Climate Change: Workplace Impacts

HANDBOOK

Canada

CCOHS.ca
Canadian Centre for Occupational Health and Safety

Climate Change: Workplace Impacts

First Edition

Published June 2023

P23-1E
ISBN 978-0-660-49251-3
DSS Catalogue Number CC273-2/23-2E-PDF

CCOHS
Canadian Centre for Occupational Health and Safety

Canadian Centre for Occupational Health and Safety
135 Hunter Street East, Hamilton, Ontario, Canada, L8N 1M5
Phone: 1-800-668-4284 or 1-905-572-2981
Fax: 905-572-2206 **Web:** www.ccohs.ca

The Canadian Centre for Occupational Health and Safety (CCOHS) promotes a safe and healthy working environment by providing information and advice about resources on occupational health and safety.

Each publication produced by CCOHS undergoes several stages of review. As part of this review, representatives from government, employers, and labour are requested to comment on draft copies of CCOHS documents for technical accuracy and readability.

Although every effort is made to ensure accuracy and completeness of the information, it is understood that CCOHS makes no warranty as to the accuracy or completeness of such information and assumes no liability for any damages or loss suffered as a result of any inaccuracy or incompleteness therein.

Table of Contents

Introduction 1
- Definitions 2

Effects of Climate Change 3

Impact of Climate Change on Workplaces and Workers 4
- Direct Impacts 5
- Indirect Impacts 6
- Psychological Impacts 7
- Pre-existing Vulnerabilities Can Worsen Impacts 8

Impact on Businesses and Industries 10
- Impacts Resulting from Responding to Climate Change 11

Health and Safety Legislation 13
- General Duty 13
- Due Diligence 13

Addressing Climate-Related Hazards and Risks 15
- Hazard Identification and Risk Assessment 15
- Implement Control Measures 16
- Continuous Evaluation 18
- Examples of Climate-related Workplace Hazards and Sample Control Measures 18

Supporting the Community 23

Strategies for Reducing the Workplace's Contribution to Climate Change 24

Conclusions 25

Managing the Impact of Climate Change on Workplaces – Handout 26

Sources 27

Appendix 1: Additional Resources 30
- OSH Answers 30

Appendix 2 – Enhancing Resilience and Reducing Contributions to Climate Change 31

Introduction

While there are many publications that discuss climate change, few focus on the impact on occupational health and safety in the workplace directly. It is no longer possible to consider the challenges presented by climate change in isolation. This publication discusses the impacts of climate change with a focus on workplaces, employers, workers, and the work they do. Understanding the effects on a workplace and taking action to identify, assess, control, and monitor climate-related hazards must be considered. Workplaces that anticipate and plan for the impacts of climate change will be more resilient.

This publication discusses climate change and its impact on workplace health and safety, employers, workers, and other stakeholders. It includes:

- direct and indirect impact of climate change on the workplace and the people in it,
- taking climate-related events into account when establishing policies and programs to address their impact on occupational health and safety,
- considering the impacts of climate change when completing workplace hazard identification and risk assessment, and
- potential approaches for addressing climate-related workplace hazards (e.g., emergency response, implementing safe work practices, etc.).

Notes:

1. This document does not refer to any jurisdiction-specific occupational health and safety legislation nor to any human rights legislation. Where recommendations are made, they are intended as good practices. For legal interpretation, contact the relevant jurisdiction or regulatory body.
2. In the case of a unionized environment, reference collective agreements and seek advice from union representatives.

Definitions

Airtight buildings are built to be sealed more tightly to reduce the energy used for air conditioning and heating. These buildings may have poor indoor air quality if ventilation is not adequate (e.g., illnesses caused by the accumulation of various pollutants). (Niculita-Hirzel, 2022)

Circular Economy is a way of business that retains and recovers as much value as possible from resources by reusing, repairing, refurbishing, remanufacturing, repurposing, or recycling products and materials. (Government of Canada, 2022)

Due diligence is the level of judgement, care, prudence, determination, and activity that a person would reasonably be expected to do under the circumstances.

Eco-anxiety is described as anxiety or worry about climate change and its effects or as "a chronic fear of environmental doom." (Clayton et al., 2017)

Urban heat islands occur in cities (or parts of cities) where there are impervious structures (e.g., buildings, concrete, asphalt, etc.) and heat-generating sources (e.g., people, cars, buses, etc.) that hold heat or heat the area, making that space warmer. Reduced natural landscapes (greenery) also contribute to heat islands. (US EPA, 2022a)

Effects of Climate Change

Climate change is described as "a long-term shift in weather conditions measured by changes in temperature, precipitation, wind, snow cover, and other indicators. This [shift] may vary from region to region. For example, temperature increases will vary from one region to another, and precipitation may increase in some regions but decrease in other regions." (Environment Canada, 2015)

Environmental effects of climate change include:

- Extreme weather (e.g., events may occur more often, be more intense, or last longer)
- Warmer or colder temperatures
- Changes in precipitation (e.g., rainfall (flooding or drought), snowfall)
- Increased risk for and extent of wildfires
- Worsening air or water quality
- Changing ecosystems and impact on plants and animals, including the timing of lifecycle events (e.g., migration, reproduction)

The effects of climate change on human health are many and may include:

- Increased smog and heat waves that result in more temperature-related illness and death
- The spread of infectious diseases such as malaria, dengue, and yellow fever into Canada as insects carrying these diseases migrate northward with the warming climate
- The decline in quality and quantity of drinking water as water sources in some areas become threatened by drought (Environment Canada, 2015)
- Psychological effects such as:
  - direct trauma if an individual has experienced an extreme weather event (e.g., impacted directly by a storm or flood)
  - increased anxiety, stress, or poor emotional well-being due to concern or uncertainty about job security or the future in general

Impact of Climate Change on Workplaces and Workers

There are many potential impacts of climate change on the health and safety of workers and workplaces, as shown in this diagram from the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST). (Adam-Poupart et al., 2013)

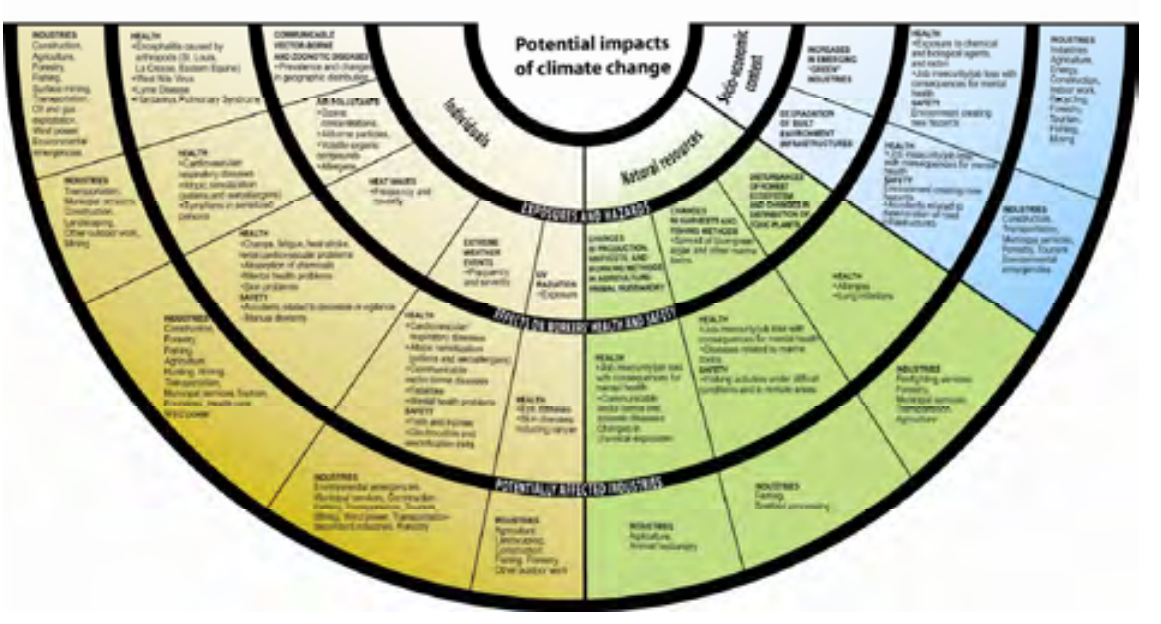


Figure 1: Conceptual framework of the potential impacts of climate change on occupational health and safety in Québec

Direct Impacts

Climate change can directly impact the workplace and workers themselves.

Climate change may result in:

- Greater exposure to extreme weather
  - Extreme temperatures can lead to heat stress and heat-related injuries, or freezing and non-freezing cold injuries including hypothermia
  - More intense sunlight may lead to more cases of skin and eye diseases
  - Contaminated water
  - Intense storm conditions (e.g., high winds, heavy rain, snow, etc.)
  - Effects of living through or responding to the weather event, such as physical or mental fatigue, dehydration, etc.
- Greater exposure to air pollution
  - Airborne particles and volatile organic compounds (such as from wildfires, increased dust, etc.) may lead to cardiovascular or respiratory issues
  - Health issues related to poor indoor air quality (e.g., due to more airtight buildings without adequate air exchanges, etc.)
- Greater exposure to disease-bearing vectors
  - From insects and animals that carry diseases (e.g., shift or expansion of their habitation range)
  - From pathogens, moulds, and allergens that lead to infectious diseases, dermatitis, allergies, or asthma (e.g., conditions become more favourable for the growth of undesired pathogens)
- Loss of natural resources, which may
  - Alter the growing season or precipitation levels may result in crop loss
  - Alter water temperature, affecting fish or other marine life that can be farmed or caught
  - Affect the number of trees available in the area where the organization has forestry rights to harvest timber from public lands (e.g., loss of trees due to wildfires or drought)

These changes may disrupt the way an organization operates, cause illnesses or injuries, lead to increased stress, or impact the organization's earnings (and thus impact the worker's job security or earnings).

Indirect Impacts

Climate change can indirectly impact workplaces and workers as well.

Climate change may result in:

- Clean-up activities after extreme weather events
  - Exposure to mould, bacteria, etc. that may grow in standing water and on damp surfaces
  - Exposure to hazardous building materials including asbestos and lead
  - Exposure to electrical hazards
  - Risk of unsafe work areas or structural failures (e.g., roof or building collapse)
  - Increased risk of injuries when performing disaster response tasks without adequate training or experience (e.g., use of heavy equipment, chainsaws, etc.)
  - Exposure to traumatic experiences including witnessing extreme suffering or death
- Job insecurity or excessive working hours (due to the reduction or growth of industries affected by climate change)
  - Mental stress, issues with work/life balance, or other health effects such as cardiovascular disease
- Musculoskeletal disorders from repetitive motions or postures due to longer work hours or by performing tasks without adequate training
- New technologies developed to address climate change may have unknown health effects and potential hazards
- Changes to production processes to achieve a circular economy
  - Increased and new refurbishing, remanufacturing, repair, and recycling activities may introduce additional health and safety hazards

Large-scale or community effects of climate events may also include:

- Higher likelihood of violence during heat events
- Conflicts over scarce resources
- Post-disaster migration or relocation (Doherty and Clayton, 2011; Eyquem and Feltmate, 2022)

Psychological Impacts

The psychological effects of climate change may include direct, indirect, and social impacts.

- Direct traumatic effects may result from experiencing extreme weather events and changing environments
- Indirect effects include threats to emotional or mental well-being based on observation of climate changes, and concern or uncertainty about the future
- Social and community effects include displacement, migration, climate-related conflicts, post-disaster adjustments, and reactions to disparities (Doherty and Clayton, 2011)

Possible mental and psychosocial outcomes include:

- Stress
- Strained relationships
- Eco-anxiety
- Suicidal behaviour
- Substance use

For example, eco-anxiety may include symptoms such as depression, insomnia, hopelessness, and panic attacks. Eco-anxiety can also include feelings of loss, helplessness, frustration, tension, fatigue, and fatalism due to an individual's inability to feel like they are making a difference in stopping climate change. Many people experience stress caused by watching the slow and seemingly unchangeable impacts of climate change unfold and worrying about the future for themselves, their children, and future generations. (Doherty and Clayton, 2011)

It has also been noted that a range of emotional responses related to climate change may occur. Individuals struggling to find adaptive responses may act out, or experience trauma associated with disasters or environmental change.

Distress may also occur after a climate event, including "distress reactions" such as insomnia, scapegoating, irritation, and engaging in risk behaviours (e.g., problematic substance use). (Harrington, 2020)

At the same time, an individual's response to climate change can be positive, such as:

- Curiosity
- Concern
- Skepticism
- Creativity

These responses could encourage a person to prioritize resource conservation or become involved in addressing the causes of climate change. (Doherty and Clayton, 2011)

Ethical dilemmas may also occur. For example, the agriculture industry both affects and is affected by the changing climate. For instance, agricultural businesses are affected by changes in rainfall. A reduction in rainfall may result in the need to use pumps (powered by gasoline or diesel fuels) to bring water to crops or increase the use of pesticides and fertilizers to maximize crop yield. The increased use of fuel, pesticides, and fertilizers further increases costs and affects the environment and climate. However, the crop may still yield less than expected amounts. Reduced profit means that the business cannot upgrade to more energy-efficient equipment or to methods that rely less on pesticides or fertilizers to help lower their climate impact.

Pre-existing Vulnerabilities Can Worsen Impacts

The impact of climate change on health and safety can be experienced differently due to a variety of personal, environmental, and social factors. For example, migrant workers and day labourers have a higher chance of experiencing inadequate housing or other social and economic constraints, making the adverse health effects of exposure to climate-related hazards worse through being exposed to similar hazards outside of work. (NIOSH, 2023)

Vulnerabilities that could make the impact of climate change more significant include:

- Systemic racism-based vulnerability (e.g., Black, Indigenous, and people of colour (BIPOC) tend to have higher exposure to pollutants, etc.)
- Gender-based vulnerability (e.g., housing and poverty inequalities)
- Location-based vulnerability (e.g., climate-vulnerable areas such as flood zones, or housing located near industrial areas)
- Pre-existing health conditions and healthcare access limitations

Did you know?
The United Nations state: "Initial inequality causes the disadvantaged groups to suffer disproportionately from the adverse effects of climate change, resulting in greater subsequent inequality." (Islam and Winkel, 2017)

Consider the impact of these vulnerabilities: (American Public Health Association, 2021)

- Low-income communities are more likely to be located within urban heat islands or industrial zones, increasing their likelihood of being impacted by heat events or pollution.
- Increasing real estate prices have resulted in low-income communities being located in less desirable and more climate-vulnerable areas, such as flood zones or urban heat islands.
- Rural locations that experience weakened infrastructure, less access to health care, and less secure food systems are also more likely to be impacted by extreme weather events, such as flooding or storms.

Impact on Businesses and Industries

Since climate change is a global phenomenon, it has the potential to impact every industry in a number of ways. However, some industries may be more affected than others. (Government of Alberta, 2022; Nilsson and Kjellstrom, 2010; European Commission, n.d.)

The industries most often cited as being negatively impacted by climate change are:

- Agriculture – change to areas where certain crops can be grown, water use, chemical use (e.g., fertilizer, pesticides, herbicides, etc.), changes in crop yields, financial security
- Fisheries – fish and marine life distribution (due to changing habitat), extreme weather making activities not possible
- Forestry – risks from drought and resulting wildfires, more susceptible to storms (weaker root systems), pests and diseases, changing plant species
- Construction and infrastructure work – changing and more frequent and extreme weather conditions to work through, or that stop the ability to work
- Emergency response (e.g., paramedics, firefighters, police officers) – increase in weather-related emergency events and resulting conflicts around resources and relocation

These negative impacts may be direct, such as:

- Damage to infrastructure, or an overwhelming demand on the capacity of the infrastructure (e.g., buildings, road works, airports, public transportation, dams, etc.)
- Loss of utilities (e.g., electricity, gas, etc.) due to weather events, additional demand, or stress on transmission infrastructure
- Reductions in manufacturing and product availability
- Increases in supply chain issues

Indirectly impacted industries include:

- Tourism and Recreation - change in the timing of visitors (e.g., areas becoming too hot for visitors), decreased visitors (e.g., areas traditionally known for snow sports that now have little or no snow), or tourist area being damaged by a weather event
- Health services – the capacity to respond to large-scale emergencies, and address new or increased diseases
- Finance or Insurance – more frequent payouts, foreclosures, or default payments due to impact on businesses

- Municipalities – can vary, for example, a reduction in tax base due to the closing of businesses and migration of residents
- All industries – changing premiums and ability of businesses to be insured (e.g., located in areas that often flood or experience extreme weather)

Other indirect impacts may be on the work itself. Greater workloads or longer shifts may be required to make up for delays or interruptions, which can increase the risk of injuries, stress, fatigue, etc. Workers in negatively affected industries may also experience decreased job security. Job insecurity has been associated with reduced safety behaviours as well as insomnia and reduced work engagement. (Zhang et al., 2021)

Positive impacts may also be present. The development of new energy sources may create new jobs through development, manufacturing, sales, or installation. New energy systems may also reduce costs. However, as we will discuss below, it is important to identify hazards, assess risks, and implement control measures to make sure the new businesses or technology does not introduce new health and safety risks.

Impacts Resulting from Responding to Climate Change

As the number of extreme weather events is expected to increase, this frequency will place a greater demand on emergency response and disaster mitigation services, healthcare workers, utility and construction workers, and others that are responsible for directly responding to these events. This demand may lead to an increased risk of injuries, illnesses, and psychological impacts for these workers.

While disaster mitigation and emergency response to an extreme weather event are often considered, other sectors could also be impacted.

For example, warming temperatures may result in:

- Swimming pools and air-conditioned public facilities may be required to stay open for longer periods of time
  - Longer working hours may impact an individual's work/life balance, the workplace's finances, etc.
  - Possible additional need for chemicals to treat the swimming pool water resulting in increased exposure to chemicals, financial costs, etc. (Eyquem and Feltmate, 2022)
- Outdoor workers may need to adjust their working hours to avoid the hottest time of the day
  - Working at dusk and dawn when mosquitoes are more active increases the chance of vector-borne illnesses
  - Disrupted workday (non-continuous hours) may impact work/life balance

- Workers may have to perform closer to their maximum physical ability for prolonged periods when work activity is combined with hot conditions, leading to increased risk for negative health effects

- Changes in agricultural yields, requiring adjustment to farming strategies and processes
  - Use of pesticides and herbicides may increase, leading to more exposure to harmful chemicals
  - Farm operators already experience greater mental strain and stress in general, but their mental health may be further affected by increasingly unpredictable weather patterns and uncertainty around the survival of their operation (Zinyemba et al., 2020; Hagen et al., 2021)

Health and Safety Legislation

Employers must be aware of their overall duty and take measures to maintain a healthy and safe workplace. In terms of the impact of climate change, legal duties may be addressed, for example, by controlling worker exposure to hazards (such as working in the cold or heat). However, Acts and regulations do not cover every possible hazard, nor do they always list or prescribe the specific steps to ensure compliance. When specific duties are not specified in legislation, employers must follow good practices to ensure a safe workplace.

General Duty

Each occupational health and safety jurisdiction in Canada includes a "general duty clause" in its legislation. This clause places a duty on the employer to ensure that the health and safety of the employees are protected while they are working.

For example, Prince Edward Island's *Occupational Health and Safety Act* contains the following requirement:

> Section 12 Duties of employers
> 12. (1) An employer shall ensure
> (a) that every reasonable precaution is taken to protect the occupational health and safety of persons at or near the workplace;

Due Diligence

Due diligence is the level of judgement, care, prudence, determination, and activity that a person would reasonably be expected to do under the circumstances. Applied to occupational health and safety, due diligence means that employers must take all precautions that are reasonable in the circumstance to prevent injuries or incidents in the workplace. Because of the general duty clause, due diligence applies to all workplace situations, even when they are not specifically addressed in occupational health and safety legislation.

Reasonable precautions are also referred to as reasonable care. This concept refers to the care, caution, or action a reasonable person is expected to take under similar circumstances. Another term used is that employers must do what is "reasonably practicable." Reasonably practicable has been described by the Labour Program (federal department responsible for occupational health and safety) as taking precautions that are not only possible, but are also suitable or rational, given the particular situation.

To exercise due diligence, an employer must implement a plan to identify possible workplace hazards and carry out the appropriate actions to prevent incidents or injuries arising from

these hazards. The employer must be able to prove that all precautions, reasonable under the circumstances, were taken to protect the health and safety of workers.

In terms of climate events, it may be that employers will be required to show that they considered extreme weather conditions as part of their safe work plans, or have procedures in place to stop work when weather conditions become too extreme. Due diligence may also mean that employers should prepare crisis communication procedures for keeping workers informed of critical information, and communicating where mental health support can be found during or after a climate-related event. (Howett and Rodrigue, 2022; Brooks et al., 2019)

Due diligence is demonstrated by actions taken before an event occurs, not after.

Addressing Climate-Related Hazards and Risks

Employers can address the impacts of climate change by identifying the hazards and assessing the existing and anticipated risks, implementing controls, evaluating the controls used, and continuously monitoring the situation. A written hazard control program consists of all steps necessary to protect workers. To ensure success, all initiatives should be supported by management, and responsibilities, accountabilities, and authority for each initiative should be clearly defined. (CSA Group, 2018)

Health and safety committees or representatives can assist with identifying hazards and assessing risks related to climate change. Committees or representatives can recommend control measures to the employer that consider the physical and psychological impacts on workers.

Ensure workers are consulted during all phases of the program. Workers have direct knowledge about each task and process. Involving workers in the process can also help reduce the chance of creating new health and safety hazards. It is also important to provide appropriate worker education and training on the control measure being implemented. Workers should be encouraged to report observations or concerns.

Hazard Identification and Risk Assessment

Identifying climate-related hazards and assessing their risk should be done both separately and in combination with other hazards to help prioritize and implement targeted control strategies. Workplaces should first identify the possible climate-related hazards that may occur. These hazards may include worker exposure to heat, cold, high winds, chemicals, air pollution, noise, etc.

For example, the hazard identification and risk assessment process should consider how a sudden or worsening situation may affect:

- workers' safety,
- the work environment,
- the tasks workers are doing,
- the cognitive demands needed to complete the work, and
- the implementation of safe work procedures.

The potential for sudden or worsening situations could be referred to as a 'heightened risk situation' or an 'escalation factor.' An escalation factor is a condition that can increase the

likelihood or severity of existing risks. For example, if a worker regularly travels to a client's site, are there existing safety risks that can be escalated by climate-related conditions (such as high winds or heavy rain)? These escalation factors could require the employer to prepare alternate travel routes (e.g., a longer route that avoids the area of worsening weather) or alternate travel methods (e.g., would flying or train travel be less risky than driving a vehicle?).

It may also be necessary to consider how climate-related events can impact infrastructure outside the workplace. For example, if heavy precipitation causes road washouts or bridge damage, how can the employer make sure workers reach the client's site safely? If the power supply is disrupted by climate events or if there is rotating power distribution, how can the workplace make sure existing control measures that rely on electrical power remain effective? If cell phone service is disrupted by climate events, how will off-site and lone workers check in with colleagues as required to ensure their safety?

Once hazards are identified, assess the risk of these hazards (the likelihood of the hazard to cause harm). Risk assessment includes examining the characteristics of the hazard, the potential exposure to the worker, and how often and how long a worker may be exposed. The organization could establish a definition and an inventory of applicable extreme working conditions to help assist with recognition and awareness.

Add climate-related hazard identification and risk assessment to routine workplace assessment and inspection procedures to make sure the situations are monitored regularly. Make sure to consider how climate-related events can affect the completion of a task, how tasks involved in responding to climate-related emergencies may need to be adapted, and any new processes or technology that are introduced in response to climate change. Anticipating and planning for various situations will help protect the health and safety of workers.

Don't forget!
Organizations addressing their impact on the climate should also consider any impacts on worker health and safety. For example, if the product's life cycle is changed to improve sustainability, review this change from an occupational risk prevention point of view. It is important to identify hazards not only for the production process, but also for any cleaning, maintenance, deconstruction, and recycling activities that will be involved throughout the life of the product. (Héry and Malenfer, 2020)

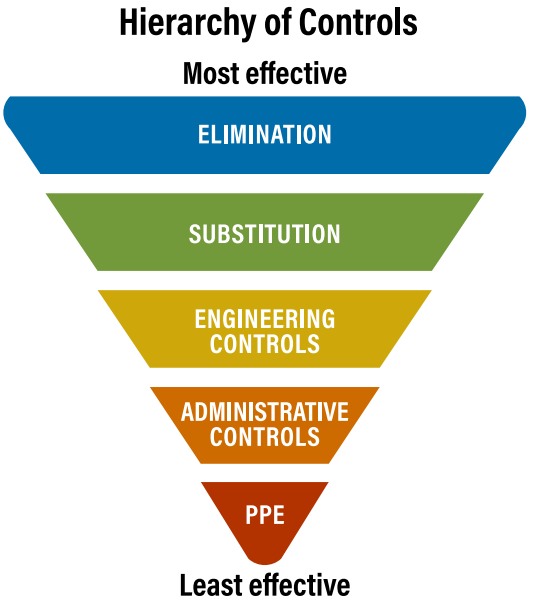
Implement Control Measures

Respond to the identified hazards and assessed risks by developing and implementing measures to control hazard exposure. While controlling for climate-related hazards may be new, the control measures used to address them may not be. Existing hazards that are worsened by climate change can be addressed by strengthening or adjusting existing control measures. For example,

work-rest cycles for outdoor workers can be revised in response to changing conditions, or the frequency of extreme temperature events.

Organizations that are facing new hazards can assess and adapt control measures already used by other industries that have experience with those hazards.

Table 1: Hierarchy of Controls and Response to Climate-Related Events



Elimination

- Defer the task until the climate event is over
- Conduct the task in a safer environment (e.g., repair a machine in an indoor environment where the surrounding conditions can be adequately controlled)

Substitution – Generally, climate-related events cannot be substituted

Engineering Controls

- Adapt or modify infrastructure to be more resilient to extreme weather events
- Provide cooling or warming shelters
- Isolate workers from extreme conditions

Administrative Controls

- Emergency response plans that include procedures for working in extreme conditions
- Business continuity plans
- Safe work procedures that consider climate-related hazards
- Monitor climate-related events for worsening conditions
- Procedures for determining when the combination of hazards and risks are too high (stop work procedures)
- Education and training of workers on tasks that may only be needed in a climate-related event (e.g., where a worker is part of the emergency response team)
- Procedures for crisis communication
- Provide supplies or equipment needed to respond to a climate-related event

Personal Protective Equipment

- Care and use of equipment specific to extreme event

The written hazard control program should outline which methods are used to control the hazard and how these controls will be monitored for effectiveness. The management system should include mechanisms for allocating appropriate resources, assigning responsibilities for implementation, as well as training and procedures required to work safely. Make sure that education and training are provided to help workers understand their roles and the role of any control measures.

The hazard control program should also create emergency response procedures and business continuity plans that can be applied in a climate-related emergency.

Whatever control measures are being considered, make sure they will not create new hazards by conducting a thorough risk assessment before implementation.

See Table 2 for examples of potential climate-related hazards and links to information on control measures that can be used to address them.

Continuous Evaluation

Hazards driven by climate change can evolve. Therefore, it is essential to re-assess workplace hazards and risks at regular intervals. Continuous evaluation of hazards also allows workplaces to determine whether their control measures remain appropriate and effective.

Re-assessments can be integrated into an organization's regular workplace inspection processes. For example, if the rising temperature is a concern in the region, the indoor and outdoor temperatures can be recorded during the workplace inspection to help monitor whether the current heating, ventilation, and air-conditioning (HVAC) system and schedule are maintaining a safe and comfortable indoor environment. Outdoor work areas can be inspected for the presence and effectiveness of shade or cooling stations.

Examples of Climate-related Workplace Hazards and Sample Control Measures

Examples of workplace hazards associated with climate change and links to information about possible control measures are listed in Table 2. This table is not an exhaustive list of all possible climate-related events, hazards, risks, negative outcomes, nor control measures.

Table 2: Workplace Hazards and Climate-related Control Strategies

Climate-Related Event	Hazards and Risks	Negative Outcomes	Sample Control Measures
Extreme Heat	▪ Heat events (hotter, longer, more frequent) ▪ Elevated temperatures ▪ Elevated humidex ▪ Dehydration ▪ Unacclimatized workers ▪ Loss of utilities (e.g., electricity, gas)	▪ Heat-related illnesses or deaths (heat stroke, heat exhaustion) ▪ Impact on working hours (too hot to work, altered or extended hours, etc.) ▪ Higher use of energy to cool buildings ▪ Disrupted operations	▪ Extreme Weather – Heat https://www.ccohs.ca/oshanswers/safety_haz/climate/extreme_weather_heat.html ▪ Hot Environments – Control Measures https://www.ccohs.ca/oshanswers/phys_agents/heat/heat_control.html ▪ Humidex Rating and Work https://www.ccohs.ca/oshanswers/phys_agents/humidex.html ▪ Skin Cancer and Sunlight https://www.ccohs.ca/oshanswers/diseases/skin_cancer.html ▪ Indoor Air Quality – General https://www.ccohs.ca/oshanswers/chemicals/iaq/iaq_intro.html
Extreme Cold	▪ Unacclimatized workers ▪ Loss of utilities (e.g., electricity, gas) ▪ Use of unvented gas-powered heaters or generators	▪ Cold-related illnesses or deaths (hypothermia, frostbite, etc.) ▪ Higher use of energy to heat buildings ▪ Damaged equipment, property, and materials ▪ Disrupted operations ▪ Carbon monoxide poisonings related to power outages	▪ Extreme Weather – Cold https://www.ccohs.ca/oshanswers/safety_haz/climate/climate-change-extreme-weather-cold.html ▪ Cold Environments - Working in the Cold https://www.ccohs.ca/oshanswers/phys_agents/cold/cold_working.html (includes appropriate outerwear and personal protective equipment) ▪ Indoor Air Quality – General https://www.ccohs.ca/oshanswers/chemicals/iaq/iaq_intro.html ▪ Carbon monoxide https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/carbon_monoxide.html

Climate-Related Event	Hazards and Risks	Negative Outcomes	Sample Control Measures
Extreme weather (wind, rain, ice, snow lightning, flooding, droughts, etc.)	▪ Raising or lowering levels of water (rivers, lakes, seas, etc.) ▪ Heavy or lack of precipitation ▪ Storms and storm surges ▪ Flooding and droughts ▪ Damage to land (erosion, mudslides, etc.), property, and infrastructure	▪ Disrupted electricity, natural gas, etc. ▪ Disrupted supply of drinkable water, materials, food, fuel, etc. ▪ Contaminated water, debris ▪ Disruption to water and sewage systems ▪ Drowning ▪ Injuries and illness ▪ Vehicle collisions (especially in winter storm) ▪ Respiratory impacts from increased dust or smoke particulates in air ▪ Longer exposure to pollen and other allergens ▪ Increased exposure to debris, which may include asbestos, lead, etc. ▪ Increased exposure to mould can aggravate asthma and other respiratory issues ▪ Carbon monoxide poisonings related to power outages (e.g., use of fuel powered generators indoors)	▪ Business continuity planning (maintaining workforce and operations) ▪ Climate Change: Extreme Weather – Preparing for Climate Related Emergencies https://www.ccohs.ca/oshanswers/safety_haz/climate/extremeweather_emergencies.html ▪ Emergency Planning (general) https://www.ccohs.ca/oshanswers/hsprograms/planning.html ▪ Emergency Management Checklist (general) https://www.ccohs.ca/oshanswers/hsprograms/emergency_management.html ▪ Working in Extreme conditions https://www.ccohs.ca/oshanswers/hsprograms/extreme_conditions.html ▪ Weather - High winds https://www.ccohs.ca/oshanswers/safety_haz/weather/high_winds.html ▪ Weather – Lightning https://www.ccohs.ca/oshanswers/safety_haz/weather/lightning.html ▪ Working on or near Ice Covered Water - Basic Information https://www.ccohs.ca/oshanswers/hsprograms/work_ice.html ▪ Driving Tips - Winter https://www.ccohs.ca/oshanswers/safety_haz/drive/icesnow.html ▪ Flood Clean Up https://www.ccohs.ca/oshanswers/biol_hazards/flood_cleanup.html ▪ Debris that includes asbestos, lead, etc. https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/asbestos.html https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/lead.html ▪ Carbon Monoxide https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/carbon_monoxide.html

Climate-Related Event	Hazards and Risks	Negative Outcomes	Sample Control Measures
Forest fires and smog	▪ Poor outdoor air quality ▪ Damage to land, property, and infrastructure	▪ Illness, injury ▪ Exposure to air contaminants ▪ Aggravation of allergies or respiratory issues or cardiovascular issues	▪ Forest Fires and Wildfire Smoke https://www.ccohs.ca/oshanswers/safety_haz/forest_fires.html
Tight buildings to reduce energy-use without adequate ventilation	▪ Poor indoor air quality ▪ Mould and fungi growth ▪ May impact radon levels in a building ▪ Insufficient supply of fresh outdoor air to occupant areas	▪ Exposure to air contaminants ▪ Exposure to mould ▪ Aggravation of allergies or respiratory issues ▪ Lower productivity	▪ Indoor Air Quality – General (e.g., maintenance, investigation, and remediation) https://www.ccohs.ca/oshanswers/chemicals/iaq/iaq_intro.html ▪ Indoor Air Quality – Moulds and Fungi https://www.ccohs.ca/oshanswers/chemicals/iaq/iaq_mould.html ▪ Radon in buildings https://www.ccohs.ca/oshanswers/phys_agents/radon.html
Increased disease vector population size (due to life cycle and migration pattern changes)	▪ More vector-borne infections (insect and tick-related diseases) ▪ More pesticide use	▪ Risk to health (e.g., West Nile virus, Lyme disease) ▪ Additional exposure to pesticides or fertilizers	▪ Surveillance and prevention programs for West Nile virus, Lyme disease, etc. https://www.ccohs.ca/oshanswers/diseases/westnile.html https://www.ccohs.ca/oshanswers/diseases/lyme.html ▪ Working with pesticides https://www.ccohs.ca/oshanswers/chemicals/pesticides/ ▪ How to work safely with chemicals https://www.ccohs.ca/oshanswers/chemicals/howto/

Climate-Related Event	Hazards and Risks	Negative Outcomes	Sample Control Measures
Economic insecurity or social disruption due to climate-related event or situation	▪ Negatively affect the mental health of those directly and indirectly impacted	▪ Eco-anxiety ▪ Depression ▪ Post-traumatic stress disorder	▪ Employee assistance programs https://www.ccohs.ca/oshanswers/hsprograms/eap.html ▪ Mental Health - Having Courageous Conversations https://www.ccohs.ca/oshanswers/psychosocial/mh/mentalhealth_conversations.html ▪ Psychological health and safety https://www.ccohs.ca/oshanswers/psychosocial/phs/mentalhealth_checklist_phs.html
Experience concern about climate change and uncertainty about the future	▪ Negatively impact mental health	▪ Eco-anxiety ▪ Increased stress ▪ Feeling of helplessness	▪ Mental Health - How to Address and Support https://www.ccohs.ca/oshanswers/psychosocial/mh/mentalhealth_address.html ▪ Employee assistance programs https://www.ccohs.ca/oshanswers/hsprograms/eap.html ▪ Workplace Stress https://www.ccohs.ca/oshanswers/psychosocial/stress.html ▪ Involve staff in reducing workplace contribution to climate change to help channel their concerns into action ▪ Announce workplace climate friendly strategies and provide regular updates to maintain momentum and trust
Increased quantity of products being recycled and new recycling processes because of transition to circular economy	▪ Air pollutants in recycling facilities ▪ Hazardous materials in products being recycled ▪ Difficulty in identifying hazardous materials in the mixture of products brought to recycling facilities	▪ Health effects from prolonged exposure to air pollutants ▪ Increased exposure to hazardous materials	▪ Assess worker exposure and implement appropriate control measures such as industrial ventilation https://www.ccohs.ca/oshanswers/prevention/ventilation/ ▪ Consider possible malfunctions of the recycling process when assessing worker exposures ▪ Group homogenous materials earlier in the recycling process to remove the sorting step at recycling facility (sorting may increase worker exposures)

(Adapted from: European Commission, n.d.; Héry and Malenfer, 2020; US EPA, 2022b; USGCRP, 2016)

Supporting the Community

Workplaces may have resources and personnel that can help their local community with an overall response to climate-related emergencies. Businesses may be able to collaborate with local government and emergency services to determine what services or resources they can provide during a climate-related emergency. For example, during a wildfire, the workplace may be able to offer transportation to assist with evacuation efforts or larger machinery such as bull dozers (to create a fire-break area) to assist with protecting the community. Workplace emergency and medical response teams may be able to volunteer to support the wildfire crews, firefighters, and medical personnel by providing additional personnel, equipment, traffic control support, first-aid response, etc. Workplaces may also be able to provide supplies, such as food, water, and lodging to those who must be temporarily relocated.

Strategies for Reducing the Workplace's Contribution to Climate Change

In addition to addressing workplace hazards related to climate change, workplaces can enhance their resilience by recognizing climate change as a workplace hazard and including this hazard's impact when developing policies and programs. Taking part in workplace climate initiatives could help reduce a person's eco-anxiety by providing opportunities to take action.

Enhancing resilience can be thought of in three areas:

- Changing behaviour (non-structural)
- Working with nature (green infrastructure)
- Improving buildings and public infrastructure (grey infrastructure) (Eyquem and Feltmate, 2022)

Did you know?
Minimizing the distance between the recycling bin and suites in a multi-unit residential building improved recycling and composting rates by 60 to 130 percent. (University of British Columbia, 2019)

Examples of strategies to help reduce climate change and enhance resilience are located in Appendix 2.

Conclusions

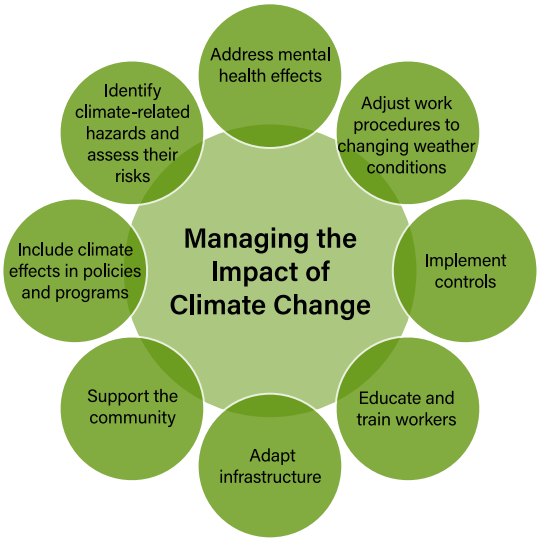
Consider how the workplace affects and is affected by climate change when developing and implementing policies and programs. Addressing potential hazards resulting from climate-related events is part of a workplace's hazard identification and risk assessment process. Appropriate control measures must be identified, and actions taken to ensure health and safety.

The workplace is in a unique position where it can simultaneously help reduce climate change, plan for resilience to climate events, and have a positive impact on their workers and community. It is no longer possible to consider the challenges presented by climate change in isolation. Workplaces that plan for the impacts of climate change will be more resilient.

Ask these questions - can your workplace:

- Develop policies and programs that consider the impact of climate-related events?
- Assess hazards and risks of climate-related events and implement control measures to protect health and safety?
- Adapt infrastructure to improve resiliency?
- Provide support to address the psychological impacts of climate change?
- Assist the community during climate events?
- Reduce the workplace's contribution to climate change?

Managing the Impact of Climate Change on Workplaces – Handout



My workplace is doing the following to manage the impact of climate change:

Sources

Adam-Poupart, A., et al. (2013). *Impacts of Climate Change on Occupational Health and Safety*. Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST). Retrieved from https://www.irsst.qc.ca/en/publications-tools/publication/i/100643/n/impacts-of-climate-change-on-occupational-health-and-safety-r-775

Agriculture Canada. (2021). *Intercropping – a new planting method for large-scale Prairie agriculture?* Retrieved from https://agriculture.canada.ca/en/news-agriculture-and-agri-food-canada/scientific-achievements-agriculture/intercropping-new-planting-method-large-scale-prairie-agriculture

American Public Health Association & Centers for Disease Control and Prevention. (2021). *Climate Change and Health Playbook: Adaptation Planning for Justice, Equity, Diversity and Inclusion.* Retrieved from https://apha.org/Topics-and-Issues/Climate-Change/JEDI

Brooks, S. K., Dunn, R., Amlôt, R., Rubin, G. J., & Greenberg, N. (2019). Protecting the psychological wellbeing of staff exposed to disaster or emergency at work: a qualitative study. BMC psychology, 7(1), 78. https://doi.org/10.1186/s40359-019-0360-6

Chandler, C. (2019). *What small businesses can do about climate change.* Yale Climate Connections. Retrieved from https://yaleclimateconnections.org/2019/11/what-small-businesses-can-do-about-climate-change/

Clayton, S., Manning, C. M., Krygsman, K., and Speiser, M. (2017). *Mental Health and Our Changing Climate: Impacts, Implications, and Guidance.* Washington, D.C.: American Psychological Association, and ecoAmerica. Retrieved from https://www.apa.org/news/press/releases/2017/03/mental-health-climate.pdf

CSA Group (2018). CSA Z1010-18: *Management of work in extreme conditions.* Retrieved from https://www.csagroup.org/store/product/Z1010-18/

Deloitte. (2022). *Deloitte CxO Sustainability Report.* Retrieved from https://www2.deloitte.com/global/en/pages/operations/articles/deloitte-cxo-sustainability-report.html

Doherty, T. J., and Clayton, S. (2011). *The psychological impacts of global climate change.* The American psychologist, 66(4), 265–276. https://doi.org/10.1037/a0023141

Environment Canada. (2015). *Frequently asked questions about climate change*. Retrieved from https://www.canada.ca/en/environment-climate-change/services/climate-change/frequently-asked-questions.html

European Commission. (n.d.). *Climate Action: Consequences of climate change*. Retrieved from https://climate.ec.europa.eu/climate-change/consequences-climate-change_en

Eyquem, J. L, and B. Feltmate. (2022). *Irreversible Extreme Heat: Protecting Canadians and Communities from a Lethal Future*. Intact Centre on Climate Adaptation, University of Waterloo. Retrieved from https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2022/06/UoW_ICCA_2022_04-Irreversible-Extreme-Heat.pdf

Government of Alberta. (2022). *Climate change in Alberta*. Retrieved from https://www.alberta.ca/climate-change-alberta.aspx

Government of Canada. (2022). *Circular Economy*. Retrieved from https://www.canada.ca/en/services/environment/conservation/sustainability/circular-economy.html

Hagen, B. N. M., Sawatzky, A., Harper, S. L., O'Sullivan, T. L., and Jones-Bitton, A. (2021). *What Impacts Perceived Stress among Canadian Farmers? A Mixed-Methods Analysis*. International Journal of Environmental Research and Public Health, 18(14), 7366. http://dx.doi.org/10.3390/ijerph18147366

Harrington, S. (2020) How climate change affects mental health. Yale Climate Connections. Retrieved from https://yaleclimateconnections.org/2020/02/how-climate-change-affects-mental-health/

Héry, M., and Malenfer, M. (2020). *Development of a circular economy and evolution of working conditions and occupational risks—a strategic foresight study*. Eur J Futures Res 8, 8 (2020). https://doi.org/10.1186/s40309-020-00168-7

Howatt, B., and Rodrigo, M. (2022). *Keeping people psychologically safe when disaster strikes*. Trusted Leader Blog – Workplace Safety & Prevention Services. Retrieved from https://engage.wsps.ca/trusted-leader/keeping-people-psychologically-safe-when-disaster-strikes

Islam, S.N. and J Winkel. (2017). *Climate Change and Social Inequality*. United Nations. Retrieved from https://www.un.org/en/desa/climate-change-and-social-inequality

Karaoulanis, A. (2022). *Impact of climate change in small business*. International Journal of Entrepreneurship, 26(S3), 1-9. Retrieved from https://www.abacademies.org/articles/impact-of-climate-change-in-small-business-14450.html

National Institute of Occupational Safety and Health (NIOSH). (2023). *Occupational Safety and Health and Climate*. Retrieved from https://www.cdc.gov/niosh/topics/climate/

Niculita-Hirzel, H. (2022). *Latest Trends in Pollutant Accumulations at Threatening Levels in Energy-Efficient Residential Buildings with and without Mechanical Ventilation: A Review*. International journal of environmental research and public health, 19(6), 3538. https://www.mdpi.com/1660-4601/19/6/3538

Nilsson, M., and Kjellstrom, T. (2010). *Climate change impacts on working people: how to develop prevention policies*. Global health action, 3, 10.3402/gha.v3i0.5774. https://doi.org/10.3402/gha.v3i0.5774

United States Environmental Protection Agency (US EPA). (2022a). C*limate Change and the Health of Workers*. Retrieved from https://www.epa.gov/climate-change/climate-change-and-health-workers

United States Environmental Protection Agency (US EPA). (2022b). *Learn about Heat Islands*. Retrieved from https://www.epa.gov/heatislands/learn-about-heat-islands

U.S. Global Change Research Program (USGCRP). (2016). *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp. https://health2016.globalchange.gov/

University of British Columbia. (2019). *The psychology of climate action*. Retrieved from https://www.arts.ubc.ca/news/the-psychology-of-climate-action/

World Wildlife Fund Canada. (n.d.). *How to form a green team - How-to guide*. Retrieved from https://atwork.wwf.ca/actions/how-to-form-a-green-team/

Zhang X, Zhao C, Niu Z, Xu S, and Wang D. (2021) Job Insecurity and Safety Behaviour: The Mediating Role of Insomnia and Work Engagement. Int J Environ Res Public Health. Jan 12;18(2):581. doi: 10.3390/ijerph18020581. PMID: 33445577; PMCID: PMC7826735. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7826735/

Zinyemba, C., Archer, E., and Rother, H. A. (2020). *Climate Change, Pesticides and Health: Considering the Risks and Opportunities of Adaptation for Zimbabwean Smallholder Cotton Growers*. International journal of environmental research and public health, 18(1), 121. https://doi.org/10.3390/ijerph18010121

Appendix 1: Additional Resources

The Canadian Centre for Occupational Health and Safety (CCOHS) has many products and services to help you identify, assess, and control workplace hazards, including hazards associated with climate change.

OSH Answers

Search our easy-to-read fact sheets on the web. Topics include:

- Health and Safety Program https://www.ccohs.ca/oshanswers/hsprograms/basic.html
- Effective Workplace Inspections https://www.ccohs.ca/oshanswers/prevention/effectiv.html
- Hazard and Risk https://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html
- Hazard Identification https://www.ccohs.ca/oshanswers/hsprograms/hazard_identification.html
- Risk Assessment https://www.ccohs.ca/oshanswers/hsprograms/risk_assessment.html
- Sample Risk Assessment Form https://www.ccohs.ca/oshanswers/hsprograms/sample_risk.html
- Hazard Control https://www.ccohs.ca/oshanswers/hsprograms/hazard_control.html
- Hierarchy of Controls https://www.ccohs.ca/oshanswers/hsprograms/hierarchy_controls.html
- Emergency Planning https://www.ccohs.ca/oshanswers/hsprograms/planning.html
- Emergency Management Checklist https://www.ccohs.ca/oshanswers/hsprograms/emergency_management.html

Appendix 2 – Enhancing Resilience and Reducing Contributions to Climate Change

Below are examples of strategies that help enhance resilience and reduce workplace contribution to climate change. Plan for changes that can be accomplished immediately, and in the short and long term to encourage continual progress. Strategizing efforts will increase accountability and maintain momentum.

Table 3: Sample of Efforts to Address Climate Change

Immediate	Short Term (1-5 years)	Long Term (more than 5 years)
■ Create a "green team" to champion sustainability efforts ■ Learn about climate friendly practices ■ Tell staff about the initiatives and actions that will be taken and why ■ Provide employee assistance programs and encourage their use beyond "crisis" counselling ■ Organize shift start and end times to coordinate with local public transportation ■ Encourage pro-environmental actions (e.g., designate the preferred parking spots for carpooling employees) ■ Make pro-environmental actions convenient and accessible (e.g., move recycling and composting stations close to where the wastes are generated) ■ Prioritize natural ventilation when possible	■ Develop response plans for climate emergencies ■ Develop remote or hybrid work arrangements to reduce vehicle emissions ■ Offer flexible work hours to reduce time spent in traffic (extra emissions) ■ Reduce business-related travel (e.g., virtual meetings and conferences) ■ Install shades, blinds, shutters, or awnings in or on buildings ■ Plant (more) trees and gardens on the property ("tree walls" could lessen energy used for cooling and heating buildings) ■ Practice intercropping –plant two or species in close proximity to help reduce weeds, pests, diseases, or encourage growth	■ Continue awareness activities – highlight successes and look for further opportunities ■ Insulate or adapt buildings for more efficient cooling and heating ■ Develop building structures to avoid creating heat islands ■ Transition vehicle fleet to electric (or hybrid) power ■ Install or maintain alternate power generation solutions (e.g., solar, wind, geothermal) ■ Optimize resource and energy consumption ■ Examine the life cycle of products or services to find opportunities for becoming more sustainable ■ Identify main sources of greenhouse gas emissions and develop a reduction plan

Continued

Immediate	Short Term (1-5 years)	Long Term (more than 5 years)
■ Share and collaborate internally and externally within the business community or industry ■ Encourage health and safety committees and representatives to develop recommendations for addressing climate-related health and safety issues ■ Maintain the company's vehicle fleet (vehicles that run more efficiently emit less air pollutants)	■ Install shade or warming shelters for outdoor workers ■ Offer "cool" or "warm" rooms for community use during emergencies ■ Collaborate with neighbouring businesses to coordinate shipments to reduce transportation needs ■ Installing energy saving equipment or technology (e.g., smart thermostats, LED lighting) ■ Design packaging to reduce unused space during shipping and transportation	■ Improving and maintaining ventilation system to make it more effective and energy efficient ■ Offer buy-back or take-back of used and broken products to be refurbished or properly broken down for recycling to ensure materials are kept out of the landfill as much as possible

(Adapted from: Agriculture Canada, 2021; Deloitte, 2022; Eyquem and Feltmate, 2022; World Wildlife Fund Canada, n.d.; Chandler, 2019; Karaoulanis, 2022)

CCOHS.ca
Canadian Centre for Occupational Health and Safety

135 Hunter Street East, Hamilton, Ontario, Canada, L8N 1M5