CLIMATE RESILIENT BUSINESS SUMMARY GUIDE

Future-proofing your business
for a changing climate

CHANGE FOR CLIMATE

Edmonton

TABLE OF CONTENTS

1. INTRODUCTION – WHY BUILD RESILIENCE?

With rising temperatures, changing rainfall patterns and more severe weather events being observed, it's clear our climate is changing.

As a result of climate change, many businesses have already suffered intense weather-related impacts. And these trends are anticipated to persist. Weather and climate conditions can:

- Damage physical assets and infrastructure
- Present health and safety risks to employees
- Reduce productivity
- Interrupt transport logistics and raw materials supply
- Disrupt power, fuel and water supply
- Hinder access to markets and reduce sales
- Increase the cost of doing business
- Create other direct and indirect impacts

Further, businesses depend on the prosperity of their communities – communities that provide them with their supplies, workforce, sales and more. Equally, prosperous communities depend on successful and stable businesses for goods, services and livelihoods. We all become vulnerable when our economic base is damaged or disrupted by extreme weather events.

Climate change requires us all to manage the physical risks that come with changing weather patterns and build resilience to minimize disruptions.

Where this Summary Guide comes from

This Climate Resilient Business Summary Guide and the accompanying online Climate Resilient Business interactive tool provide practical guidance to help Edmonton's businesses manage the physical risks associated with climate change.[1]

Like the longer, comprehensive guide from which it is adapted, this Summary Guide focuses on 3 areas:

- Enhancing the resilience of **fixed assets (i.e. buildings)** to climate-related risks.
- Ensuring safe and productive future working conditions for **employees.**
- Minimizing the consequences of **supply chain** disruptions.

Benefits of resilience for businesses

Building resilience to the physical risks of climate change ensures your business will experience the benefits, such as:

- The ability to better manage and avoid downtime.
- Reduce operating and recovery costs.
- Maintain or increase your profits.

Who this Summary Guide is for

More specifically, both this Summary Guide and the accompanying online interactive tool are **designed to support business owners and managers in Edmonton's small- and medium-sized enterprises (SMEs).**[2]

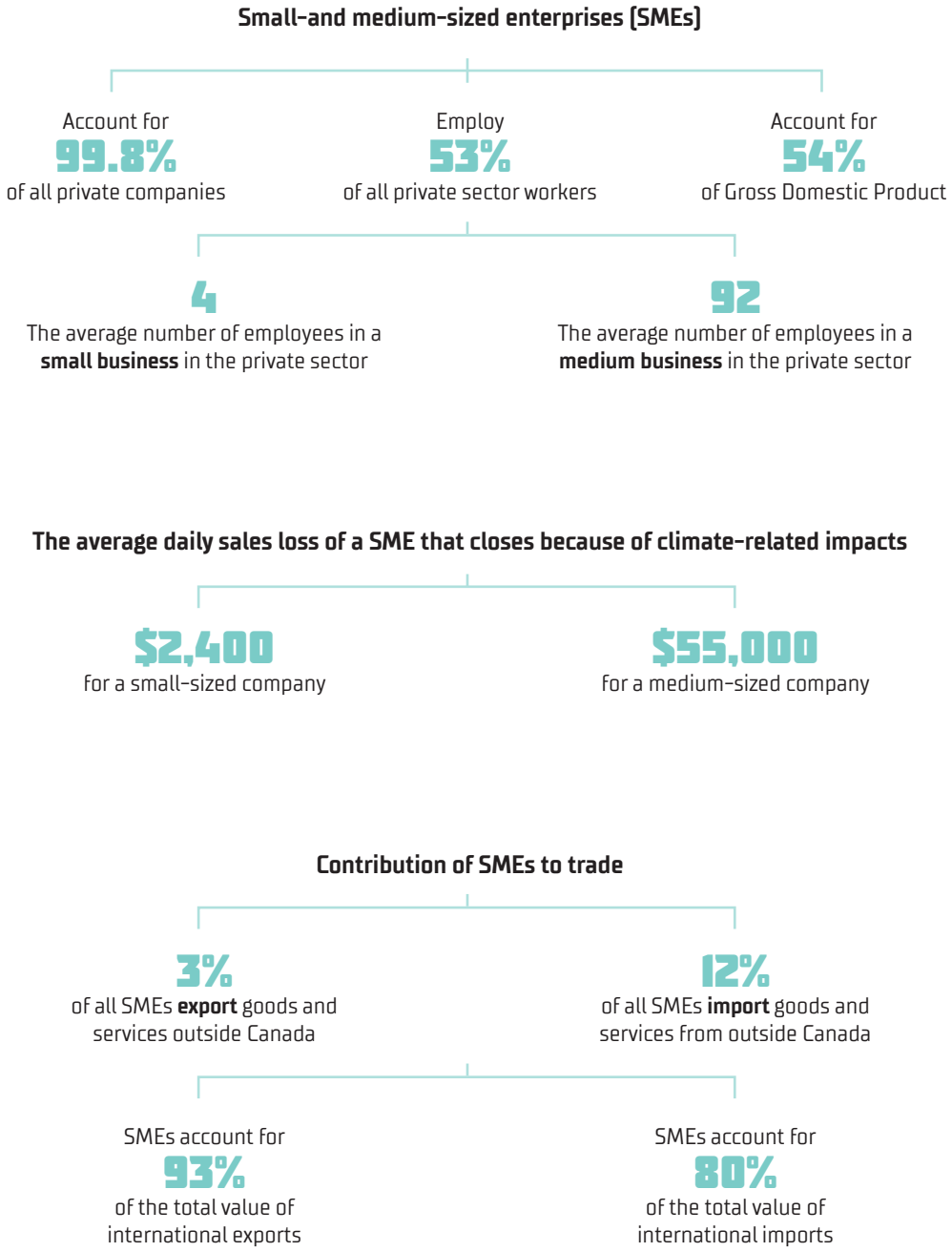
Why? Because SMEs are the backbone of the local economy (as shown in Figure 1). But most are unprepared for the risks presented by the changing climate.

COMPANION TOOLS TO THIS SUMMARY GUIDE

Use this Summary Guide in companion with:

- **The online Climate Resilient Business Tool to get tailored information for your business on risks you may face and steps you can take.**
- **The full-length, comprehensive Climate Resilient Business Guide to get more detail on climate projections and discussion on the solutions proposed. Find the full-length guide on the City's website at edmonton.ca/climateresilience.**

Figure 1: Small- and medium-sized businesses are the backbone of the local economy in Edmonton



1.1. ORGANIZATION OF THIS SUMMARY GUIDE

This Summary Guide is structured around the question:

"What is needed to make a typical business work?"

In response, **six business functions were identified**, applicable across any business or sector:

Businesses need a **site** from which to operate. They then acquire and use **capital** and depend on **employees** to transform intermediate goods – procured through **supply chains** – into finished products and services. Finally, they choose how these finished products and services are **distributed** to **consumers** and across markets (adapted from Surminski et al., 2017). [3]

How these business functions relate to one another is illustrated in the **left-hand-side** of Figure 2 below.

Key climate-related impacts on each business function are listed on the **right-hand-side** of the figure.

Figure 2: Business functions and potential climate-related impacts

Business function approach	Potential climate impacts on business functions
Businesses choose a:	
Site (business premise)	Loss or damage or increased wear to buildings Loss or damage to equipment or inventories Changes to climate-sensitive processes or practices Loss of data
They then acquire and use:	
Capital	Changes to cost of capital and debt financing Changes to equity investment Changes to insurance premiums, conditions and availability
And depend on:	
Employees	Disruption to commute to and from place of work Health and safety risks Productivity impacts
To procure and transform intermediate goods which they acquire from:	
Supply chains (upstream of site)	Disruption to transport infrastructure and services Disruption to utilities (water, sanitation, power, telecoms, etc.) Change to availability or price of utilities Changes to availability, quality or price of raw materials
Into finished products and services which they get to markets through:	
Distribution networks (downstream of site)	Disruption to transport infrastructure Disruption to consumer access
To meet the demands of:	
Consumers	Changes in demand for finished products or services Demand for new products or services

Source: Adapted from Surminski et al. (2017)

Detailed practical support to help you understand and manage the risks across four of these business functions can be found in the following sections of this Summary Guide:

1. Site [go to Section 3].
2. Employees [go to Section 4].
3. Supply chains [go to Section 5].
4. Distribution networks [go to Section 5].[4]

Section 2 summarizes the latest evidence for projected climate change in Edmonton and beyond.

2. PROJECTED CLIMATE CHANGES AND IMPACTS FOR EDMONTON

This section provides a high-level summary of climate projections and impacts for the Edmonton area. However, with today's global supply chains, climate changes anywhere in the world can affect your business in Edmonton.

See the full-length Climate Resilient Business Guide for summaries of projected climate changes in Alberta, Canada and internationally.

2.1. EDMONTON

Weather records from the Edmonton area show the mean annual temperature has increased about 1.5˚C over the past century (or 0.15˚C per decade). This rate is about 60 per cent faster than the observed global rate of surface warming over the same period.[5] Winter temperatures have increased even more substantially, by 3.0˚C over the past century (or 0.3 ˚C per decade).

Over the last 50 years the rate of annual warming is over double the average rate observed over the past century, with mean annual temperature increasing at 0.34˚C per decade.

Climate change projections for Edmonton can be found at (edmonton.ca/climatealmanac) under "Temperatures." But in general, Edmonton can expect to see the following changes in climate in the coming decades:

- Hotter summers, with an increase in average temperatures, hot days and heat waves.
- Warmer winters, with fewer cold days, fewer freeze-thaw cycles and less snow.
- More precipitation overall, including more extreme precipitation events (e.g., with larger volumes of rain falling in a single event relative to what Edmonton normally experiences).
- Drier summers, caused by higher temperatures, coupled with virtually no change in summer precipitation, but significant evapotranspiration (evaporation and water transfer from plants into the atmosphere).
- More extreme weather overall.

See the full-length Climate Resilient Business Guide for detailed projections of climate changes in Edmonton by the 2050s and 2080s.

2.2. ALBERTA

Similar to Edmonton, the climate across Alberta has changed and will continue to change. Alberta is projected to become less cold than today, with an increase in total precipitation during winter and spring.

See the full-length Climate Resilient Business Guide for a summary of projected climate changes in Alberta.

2.3. CANADA

On average, all regions of Canada have warmed at twice the global rate.[6] The mean annual temperature in Canada has increased by about 1.7°C since the mid-1900s, with the Prairies and the North experiencing higher levels of warming. Canada is anticipated to continue warming at twice the global rate in the future.

See the full-length Climate Resilient Business Guide for a summary of projected climate changes in Canada.

2.4. INTERNATIONALLY

In 2017, five per cent of surveyed small and medium enterprises in Edmonton sold **(exported)** goods and services outside of Canada.[7] The main export destinations were the United States, Europe and Asia. Smaller markets included Central and South America and Mexico.

About 12 to 15 per cent of Edmonton's small and medium enterprises *directly* **imported** goods or services from outside Canada to be used in the production of goods or were resold as is.[8] Just over five per cent of enterprises had products manufactured at a site outside of Canada.

It's worth noting, however, that even suppliers in Canada have supply chains that extend beyond Canada's borders. Just over 16 per cent of all intermediary resources purchased by Alberta businesses to create goods and services were sourced from outside of Canada.[9]

See the full-length Climate Resilient Business Guide for a summary of projected climate changes and impacts on communities in different regions of the world.

3. SITE

This section summarizes potential impacts of climate change and resilience measures you can take related to your **business site**.

Your site (or business premise) refers to:

- Your building structure or envelope.
- Mechanical, electrical, and water and waste systems.
- The comfort conditions created by your internal environment.

3.1. UNDERSTANDING CLIMATE-RELATED RISKS TO YOUR SITE

3.1.1. Impacts to buildings

Impacts to buildings can result in a wide range of consequences for your business, including:

- Costs to repair damaged buildings and structures.
- Disruption of services, including lost revenue, from business closure.
- Injury to or death of building occupants, as well as any psychological impacts or trauma from experiencing and surviving a natural disaster.

Building damage can result from a wide range of climate-related weather: high winds, extreme heat, flooding, snow and ice, hail, wildfire, as well as long-term weather changes.

What does that damage look like? Here is a summary is a summary by hazard:

3.1.1.1. High winds

High winds from severe weather events can cause:

- **Structural damage** including blow-off or collapse of the roof structure, collapse of exterior load-bearing walls, which primarily occurs during strong and violent tornadoes.
- **Roof damage** (lifting, peeling and blowing off), which is the most common type of wind damage.
- **Damage to windows and window glazing**, typically caused by wind-borne debris.
- **Exterior doors to be blown off**. Large sectional or rolling doors are particularly vulnerable.
- **Wall coverings and soffits to be damaged**. Extreme winds can also cause blowing debris to penetrate siding.

3.1.1.2. Extreme heat

Edmonton's temperatures are increasing, and local temperatures are expected to continue to get hotter.

High temperatures and large variations in temperature can damage building materials (e.g., roofing and siding) over time, causing buckling, bowing, cracking, and sometimes breakage. Some chemical processes are accelerated by an increase in temperature, which can degrade and damage concrete, asphalt and steel structures over time.

Extreme heat risks to buildings can also include electrical system overload and interruption due to increased use of ventilation and air conditioning systems.

3.1.1.3. Flooding

Flooding has the potential to inundate buildings, causing moisture damage and water accumulation in basements and below-grade areas.

3.1.1.4. Snow and ice storms

Snow accumulation beyond what original building designs can handle can result in structural failure or collapse because of, but not limited to:[10]

- **Unbalanced snow loads**
- **Rain-on-snow load**
- **Snowmelt between snow events** that can cause ice dams to form and overload eaves.
- **Irregular roof geometry**
- **Ice dams** can damage downspouts and gutters and affect the structural integrity of the roof. Ice dams are one of the most common sources of roof damage in Canada.

Heavy snowfall and ice build-up can also lead to interior water damage, as snow or ice melts and seeps into the building.

3.1.1.5. Hail

Large hailstones can cause extensive damage to roof coverings, siding, windows, doors and exterior equipment such as vehicles. An assessment of a 2016 hailstorm in Texas showed:[11]

- Built-up roofing with aggregate-surface generally performs well.
- Flat roofs with modified bitumen membrane (shingles) can be severely damaged, particularly when not supported by a high compressive strength substrate.
- Steep-slope roofs with asphalt shingles generally perform well.
- Sprayed Polyurethane Foam (SPF) roof systems perform poorly and are severely damaged.
- Flat metal roofs can be severely damaged with large dents and distortion of seams.
- Single-ply membranes had potential for severe damage, particularly when not supported by a high compressive strength substrate.
- Cedar shake and shingles on steep-slope roofs can sustain splits in the shingles, impact marks and broken shingles, when exposed to large hail (>32 mm).
- Metal roofing on steep slopes generally performs well, with only some possible denting.

3.1.1.6. Wildfire

Although building type and designs vary widely, roofs, walls, doors, windows and skylights, along with ramps, decks and foundations that are not constructed of fire-resistant materials will be the most susceptible to wildfires.

Vents and openings for utilities, gaps around doors and breaking glass, as well as heating, ventilation and air conditioning systems may allow hot gases and embers to intrude, causing fire to ignite within the building.

3.1.1.7. Drought

Drought can wreak havoc on structures. In extreme drought scenarios, the drying out of soils can lead to:

- Soil shrinkage, causing **building settlement.**
- Premature **drying or deterioration of caulking, roofing and exposed membranes.**
- **Excessive shrinkage of wood or wood siding.**

3.1.1.8. Chronic climate changes

Long-term changes in climate can also eventually cause premature degradation in building structures such as:

- Frost decay of masonry
- Concrete carbonation (from increased atmospheric CO_2)
- Corrosion of embedded metals in concrete (from increased carbonation and chlorination rates)
- Degradation of wood products (from increases in temperature and rainfall)
- Corrosion of metals
- Solar radiation on plastic

3.1.2. Impacts to land around your buildings and site

Land damage includes damage to trees, shrubs and landscaping from high winds, extreme heat, snow and ice accumulation, wildfires, flooding or drought.

Overall, increasing temperatures and drier conditions will change the composition of forests and ecosystems in and around Edmonton. This shift will change the type of trees that are suitable, the tree pests and diseases we encounter, and the diversity of wildlife species that reside in this area.

3.1.3. Impacts to equipment

Equipment stored outdoors in unprotected areas is most likely to be directly damaged by extreme weather. Exposed assets may include vehicles, benches, picnic tables, garbage cans and outdoor storage facilities. However, materials inside damaged buildings may also be at risk. This includes computers and servers that store data, and inventories of supplies and materials.

3.1.4. Impacts to building occupants

See Section 4 – Employees.

3.2. BUILDING RESILIENCE AND ADAPTING YOUR SITE FOR CLIMATE CHANGE

The good news is, you can reduce your vulnerability to extreme weather events, maintain your services and protect the long-term value of your assets.

ONLINE CLIMATE RESILIENT BUSINESS TOOL

Take our online assessment found at climateresilientbusiness.ca to identify areas of risk specific to your business and get tailored information on the steps you can take when it comes to:

- ☑ **Planning and design of your building, landscaping and equipment**
- ☑ **Structural improvements you can make**
- ☑ **Building envelope, mechanical and electrical system improvements**

4. EMPLOYEES

Your employees are your most valuable resource. On average, adults in Alberta spend about half of their waking hours commuting or at work[12]. That makes their health and safety paramount to the success of your business.

Evidence for the negative consequences of climate change on human health is unequivocal[13], and climate change may increase the risk to the health and safety of the workforce. Employees are often exposed to adverse environmental conditions for longer durations and intensities than the public. Workers are less able to avoid exposure, especially if they work outdoors.

And just as the health of some population groups are more affected than others, certain groups of workers are more vulnerable to climate-related impacts because of where they work or the type of work they do.

Climate change can affect employees in two ways:

1. More severe or frequent hazards, such as storms, heat events, wildfires and air pollution – hazards that are likely already contributing to occupational injuries, illnesses and fatalities.[14]
2. Unprecedented or unanticipated occupational hazards, such as widening ranges of infectious disease vectors, like ticks and mosquitoes.

In this section you will find guidance to help you:

- Better understand how these climate-related impacts will affect your workforce, and the level of risk posed to your business (Section 4.1), and
- Identify actions to help you manage risks to acceptable levels (Section 4.2).

4.1. UNDERSTANDING CLIMATE-RELATED RISKS TO YOUR WORKFORCE

We start by identifying existing hazards to your workforce that will be made worse by climate change, as well as new hazards that climate change will create (i.e., the potential for tick- and mosquito-borne diseases to expand into the region).

4.1.1. Impacts of climate change on workforce hazards

The main climate-related occupational hazards are listed below:

4.1.1.1. Ambient air temperature in Edmonton

Climate change will lead to an increase in both average and extreme temperatures in Edmonton.

More extreme temperatures

In terms of temperature extremes, Edmonton is projected to see an additional 7 to 8 days with daily highs exceeding 30°C by the mid-2030s and an additional 22 to 23 days by the mid-2060s.

Exposure to moderate to high temperatures can cause acute heat stress (edema, rashes, cramps, exhaustion, heat stroke and hyperpyrexia (exceptionally high fever)) among workers[15], especially those in more physically strenuous jobs. Moderate to high temperatures can also worsen chronic conditions such as cardiovascular disease, respiratory disease, cerebrovascular disease and diabetes-related conditions.

Workplace temperatures and worker performance

Workplace temperatures also affect worker performance: **beyond certain temperatures, hourly productivity of workers declines.**[16] When an employee performs strenuous physical work, the risk of overheating increases.[17]

Heat generated needs to be transferred to the external environment to avoid increases in the body's temperature. If the body is unable to dissipate the heat—because of prolonged exposure, or water or salt deficiencies—it begins to cause dizziness, muscle cramps and fever. In extreme cases, prolonged exposure to high temperatures can worsen acute cardiovascular, respiratory, and cerebrovascular distress, which can be life threatening and hospitalization.

At lower temperatures, before these serious health effects occur, workers can experience diminished 'work ability'.[18] Temperature stress may affect workers in two ways:

- It may cause direct physical or psychological discomfort.
- It may reduce productivity, altering the amount of effort exerted or the marginal return of that effort.

These two direct effects may adversely affect the number of hours that can be worked, impacting productivity. For example, workers at an outdoor industrial site in Ontario lost on average 22 hours each summer (equivalent to about 1% of annual work hours) as a result of taking breaks or stopping work due to heat stress. In Edmonton, heat-related productivity losses for the local economy can be substantial, as shown in the table below.

Projected heat-related losses of labour productivity and economic output in Edmonton, attributable to climate change

By the 2050s, estimated losses from exposure of workers in 'high risk' sectors to high temperatures in Edmonton will amount to:

SECTOR	WORK HOURS LOST (1000 hours per year)	LOST VALUE ADDED ($ 2020 M per year)
Agriculture	415	$0.8
Primary extractive industries	953	$24.0
Utilities	191	$6.7
Construction	1,767	$31.2
Manufacturing	1,775	$31.3
Transportation and warehousing	999	$17.3

Source: Boyd et al. (2020)[19]

Note: Projected lost value added by the 2050s is measured in constant 2020 dollars.

Workplace temperatures and accidents or injuries

Exposure to heat can also increase the risk of workplace accidents and injury. High temperatures can change worker capabilities, especially for strenuous tasks.

4.1.1.2. Extreme weather events in Edmonton

Climate change projections suggest the occurrence and severity of some extreme events will continue to rise through this century, with the potential to affect Edmonton directly or indirectly.

River and stormwater (urban) flooding, naturally occurring wildfires, drought, and severe windstorms may increase. For other extreme weather events, such as heavy snowfalls, ice storms hailstorms and lightning activity, there is the potential to cause considerable disruption and damage.

Extreme weather events can have multiple impacts on occupational health and safety, the most obvious being the potential for work related injuries and fatalities incurred during a weather event.

Indirect causes can also increase the likelihood of injuries or death. For example, outdoor workers speeding up to try to complete tasks before a storm may create unsafe conditions resulting in injuries.

During some extreme weather events, the risk of injuries and fatalities to employees will also be higher during commuting and may increase the risk of accidents for fatigued workers who must remain at the work site and put in extra hours until their replacements arrive.

Workplace temperatures and accidents or injuries

Occupational exposures to heat can also increase the risk of workplace accidents and injuries, which might be caused by, for example, sweaty palms, fogged-up safety glasses, dizziness, increased fatigue or reduced vigilance. High temperatures can change worker capabilities, especially for strenuous tasks.

4.1.1.3. Extreme weather events in Edmonton

Climate change projections suggest the occurrence and severity of some extreme events will continue to rise through this century, with the potential to affect Edmonton directly or indirectly.

There is medium to high confidence of increases in river and stormwater (urban) flooding, naturally occurring wildfires, drought, and severe windstorms.[20] For other extreme weather events, there is less confidence in the direction of change—for example, with respect to heavy snowfalls, ice storms, hailstorms and lightning activity. Even so, these events will continue to happen with the potential to cause considerable disruption and damage.

Extreme weather events can have multiple impacts on occupational health and safety. The most obvious concerns relate to the potential for injuries and fatalities incurred by an employee in the performance of, or in connection with, their work during a weather event.

Impacts of extreme weather are not limited to injuries or fatalities caused directly by the event—e.g., by falling branches, blowing debris, lightning strikes or flood waters—but also indirectly. The risk of accidents can increase, for example, because construction or other outdoor workers speed up the pace of work to try to complete tasks before a storm.

During some extreme weather events, the risk of injuries and fatalities to employees will also be higher when travelling to and from work. Also, disruption to work commutes may increase the risk of accidents for fatigued workers who must remain at the work site and put in extra hours until their replacements arrive.

4.1.1.4. Air quality in Edmonton

Changes in the climate will affect air quality indoors and outdoors, increasing the levels of outdoor air pollutants such as ground-level ozone (O_3)[21] and fine particulate matter ($PM_{2.5}$).[22]

Increase in fine particulate matter (due to wildfires)
Wildfires are a major source of $PM_{2.5}$ from natural sources—plants, wildfires and dust. The number and severity of fires in western North America is projected to increase driven by climate change. Because winds can transport $PM_{2.5}$ great distances, air pollution from wildfires in British Columbia and the western United States can affect workers in Edmonton.

Poor air quality negatively affects respiratory and cardiovascular systems, and can cause premature deaths, hospital visits, acute respiratory symptoms (e.g., coughing, shortness of breath, and more), leading to lost workdays.

KEEP STAFF AWARE WITH AN AIR QUALITY HEALTH INDEX LAMP

To inform your staff about air quality and the Air Quality Health Index (AQHI), consider setting up an AQHI Light at your workplace. This free online tool available from the City of Edmonton connects a Wi-Fi enabled bulb to automatically change colour and reflect the current AQHI level for any community on the Alberta AQHI Map. To access a user-friendly tutorial on the type of bulb required and instructions on connecting it to your community's AQHI reading, visit edmonton.ca/airquality.

Increase in allergens

Changes in minimum and maximum temperatures, precipitation patterns, and increasing concentrations of atmospheric carbon dioxide (CO_2) brought on by climate change are also projected to increase levels of airborne allergens. These changes will influence the prevalence and severity of allergic disease. Higher pollen levels and longer pollen seasons can increase allergic sensitization and asthma attacks, affecting workforce productivity.

Airborne allergens can affect employees indoors or outdoors, or while travelling to and from work.

4.1.1.5. Biological threats in Canada

Climate change is projected to alter the seasonality, distribution, and prevalence of vectors and vector-borne diseases (diseases transmitted by the bite of an insect).

Vector-borne diseases from insects including ticks and mosquitoes can carry infectious viruses, bacteria and protozoa (a single cell microscopic animal) from one host (a rodent, bird or deer) to another (a person).

Climatic conditions—in particular, high and low temperature extremes and precipitation patterns—exert a significant influence on vector-borne disease numbers. This happens by altering the geographic range, size and density of the vector population, vector survival rates and activity, the abundance of pathogen-carrying animal hosts, and pathogen reproduction rates. Together, changes in these variables can increase the risk of the pathogen being transmitted to humans.

Lyme disease and West Nile virus
Although ticks and mosquitoes can transmit multiple infectious pathogens to humans, Lyme disease (tick-borne)[23] and West Nile virus (mosquito-borne)[24] are of the greatest concern. Both diseases can result in a range of symptoms, from headaches, fever, fatigue and gastrointestinal issues to serious effects on the nervous system. Even the milder acute symptoms may lead to workers being absent.

Other pathogens – food-borne and water-borne
Several food-borne pathogens are climate sensitive, such as *Campylobacter*, *Salmonella*, and *Escherichia coli (E. coli)*. These pathogens favour warmer temperatures, so their occurrence is expected to increase with climate change. These food-borne pathogens can result in acute illness.

Water-related afflictions can be affected by changes to air and water temperature, heavy precipitation and runoff brought on by climate change. These changes can also affect the growth, survival and virulence of these pathogens (bacteria, viruses and protozoa, as well as toxins produced by certain harmful algae and cyanobacteria (i.e., blue-green algae). Most water-borne illnesses result in a range of symptoms from mild to severe.

Workers may acquire food- or water-borne illnesses through ingestion or direct contact with food or water contaminated by disease-causing pathogens or toxins.

4.1.1.6. UV radiation in Edmonton

Ultraviolet (UV) radiation levels at the earth's surface are projected to increase with climate change. This is primarily because of damage to the stratospheric ozone layer.[25] Despite the benefits of Vitamin D, exposure to UV radiation is still associated with the development of a number of different medical conditions.

Workers are at greatest risk when the sun's rays are at their highest intensity between the hours of 10 a.m. and 4 p.m. during the summer months. The heat that often occurs during these periods can make some workers remove clothing, increasing skin exposure. Working in the vicinity of highly reflective surfaces such as snow, ice and light-coloured sand and concrete also increases potential UV exposure.

4.1.2. Defining levels of climate-related risks to your employees

Assessing the occupational health and safety, and productivity risks to your employees involves:

1. Identifying hazards and risk factors that can adversely affect your workforce (i.e., **risk identification**).
2. Analyzing and evaluating the risk against set criteria to determine its significance to your business (i.e., **risk analysis and evaluation**).
3. Outlining actions to either eliminate unacceptable, high priority hazards or manage their consequences to within acceptable levels (i.e., **risk control**).

There are many guides with detailed step-by-step instructions and templates for performing thorough risk assessments, and completing each of these three steps.[26] ***Recommended:*** consult Alberta Occupational Health and Safety (OHS) Legislation to ensure you are fully aware of what is required for compliance. Visit **www.alberta.ca/occupational-health-safety.aspx** for legislation, education and resources.

In this next section, we identify some generic characteristics of the workforce that influence exposure levels to climate-related hazards. We then identify some simple practices to help smaller businesses get a better feel for the level of risk to their employees. The following may be useful as you review the Alberta OHS Legislation.

4.1.2.1. Workforce determinants of risk

The risk posed by different types of climate-related hazards depends on the type of work, the physical effort required, the season and the duration of work time, among other things. As an example, the range of risk factors influencing health and safety from exposure to high temperatures is shown in Figure 3.

Workers expected to be especially at risk include most outdoor workers including those working in agriculture, construction, landscaping and land surveying, utility, recreation, natural resource extraction, transportation and the waste management and remediation sectors. First responders and other emergency and recovery workers are also a risk.

While the occupational risk posed to indoor workers by climate-related hazards might be lower, it is not insignificant. Several categories of indoor workers may be affected by high ambient air temperatures — especially those who work in warm spaces that are not air-conditioned, such as bakeries, manufacturing sites and warehouses.

Whether working indoors or outdoors, risks arising from exposure to high temperatures depend greatly on the intensity of the work and whether workers are acclimatized to the workloads and temperatures.

Finally, all employees are at risk of delays, accidents or illness, as a result of exposure to extreme weather events, high temperatures or poor air quality during their commute to and from work. The longer the commute, the higher the exposure to the hazard, and the higher the resulting risk.

Figure 3: Web of risk factors for occupational heat-related illness

4.1.2.2 Key questions to help you determine workforce risks

To help you evaluate the level of potential climate-related risks facing your employees, consider the following questions (NOTE: Responses do not account for safety gear, heavier clothing or personal protective equipment (PPE). The type of clothing worn could increase – or decrease – a worker's risk of heat stress, for example):

Outdoor Workers

What proportion of your employees work largely outdoors on a daily basis?

<25% [lower risk]	25%–50% [moderate risk]	>50% [higher risk]

Is the work performed outdoors physically demanding (e.g., construction and landscaping tasks, intermittent heavy lifting, pushing, pulling)?

If yes, risk is increased

Do you schedule or modify work tasks to minimize the exposure of outdoor workers to heat and UV radiation – e.g., use a temperature-driven work-rest schedule or schedule tasks to avoid midday work in summer months?

If yes, risk is reduced

Have employees been trained on the impacts of exposure to high temperatures, poor air quality and UV radiation, how to take precautions to protect themselves, and what to do if they or a co-worker exhibits signs of illness?

If yes, risk is reduced

Do you have a Heat Acclimatization Plan for new employees or employees returning to work after an absence? (A Heat Acclimatization Plan gradually increases the intensity or duration of work performed in hot settings.)

If yes, risk is reduced

Do you take air quality into account when scheduling outdoor work – e.g., by looking at forecasts for the local Air Quality Health Index (AQHI)?

If yes, risk is reduced

Do outdoor workers spend time in grassy or wooded areas? Or work at dawn, dusk or the early evening, or in the vicinity of standing water between April and October?

If yes, risk is increased

Do you educate and encourage employees to take necessary precautions to avoid being bitten by mosquitoes or ticks, what to do if bitten by a tick, and the symptoms of Lyme disease?

If yes, risk is reduced

Indoor Workers

What proportion of your indoor workforce perform physically demanding work on a daily basis (e.g., moderate to heavy lifting, pushing or pulling)?

<25% [lower risk]	25%–50% [moderate risk]	>50% [higher risk]

Do these employees work with, or close to, radiant heat sources (equipment, processes or surfaces)?

If yes, risk is increased

Are workspaces well ventilated (good air flow) and have effective air-conditioning?

If yes, risk is reduced

Do you schedule or modify work tasks to minimize the exposure of workers to heat – e.g., use a temperature-driven work-rest schedule recommended by industrial hygienists?

If yes, risk is reduced

Have these employees been trained on how to avoid heat-related illness, how to recognize the symptoms of heat-related illness, and what to do if they or a co-worker exhibits signs of illness?

If yes, risk is reduced

Do you have an Acclimatization Plan for new employees or employees returning to work after an absence? In general, acclimatized workers are at lower risk to high temperatures than unacclimatized workers.

If yes, risk is reduced

Does your business have an emergency response plan that includes procedures to be taken by the business and workers in the event of severe weather?

If yes, risk is reduced

Commuting Workers

What proportion of your workforce have commutes to or from work longer than 30 minutes?

<25% [lower risk]	25%–50% [moderate risk]	>50% [higher risk]

Do most employees commute to work using their personal vehicles or a company (fleet) vehicle?

If yes, risk is increased

Does your business have an Inclement Weather Policy that outlines rules, expectations and operating procedures in the event of extreme weather?

If yes, risk is reduced

Does your business have a work-from-home (or remote work) policy that allows employees to perform their usual job duties at an approved alternative location?

If yes, risk is reduced

4.2. BUILDING RESILIENCE AND ADAPTING YOUR WORKFORCE FOR CLIMATE CHANGE

Multiple strategies are required to reduce the risks of occupational injuries, illnesses, fatalities and productivity losses from climate change.

NOTE: Section 4.2 provides a high-level summary. It is recommended that you visit the full-length guide found at: edmonton.ca/climateresilience for more detailed information. The interactive online assessment tool that accompanies these guides is another excellent resource, visit climate resilient business.ca.

4.2.1. Adaptation specific to climate-related occupational hazards

4.2.1.1. Ambient air temperature

There are three main approaches to managing heat-related impacts on your workforce:

- Engineered controls
- Administrative controls
- Personal protective equipment or behaviours.

In general, engineered controls are the most effective means to avoid heat-related illness and productivity losses, followed by administrative controls. However, despite their effectiveness, engineered controls can be practically impossible in an outdoor working environment. Personal protective equipment should be considered a last resort or be used as a supplementary control method. [27]

The good news is, there are some common strategies that you can employ to reduce the risks associated with higher temperatures in the workplace. [28]

ONLINE CLIMATE RESILIENT BUSINESS TOOL

Take the online assessment or view the detailed guide to identify areas of risk specific to your business and get tailored information on the steps you can take when it comes to:

- ☑ **Engineered controls to reduce the risk that can come with high temperatures**
- ☑ **Administrative controls**
- ☑ **Personal protective equipment or behaviours your employees can use and adopt**

4.2.1.2. Extreme weather events, air quality, biological threats, UV radiation

Beyond managing the risk of higher temperatures, there are also many steps you can employ to reduce the risks associated with extreme weather, air quality, insect-borne diseases and UV radiation. These can also be accessed in more detail by taking our online assessment.

ONLINE CLIMATE RESILIENT BUSINESS TOOL

Take the online assessment or view the detailed guide to identify areas of risk specific to your business and get tailored information on the steps you can take to manage risks to your employees when it comes to:

- ☑ **Extreme weather events**
- ☑ **Air quality**
- ☑ **Biological threats (such as insect-borne diseases)**
- ☑ **UV radiation**

5. SUPPLY CHAINS

Since the 1980s, supply chain management has promoted the benefits of low inventory, just-in-time delivery, single-sourcing and centralization. Many businesses have implemented this 'lean' approach successfully, achieving significant cost savings and productivity gains.

At the same time, sourcing, production and distribution operations have become increasingly globalized, creating complex webs of inter-related supply chains – all considered to be good business practice. By doing so, however, businesses have made their supply chains more vulnerable to different forms of disruption at a time when the risks of this happening are increasing.

As a business owner, you contend with supply chain risks as part of your routine operations. Supply chains need to be consistent and reliable so you can meet the demands of your customers and manage costs.

The problem is, *rapid-onset, acute risks* that cause supply disruption today – like extreme weather events – are expected to become more severe, frequent and widespread. *Gradual, chronic risks* – like sustained warming, changes to the timing of river flows, increasing winter rainfall and sea-level rise – will create new challenges.

In this section you will find guidance to help you:

- Better understand how climate change and its consequences may affect your supply chains, and the level of risk posed to your business (Section 5.1).
- Identify actions to help you manage risks to acceptable levels (Section 5.2).

5.1. UNDERSTANDING CLIMATE-RELATED RISKS TO YOUR SUPPLY CHAINS

5.1.1. Impacts of climate change on supply chains

The potential impacts of climate change on supply chains – both upstream and downstream of your site of operations – are summarized in Figure 4.

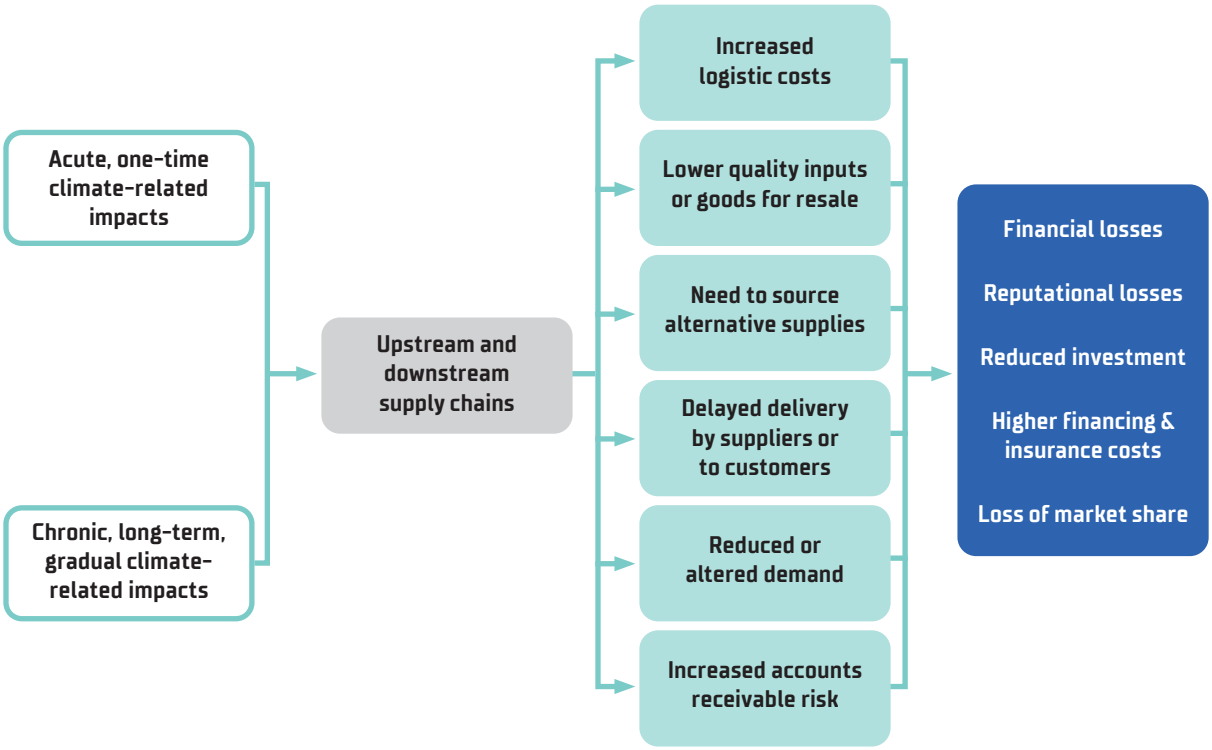
Climate change will increase the frequency, intensity and spatial distribution of **acute (one-time) supply chain disruptions** caused by powerful storms, wildfires and floods that damage production facilities and infrastructure. Damaged infrastructure may in turn lead to cascading risks, such as disrupted energy, water, and communications and information technology (ICT) disruption.

Climate change will also create **chronic (on-going) changes to supply chains** and may give rise to new, not previously encountered risks. Gradually shifting temperature and precipitation patterns could affect, for example, the availability, quality and price of agricultural and other feedstocks, making it necessary to source alternative, potentially more expensive or lower quality, supplies.

A sudden, unplanned transition to a new supplier may result in delays, in addition to increasing management costs.

Customer demand for goods and services could also be affected by chronic climate impacts. Further, extreme weather events can restrict the ability of customers to access your site of business – which is what happened with the 2013 flooding in Calgary, when much of the road network in the vicinity of the Bow and Elbow Rivers closed.

Figure 4: Risks to supply chains from climate change



5.1.2. Levels of risks to your supply chains

To help you measure the potential vulnerability of your upstream and downstream supply chains to climate change, a set of indices were created and subsequently used to define indicative risk levels (relatively low, medium, or high) for sectors and sub-sectors.

The results for 17 business sectors (defined by 2-digit North American Industry Classification System codes) are provided in Table 4.

*See the full-length Climate Resilient Business Guide at **edmonton.ca/climateresilience** for detailed results on over 220 business sub-sectors.*

Table 4: Supply chain risks: summary sector level

SECTOR – SUMMARY LEVEL	UPSTREAM RISK LEVEL	DOWNSTREAM RISK LEVEL
Agriculture, forestry, hunting and fishing	Medium	High
Mining, quarrying, and oil and gas extraction	Medium	Medium
Utilities	Low	Low
Construction	High	Low
Manufacturing	Medium	Low
Wholesale trade	Medium	High
Retail trade	Low	Low
Transportation and warehousing	Low	High
Information and cultural industries	High	Medium
Finance, insurance and real estate	Low	Low
Professional, scientific and technical services	Medium	Low
Administrative support, waste management and remediation services	Low	Low
Educational services	Low	Low
Health care and social assistance	Low	Low
Arts, entertainment and recreation	Low	Medium
Accommodation and food services	Medium	Medium
Other services	Low	Medium

In addition to the sector risk levels presented above, you could also consider the following questions to help you evaluate the level of climate-related risks facing your supply chains:

For upstream (supply) risks:

Does your business depend on climate-sensitive (e.g., agricultural products) material inputs that are not easily substituted? [An input is climate-sensitive if it is susceptible to damage or loss of quality from weather.]

If yes, risk is increased

Are suppliers of critical material inputs clustered in the same location or region? [An input is critical if it would shut down operations if it were not available.]

If yes, risk is increased

Do any of your critical supply chains depend on unique infrastructure, such as a single port or land or air route that is not easily substituted?

If yes, risk is increased

Do you rely on a single supplier for a critical material input?

If yes, risk is increased

Do you or any of your critical suppliers use Just-In-Time delivery processes (i.e., receive inputs only as they are required) or carry minimal inventory?

If yes, risk is increased

For downstream (demand) risks:

Does your business depend on the sales of climate-sensitive (e.g., agricultural products) products that are not easily substituted?

If yes, risk is increased

Are your main customers clustered in the same location or region?

If yes, risk is increased

Do any of your supply chains for moving goods to markets depend on unique infrastructure, such as a single port or land or air route that is not easily substituted?

If yes, risk is increased

Do you rely on a single customer for sales?

If yes, risk is increased

Do you sell goods that are time-sensitive for delivery?

If yes, risk is increased

For utilities disruption risks:

If a power outage would affect the phone, internet, or cable services, can your business operate without any of them?

If no, risk is increased

Can your business deliver products and services during a power, water or ICT outage?

If no, risk is increased

Can your business open, or employees work at your site of operations without any of the following systems that depend on power supply: heating, ventilation, air conditioning, water heating and distribution, escalators or elevators, or lighting?

If no, risk is increased

Is your operations site and your inventory safe from water or temperature damage if environment control systems fail due to a power outage?

If no, risk is increased

Can you or employees access your site of operations without electricity, and will security and safety alarm systems operate as intended?

If no, risk is increased

Are you able to pay suppliers and employees, or receive payments from customers without electricity or functioning information and communication systems?

If no, risk is increased

Are utilities located in the basement?

If yes, risk is increased

Do you have back-up power or alternative water supply, or water storage on site?

If no, risk is increased

Is critical data regularly backed up and safely archived?

If no, risk is increased

Can your business open without production systems that depend on power, water or functioning information and communication systems (e.g., assembly lines, machines, restaurant equipment)?

If no, risk is increased

5.2. BUILDING RESILIENCE AND ADAPTING YOUR SUPPLY CHAINS FOR CLIMATE CHANGE

Simply put, a supply chain is considered resilient to the degree it can cope with (i.e., resist, absorb, accommodate or adapt to) a hazardous event, trend or disturbance and ensure a business can continue to operate.

Below you will find guidance on how to increase the resilience of your supply chains and utilities to climate change.

5.2.1. Utilities

ONLINE CLIMATE RESILIENT BUSINESS TOOL

Take the online assessment to identify areas of risk specific to your business and get tailored information on the steps you can take when it comes to:

- ☑ **Reducing the risk of disruption to your utilities**

5.2.2. Suppliers and customers

Two main strategies can be used to manage supply chain risk: bridging and buffering.

Bridging involves strengthening the capacity of your suppliers to manage supply chain risks. **Buffering** involves protecting your business from 'failures' in your supply chains.

Bridging is the first line of defence, as you seek to minimize the chances that an acute or chronic climate-related disruption will even occur. *Buffering is your second line of defence*, as you seek to minimize the consequences for your business should supply chains be disrupted by climate events.

These strategies are not mutually exclusive. You can implement both for your business, although bridging strategies *may only be available to medium-sized enterprises*, given the need to work with and provide direct support to your upstream suppliers.

5.2.3. Bridging strategies

Bridging strategies help ensure your critical suppliers continue to function should a climate-related disruption occur and to rapidly recover to full operation despite the disruption.

ONLINE CLIMATE RESILIENT BUSINESS TOOL

Take the online assessment to identify areas of risk specific to your business and get tailored information on the steps you can take to:

- ☑ **Work with your suppliers to manage risks collaboratively**
- ☑ **Set up financial assistance or procurement agreements to reduce the risk of disruptions**

5.2.4. Buffering strategies

Buffering strategies protect your business from the real consequences of failures in your supply chain. Common buffering strategies are about building redundancies at critical points in supply chains.

ONLINE CLIMATE RESILIENT BUSINESS TOOL

Take the online assessment to identify areas of risk specific to *your* business and get tailored information on the steps you can take to:

- ☑ **Set up an inventory buffer and manage carrying costs**
- ☑ **Set up capacity buffers that increase the number of accessible suppliers or logistics providers available to you**
- ☑ **Set up a lead time buffer that provides information before disruptions occur**
- ☑ **Influence consumer decisions to purchase more readily available goods**

5.2.5. Good practices to build your supply chain resilience

In addition to bridging and buffering strategies, there are several general good practices that will enhance the resilience of your supply chains to climate-related risks. Like the bridging strategies, some of the good practices listed below will *only be applicable to medium-sized enterprises.*

- ☑ **Create a climate resilience culture.** Designate an individual or team with responsibility for engaging with all levels of the business (externally with upstream suppliers and downstream customers) to manage the risk of supply chain failure or disruption.
- ☑ **Improve supply chain visibility.** It may not be clear to anyone what the status of your upstream suppliers or downstream customers is, or what your flow and inventory levels look like. It can take weeks or months before problems come to light.
- ☑ **Ongoing monitoring of critical supply chains.** Monitoring your key supply chains helps you identify early signs of potential failures and disruption.
- ☑ **Perform stress-tests.** Stress testing will help your business understand and prioritize climate-related supply chain risks. The starting point is to 'improve supply chain visibility' as above.
- ☑ **Insure against supply chain risks**. There are two types of relevant insurance products to supply chain disruption. **Business Interruption insurance** covers events that happen at the site of business, such as a fire at your manufacturing plant. **Contingent Business Interruption insurance** covers events that happen at a property owned by your suppliers or customers. Talk with your insurance provider.

*Take the online assessment at **climateresilientbusiness.ca** or see the full-length Climate Resilient Business Guide at **edmonton.ca/climateresilience** for a more detailed discussion of good practices for building your supply chain resilience.*

6. KEY VOCABULARY

Adaptation (actions)	Initiatives and measures to avoid or moderate harm to businesses, or to exploit beneficial opportunities, posed by current or anticipated climate change.
Adaptive capacity	A business's ability to implement actions to adapt to a changing situation.
Climate	Average weather of a place or region over a period of years, decades or longer.
Climate baseline period	The average weather conditions observed over a historical 30-year period in a given place or region, against which changes are measured.
Climate change	Refers to any persistent, long-term change in the climate over time (an increase or decrease in the mean, variability or extreme of a climatic variable, such as temperature or precipitation).
Climate extreme	The occurrence of a weather variable above (or below) a threshold near the upper (or lower) ends of the range of observed historical values at a particular place or time of year. Often used interchangeably with both extreme weather events and extreme climate events.
Climate Impact-drivers	Refers to physical climate conditions (e.g., means, events, extremes) that can have detrimental, beneficial or neutral impacts for a business, community or natural systems. Examples of climate impact-drivers include mean air temperature, extreme heat, mean precipitation, extreme rainfall and stormwater flooding, drought, severe windstorm, hail, heavy snowfall, ice storm, fire weather, etc. See also: Risk, Hazard and Impacts.
Climate variability	Variations above or below the average state of the climate (including the occurrence of extremes), whether as a result of natural variability or human activity.
Exposure	The presence of people, businesses, economic assets and infrastructure, and natural resources in places where they could be adversely affected by climate impact-drivers.
Hazard	A source of harm to your business. In a climate change context, it refers to the potential occurrence of climate conditions (e.g., means, events, extremes) that may cause loss of life, injury, or other health impacts, reduced productivity, or damage and loss to property and infrastructure, and disruption to value chains. See also Climate Impact-drivers, Impacts and Risk.

Impacts	The consequences of a realized risk to a business, where risk results from the interactions of a climate impact-driver, exposure and vulnerability. Impacts refer to loss or damage to buildings, equipment, or inventories, loss of life, injuries, or other health effects to the workforce or customers, lost labour productivity, disruption to utilities, supply chains and access to markets, and changes to the availability, quality or price of raw materials, as well as changes in demand for finished products and services. Often used interchangeably with consequences. See also Climate Impact-driver, Exposure, Hazard, Risk, Vulnerability.
Likelihood	The chance of a specific outcome occurring.
Mitigation (actions)	Initiatives and measures taken by businesses to reduce emissions or remove and store heat-trapping greenhouse gases.
Natural variability	Short-term changes that take place over months, seasons and years, due to variations in the interactions of the oceans and the atmosphere that occur. For example, in the Pacific Ocean during an El Niño event, as well as natural variations in the sun's radiation or volcanoes.
Resilience	The ability of a business to absorb disturbances while retaining the same basic structure and means of functioning, and its capacity to adjust to stress and change.
Risk	The potential for adverse consequences for business assets, employees, value chains and communities, where the occurrence and magnitude of the consequences is uncertain. Risk results from the interaction of vulnerability (of an affected business), its exposure over time (to the climate impact-driver), as well as the nature and intensity of the climate conditions and their likelihood of occurrence. See also Climate Impact-driver, Hazard and Impacts.
Sensitivity	The degree to which a business is affected, either adversely or beneficially, by a climate impact-driver. See also Climate Impact-driver and Vulnerability.
Supply chain	The entire system of procurement, logistics, transformation and delivering a product or service, from the sourcing of the raw materials through to the delivery of the finished product or service to customers. Sometimes used interchangeably with value chain.
Vulnerability	The degree to which a business (its assets, employees and value chain) is susceptible to, and unable to cope with, adverse effects of climate change. It is a function of character, intensity, frequency and duration of the climate impact-driver to which the business is exposed and the sensitivity and adaptive capacity of the business. See also Adaptive Capacity and Sensitivity.
Weather	The atmospheric conditions outside at any particular time and place, which can change quickly.

7. FOOTNOTES

1. A similar tool is available for Edmonton's homeowners and builders that provides practical guidance on how to improve the climate resilience of homes in the city—the Climate Resilient Home (CRH) (see www.climateresilienthome.ca).
2. Statistics Canada officially defines small- and medium-sized businesses as having less than 500 employees; a small-sized business employs less than 100 individuals while a medium-sized business employs 100 to 499 individuals.
3. Surminski, S., Style, D., Di Mauro, M., et al., 2016, UK Climate Change Risk Assessment Evidence Report: Chapter 6, Business and Industry. Report prepared for the Adaptation Sub-Committee of the Committee on Climate Change, London, UK.
4. The supply chains and distribution networks business functions are considered together in Section 5 because of the vulnerability of both functions to impacts on (sometimes the same) logistics and transport infrastructure.
5. Historical data obtained from Environment Canada's Adjusted and Homogenized Canadian Climate Data (AHCCD) from weather stations in the Edmonton Area. Cited in: City of Spruce Grove, Climate Resilience Express Action Plan. March 2018.
6. Learn more: See Canada's Changing Climate Report (available at https://changingclimate.ca/CCCR2019).
7. Statistics Canada, 2018. Survey on Financing and Growth of Small and Medium Enterprises 2017, Data Tables. Centre for Special Business Projects, Statistics Canada, Ottawa, ON.
8. Ibid.
9. Statistics Canada, Provincial Symmetric Input-Output Tables, 2019.
10. Source: Federal Emergency Management Agency (n.d.). FEMA Snow Load Safety Guidance. FEMA P-957.
11. The Roofing Industry Committee on Weather Issues, Inc. (2017). Hailstorm investigation report. North Texas – April 11, 2016.
12. Statistics Canada. 2017. Focus on Geography Series, 2016 Census. Statistics Canada Catalogue no. 98-404-X2016001. Ottawa, Ontario. Data products, 2016 Census.
13. IPCC Sixth Assessment Report, WGI, Technical Summary.
14. Kjellstrom, T., et al. (2015). Heat impacts on work, human performance and daily life. In: Climate Change and Public Health [Levy, B. and Patz, J., (eds.)], Oxford University Press, New York, 73–86.
15. Boyd, R. and Markandya, A. (2021): Costs and Benefits of Climate Change Impacts and Adaptation; Chapter 6 in Canada in a Changing Climate: National Issues Report, (Eds.) F.J. Warren and N. Lulham; Government of Canada, Ottawa, Ontario.
16. Kjellstrom, T., et al. (2015). Heat impacts on work, human performance and daily life. In: Climate Change and Public Health [Levy, B. and Patz, J., (eds.)], Oxford University Press, New York, 73–86.
17. Kjellstrom, T., et al. (2015). Heat impacts on work, human performance and daily life. In: Climate Change and Public Health [Levy, B. and Patz, J., (eds.)], Oxford University Press, New York, 73–86.
18. Kjellstrom, T., et al. (2015). Heat impacts on work, human performance and daily life. In: Climate Change and Public Health [Levy, B. and Patz, J., (eds.)], Oxford University Press, New York, 73–86.
19. Boyd et al. (2020).
20. Hot days and heat waves, which are discussed separately, would fall within this category of extreme events.
21. Learn more: Visit the Government of Canada's Air Quality Health Index site (available at https://weather.gc.ca/mainmenu/airquality_menu_e.html). The AQHI forecast values for Edmonton are available at: https://weather.gc.ca/airquality/pages/abaq-001_e.html.
22. Government of Canada, Health Risks of Air Pollution (https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index/health-risks.html#toc1) (accessed 30-11-2021).

23. Learn more: see Bouchard, C., Dibernardo, A., Koffi, J., Wood, H., Leighton, P. and Lindsay, L. (2019). Increased risk of tick-borne diseases with climate and environmental changes. CCDR, 45 (4), 81–89 (https://doi.org/10.14745/ccdr.v45i04a02).

24. Learn more: see Ludwig, A., Zheng, H., Vrbova, L., Drebot, M., Iranpour, M. and Lindsay, L. (2019). Increased risk of endemic mosquito-borne diseases in Canada due to climate change. CCDR, 45 (4), 90–97 (https://doi.org/10.14745/ccdr.v45i04a03).

25. The stratospheric ozone layer is a naturally occurring gas that filters the amount of the sun's UV radiation reaching the Earth's surface. Think of it as the Earth's sunscreen.

26. Learn more: visit the Canadian Centre for Occupational Health and Safety's online "Risk Assessment" guide (available at https://www.ccohs.ca/oshanswers/hsprograms/risk_assessment.html). Or see the Standards Council of Canada's Z1002 Occupational Health and Safety – Hazard Identification and Elimination and Risk Assessment and Control (CAN/CSA-Z1002-12 (R2017) (available at https://www.csagroup.org/store).

27. ESDC (2018).

28. Learn more: see Alberta Government (2014), Best Practice – Working Safely in the Heat and Cold. Alberta Government, Edmonton (available at https://ohs-pubstore.labour.alberta.ca/gs006) or Work Safe B.C. (2007 update), Preventing Heat Stress at Work (available at https://www.worksafebc.com/en/resources/health-safety/books-guides/preventing-heat-stress-at-work). Also, visit the Canadian Centre for Occupational Health and Safety's "Fact Sheets" for "Hot Environments-Control Measures" (available at https://www.ccohs.ca/oshanswers/phys_agents/heat_control.html) and "Temperature Conditions-Hot" (available at https://www.ccohs.ca/oshanswers/phys_agents/max_temp.html).

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Environment and Climate Resilience
Urban Planning and Economy Dept.

City of Edmonton
8th Floor Edmonton Tower
10111-104 Avenue NW
Edmonton, AB.
T5J 0J4

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Future-proofing your business for a changing climate

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ALL ONE SKY FOUNDATION is a not-for-profit, charitable organization established to help vulnerable populations at the crossroads of energy and climate change. We do this through education, research and community-led programs, focusing our efforts on adaptation to climate change and energy poverty. Our vision is a society in which ALL people can afford the energy they require to live in warm, comfortable homes, in communities that are resilient and adaptive to a changing climate.

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CHANGE FOR CLIMATE

Edmonton