any impacts on product accessibility?				
32	Is there any opportunity to extend or adapt product portfolio to climate change impacts?				
			33	Are there any problems regarding short-term cash-flow and financing caused by climate change impacts?	





Table 13		Assessment grid on sensitivity and adaptive capacity			
Impact Area		Critical Points		Assessment	
Finance and market	Finance	34	Are there any problems caused for long-term investments by climate change impacts?		
		35	Is it likely that your company's liabilities increase due to climate change impacts? (e.g., flooding resulting in toxic discharge)		
		36	Are insurance premiums likely to be raised due to climate change impacts and / or are the existing insurances still adequate?		

Table 14		Past climate change and impacts on the company				
			Impact Area			
	Climate Phenomenon	Point in Time	Infrastructure & operations	Stakeholders	Finance & market	



	In case of risk: Potential loss or damage (low, medium, high) / Likelihood of occurrence (not likely, likely, very likely)	Ideas on measures for addressing risk / opportunity

	Description of Phenomenon	Resulting impacts (Disadvantages /Benefits)	Subsequent measures taken



Table 14		Past climate change and impacts on the company				
		Impact Area				
	Climate Phenomenon	Point in Time	Infrastructure & operations	Stakeholders	Finance & market	



	Description of Phenomenon	Resulting impacts (Disadvantages /Benefits)	Subsequent measures taken











Table 17

Risk matrix

<b>DEGREE OF LOSS OR DAMAGE</b>	<b>5 - Very High</b>		
	<b>4 - High</b>		
	<b>3 - Medium</b>		
	<b>2 - Low</b>		
	<b>1 - Very low</b>		
			<b>1 - Very low</b>
<b>PROBABILITY</b>			









<b>Table 19</b>	
<b>Prioritised risks for the CC phenomenon "Heat Waves"</b>	
<b>Priority Level A</b>	
<b>Priority Level B</b>	
<b>Priority Level C</b>	

(1 = Location & Buildings | 2 = Processes | 3 = Logistics & Stocks | 4 = Employees & Community | 5 = Government & Regulation | 6 = Market | 7 = Finance)



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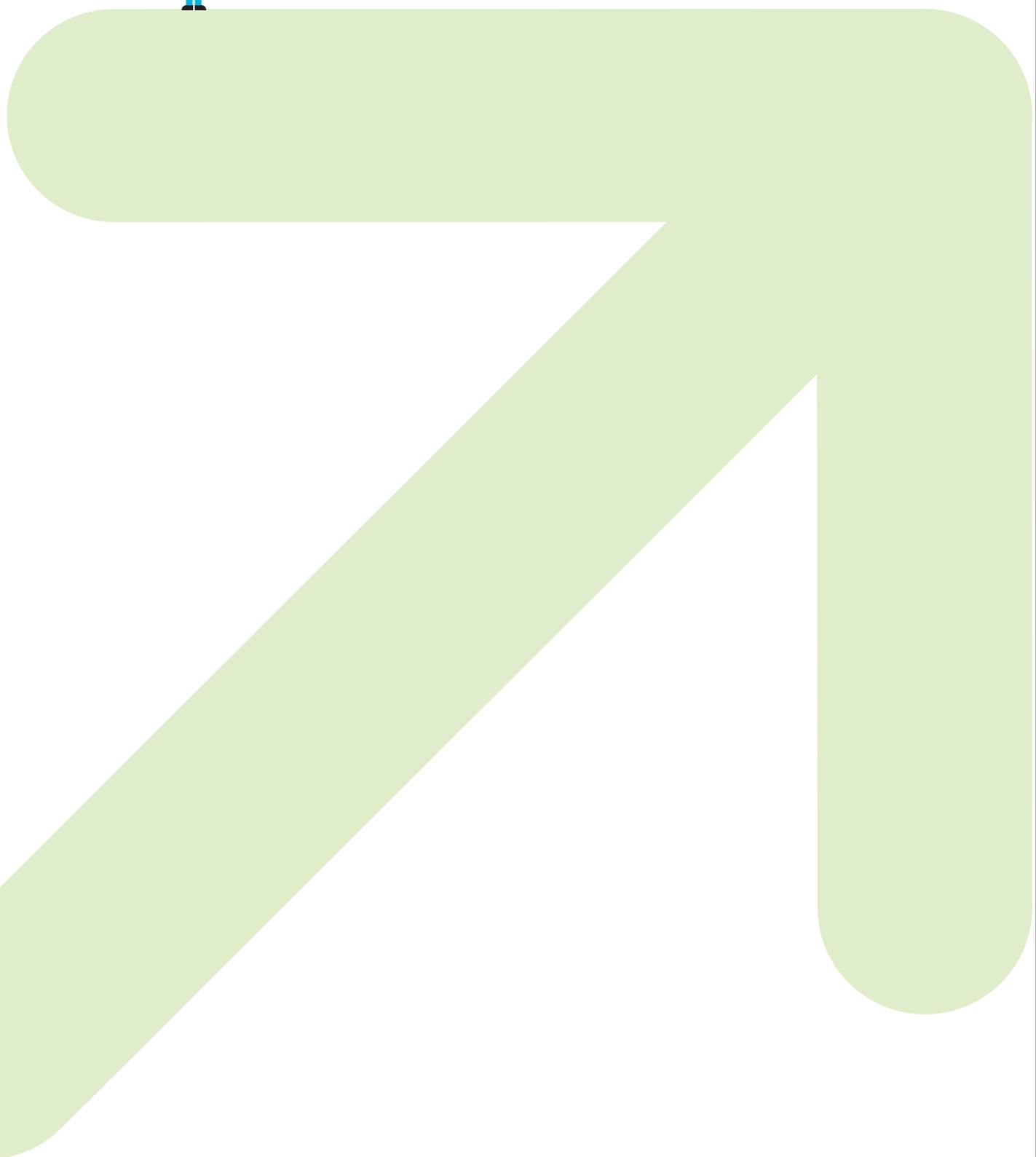












## About GIZ

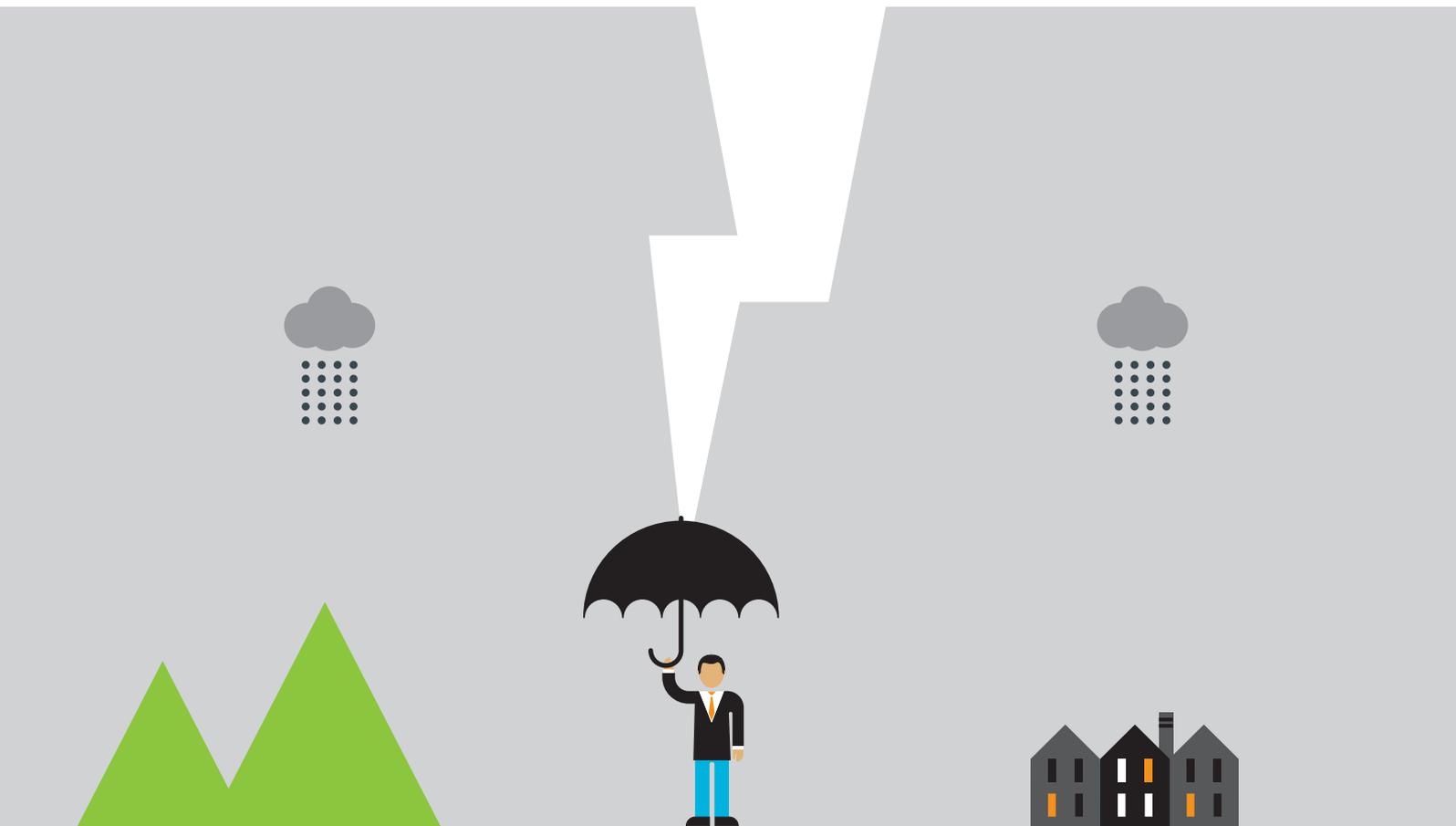
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- Financial Systems Development
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