

Sustainability 101

GAPTCG 23

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2023/09/28



Outline

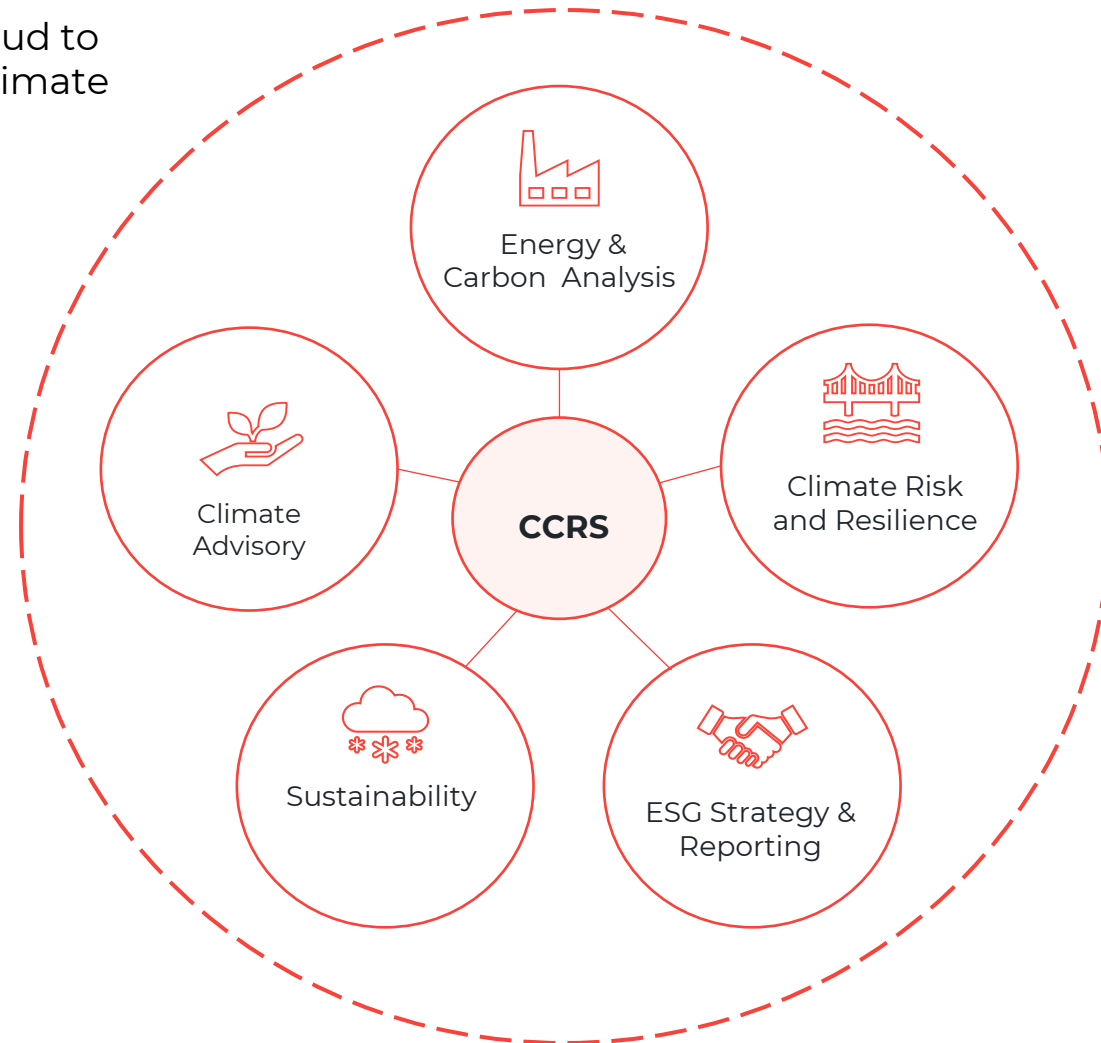
- 1 Fundamentals
- 2 Current Policy Landscape
- 3 Action on Climate Change



Climate Change, Resilience and Sustainability Team at WSP

Our national Climate Change, Resilience and Sustainability (CCRS) team is one of the largest climate change and sustainability consulting teams in Canada. We are proud to offer our services to become your trusted partner in climate change.

- **Over 85 employees**, including scientists, engineers, economists, and consultants.
- We work across the **full range of climate change services**: decarbonization, climate risk and opportunity analysis, scenario planning, net zero targets, facilities and buildings, and ESG strategy.
- Our team provides climate change services that combine WSP's **technical expertise** with the **strategic guidance** required for implementation and monitoring.
- Our team has a strong relationship with WSP's **global network** to better support our international clients through coordinated and consistent approaches.



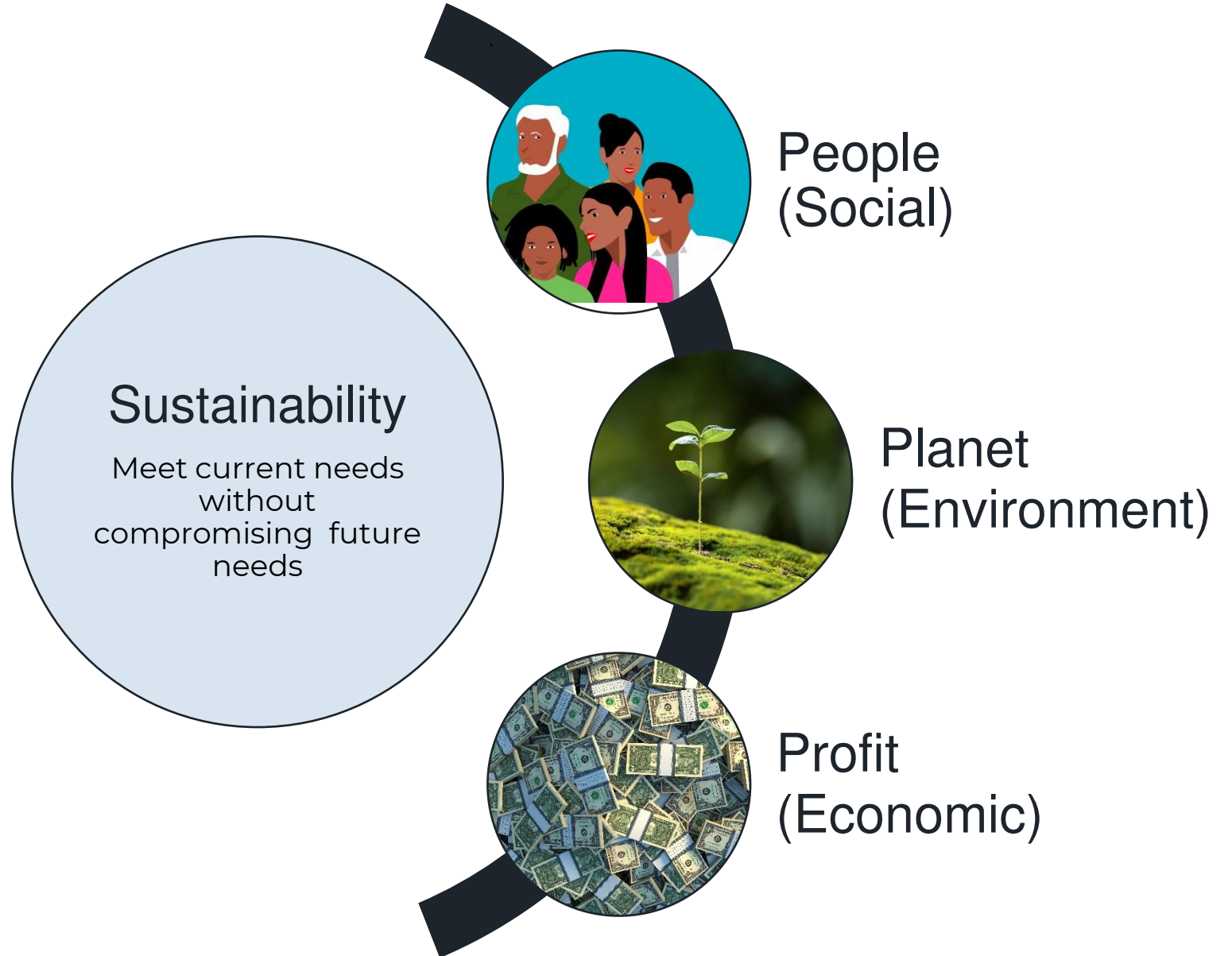
Sustainability Fundamental S



What is Sustainability?

Sustainability means taking only what you need and leaving systems capable of continued existence

The term has been confused and diluted over the years making it challenging to understand if real progress is being made





ESG sets measurable criteria to define sustainability success.

A specific set of criteria are used to define against ESG systems, removing ambiguity.



Environment

How the environment is impacted including climate policies, resource use, waste management & ecosystems.

Ex. %GHG reduction compared to target



Social

How people are impacted – everything from employees to customers to the public.

Ex. # high risk safety incidents



Governance

How the company is run including topics such as ethical accounting, disclosure, board diversity etc.

Ex. # of non-compliance instances with Code of Ethics

The Environment

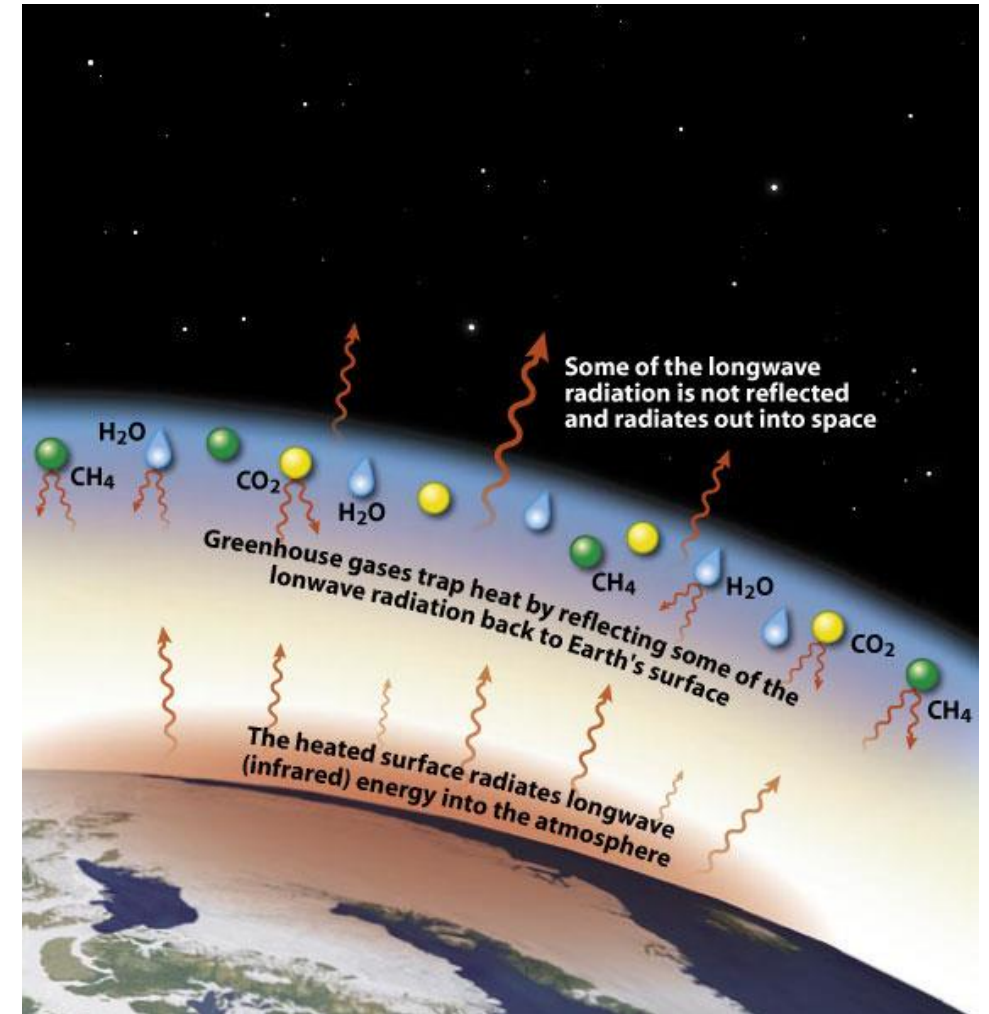
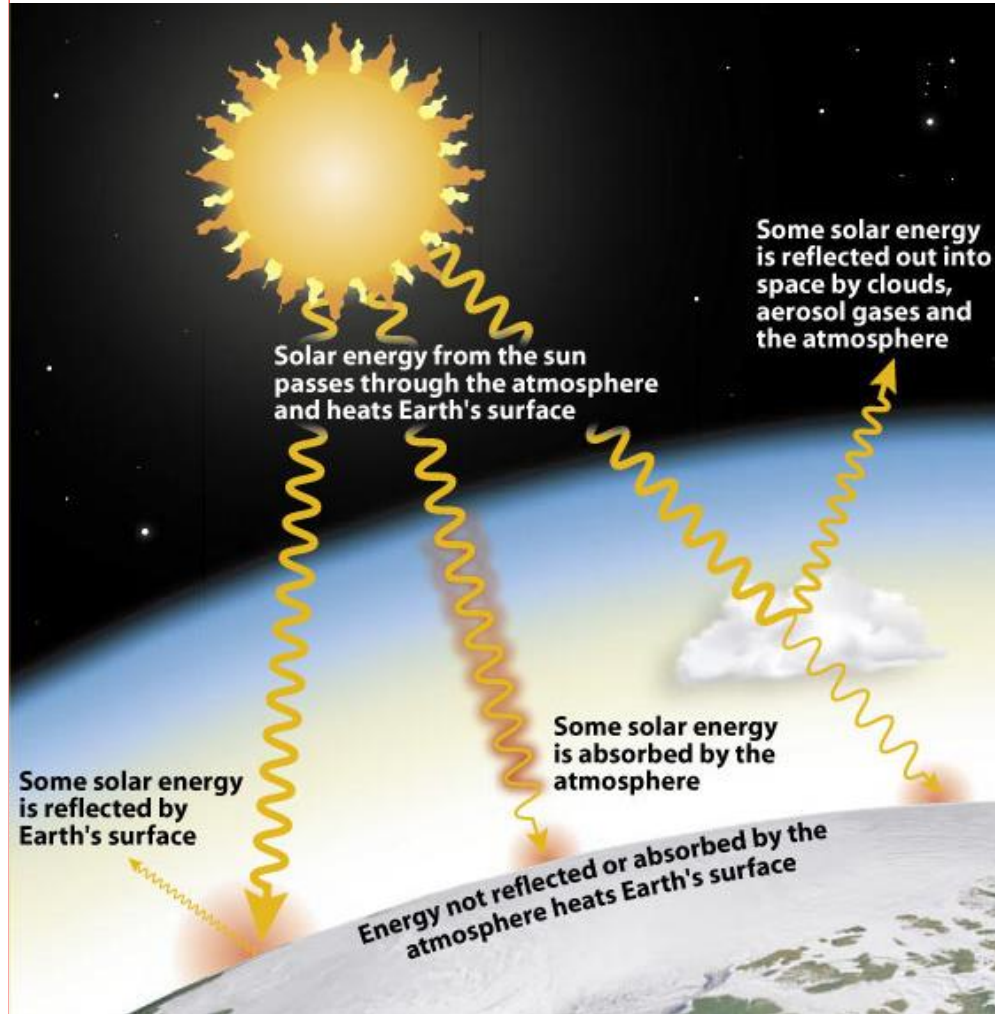


What is climate change?

Climate change means long-term shifts in temperatures and weather patterns.

Since 1800s human activities has been the main driver of climate change.

Burning fossil fuels release greenhouse gases into the atmosphere.



Source: https://forces.slu.edu/atmosphere/02_04_07.html

Defining “Carbon”

Each greenhouse gas is standardized to and reported as its carbon dioxide equivalent (**CO₂e**) - the potency of its global warming potential relative to one carbon dioxide molecule.

The term “carbon emissions” refers to all of the greenhouse gases contributing to global warming.

CARBON DIOXIDE EQUIVALENTS

Greenhouse Gas	Global Warming Potential (GWP)
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	25
Nitrous oxide (N ₂ O)	298
Hydrofluorocarbons (HFCs)	124 – 14,800
Perfluorocarbons (PFCs)	7,390 – 12,200
Sulfur hexafluoride (SF ₆)	22,800
Nitrogen trifluoride (NF ₃)	17,200

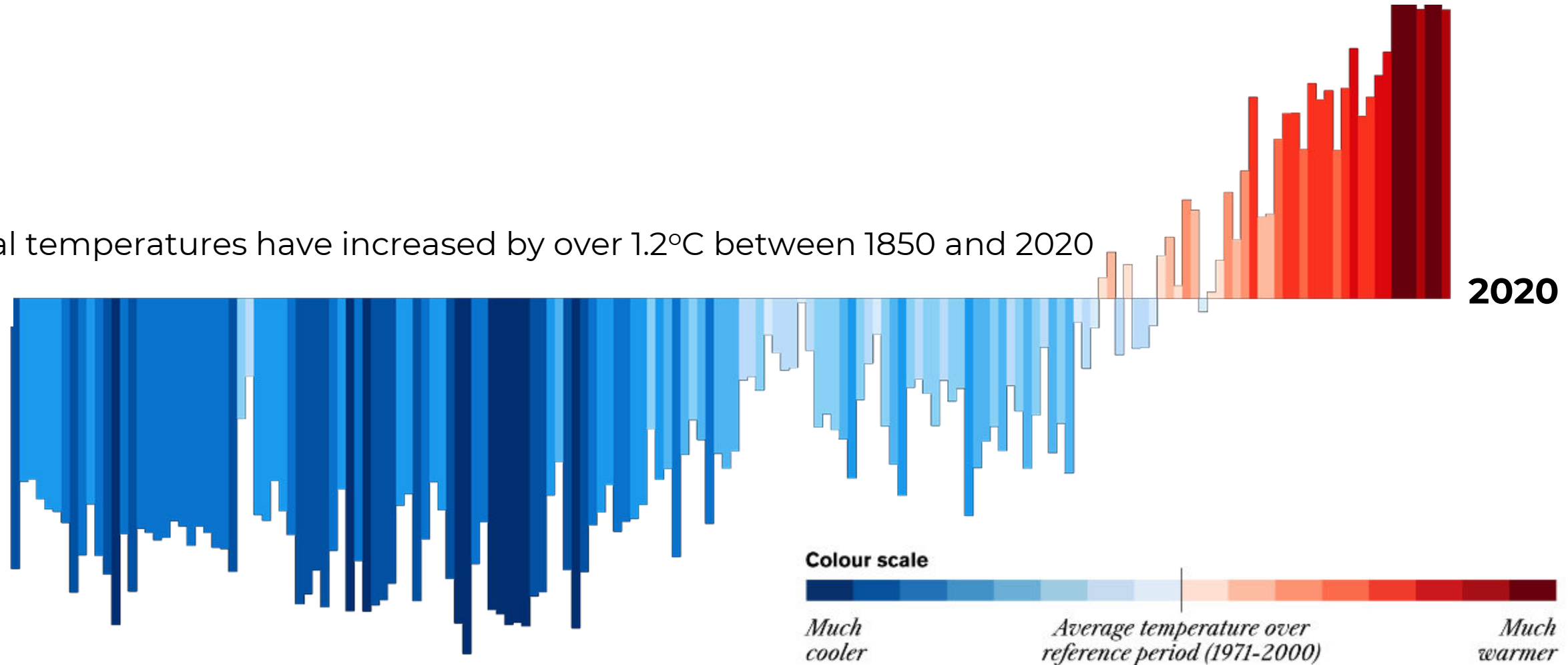
Source: <https://www.coolerfuture.com/blog/co2e>

Carbon Dioxide Equivalents allow us to compare the impact of different greenhouse gases.

How Have Global Temperatures Changed?

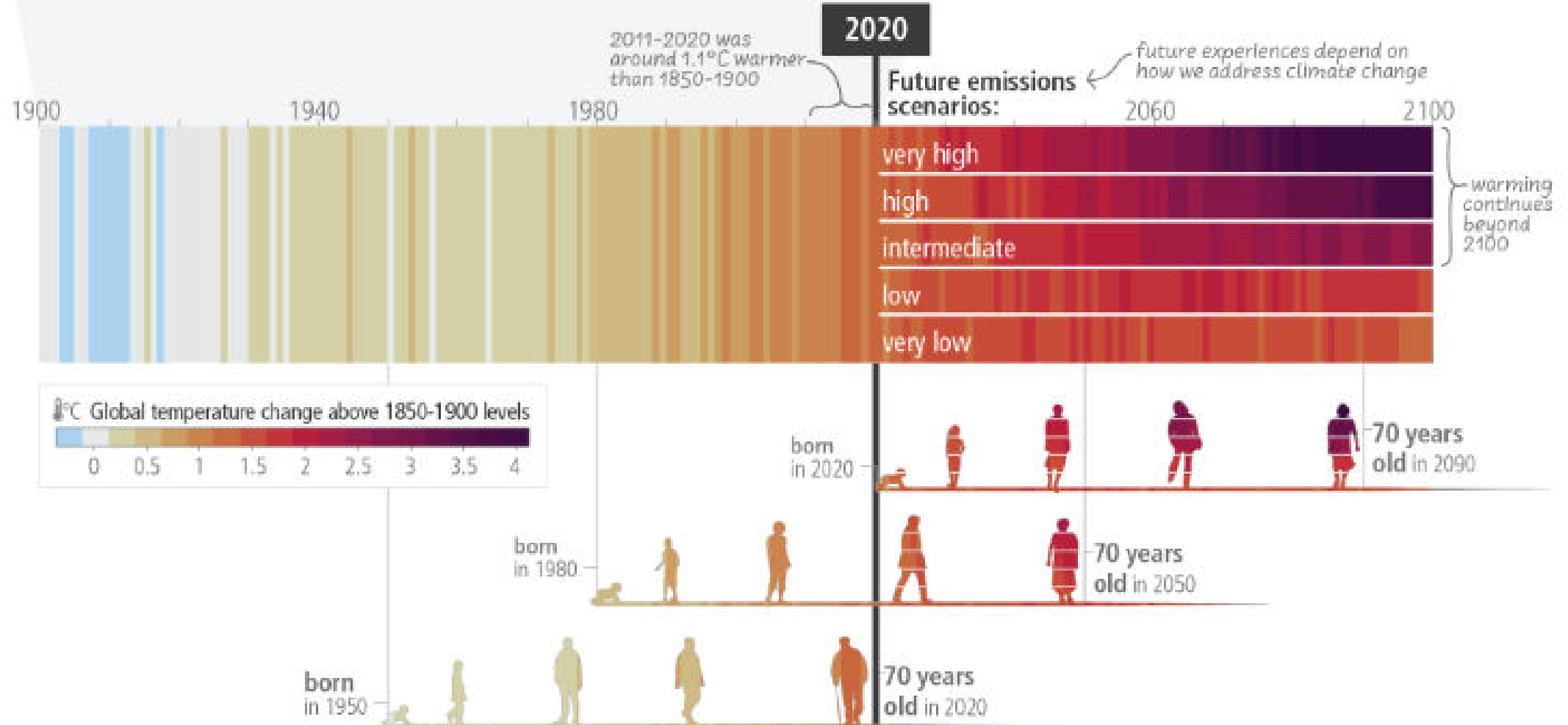
Global temperatures have increased by over 1.2°C between 1850 and 2020

1850



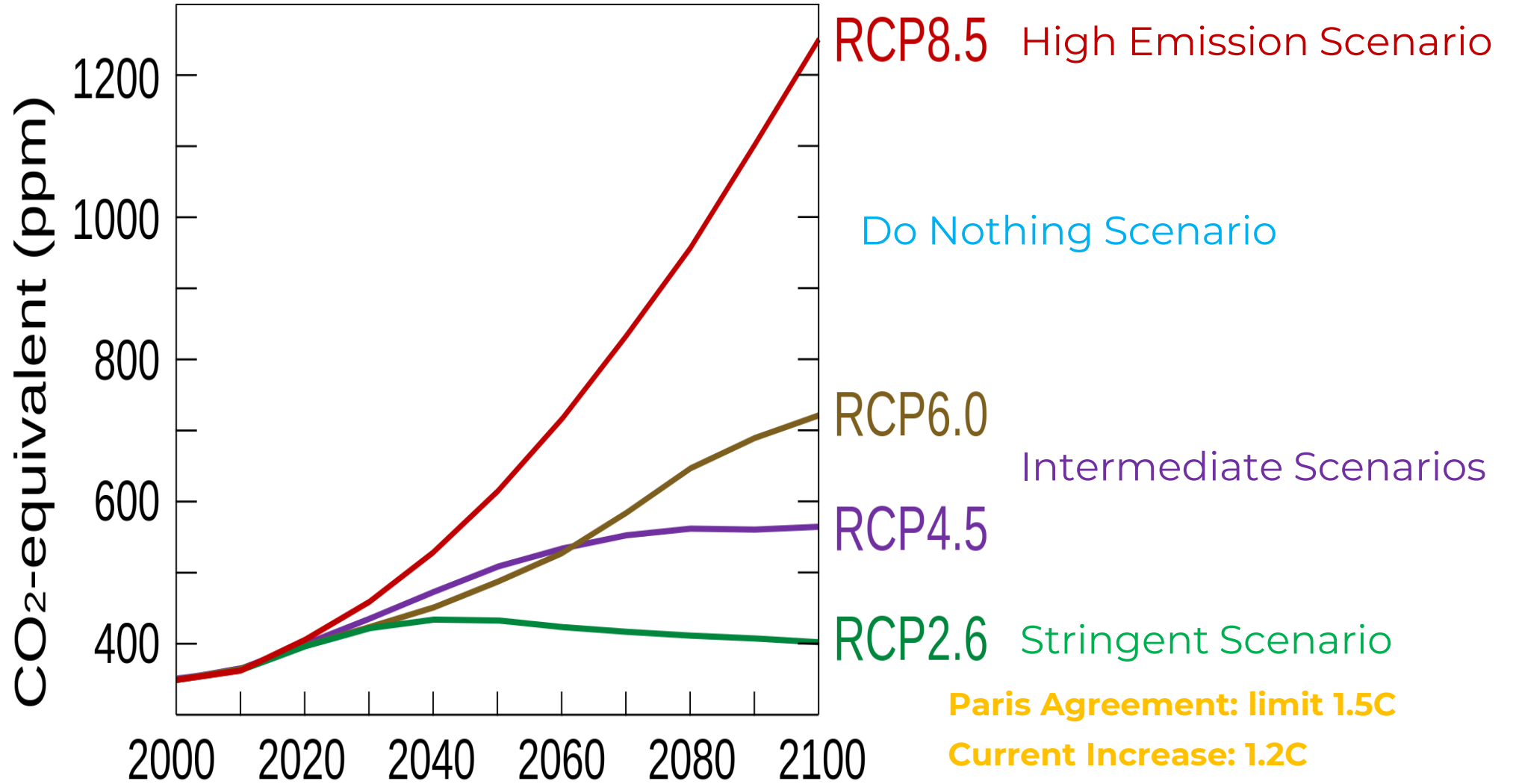
Climate Risk → current and future generations

- The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near term



Climate Mitigation Scenarios

IPCC Representative Concentration Pathways

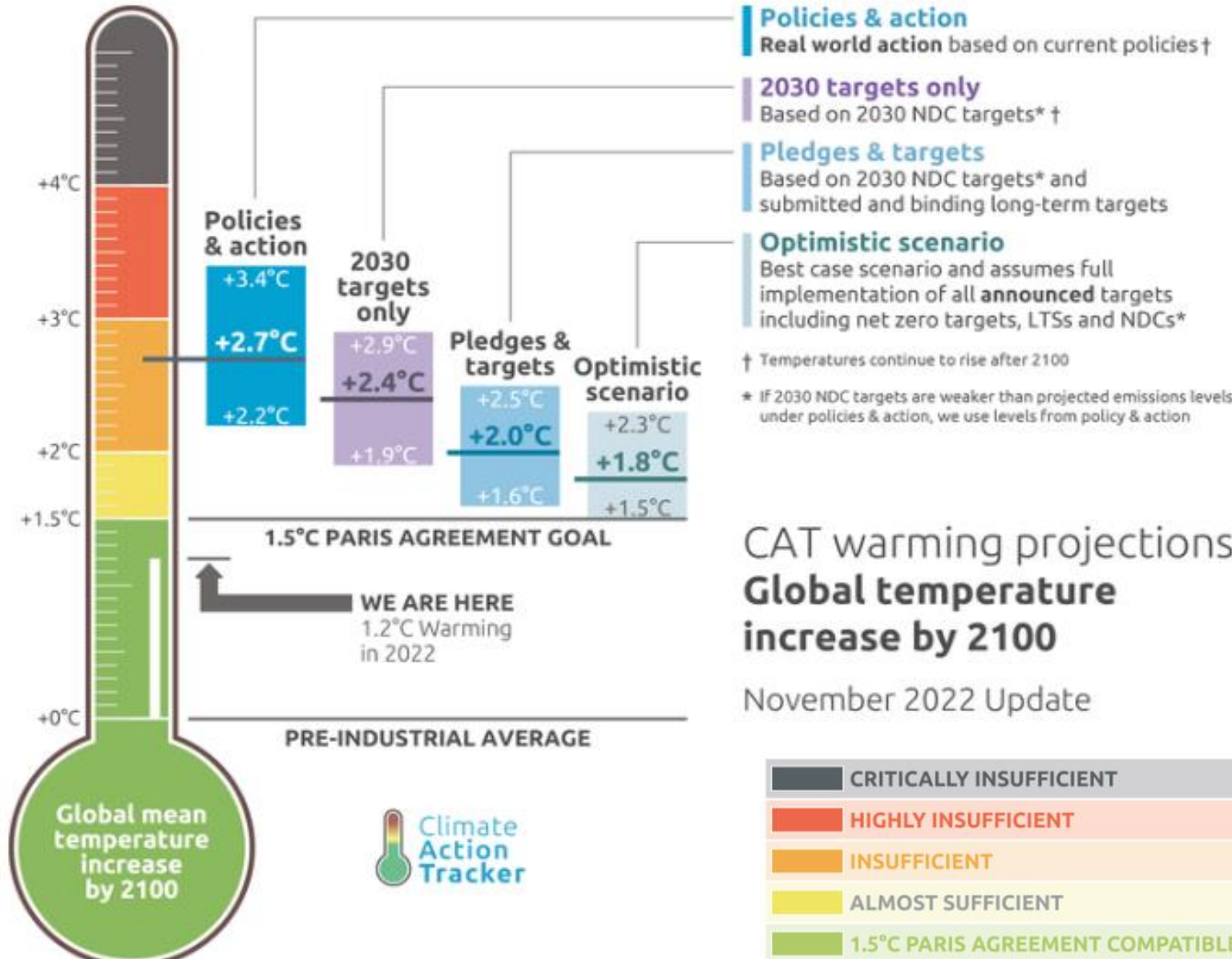


The severity of climate change impacts increases with each increase in temperature scenario

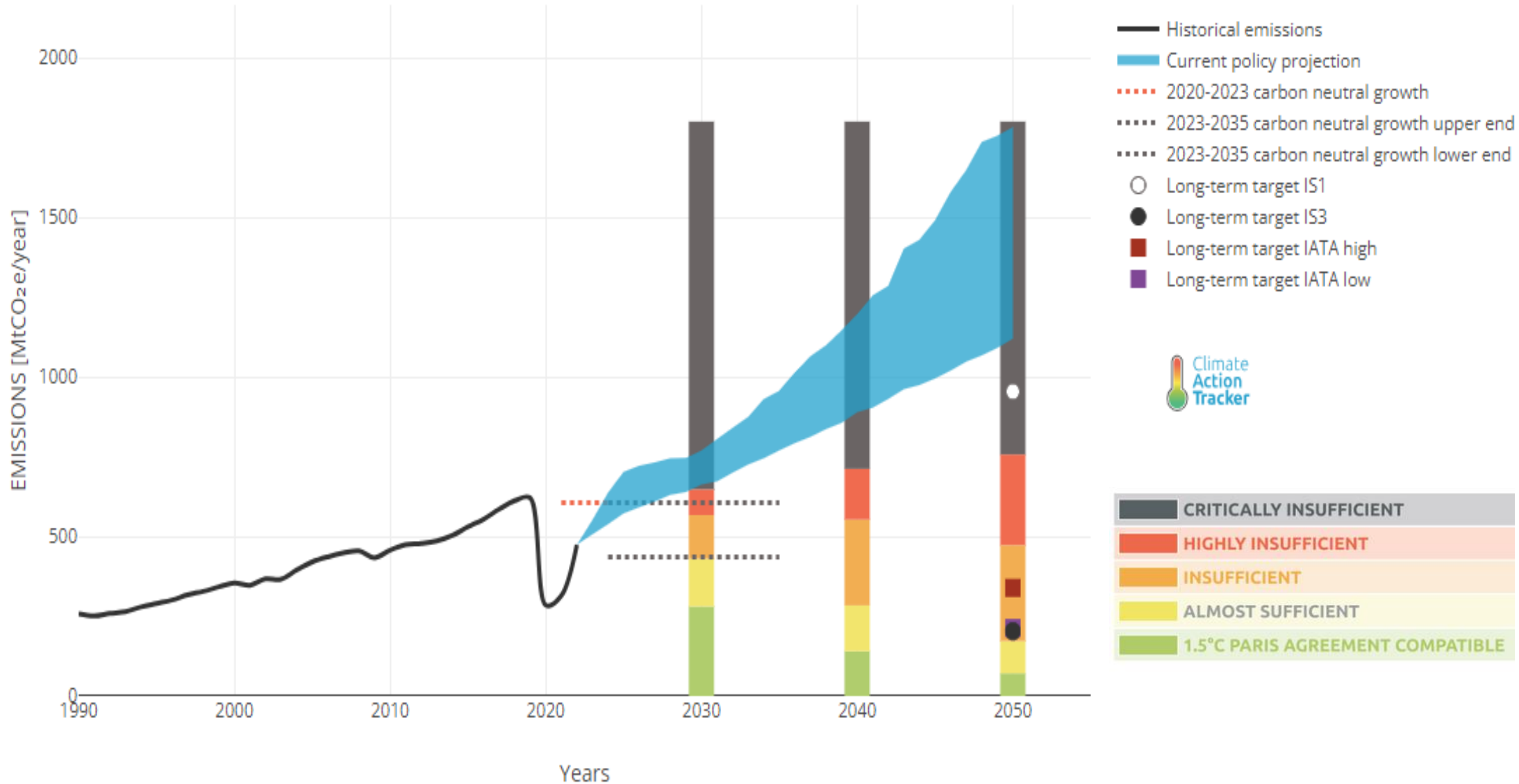
Global Progress on Climate Action

The Climate Action Tracker (CAT) is an independent scientific project that tracks government climate action and measures against the Paris Agreement.

The Paris Agreement sets long-term goals to guide all nations to substantially reduce global greenhouse gas emissions to limit global temperature increases below 1.5 to 2°C.



Aviation Globally → Rated Critically Insufficient



This does not reflect the announcements made at the International Civil Aviation Organization (ICAO) Assembly in September 2022.

<https://climateactiontracker.org/sectors/aviation/>

Policy Landscape



Greening Government Strategy

Example Commitments

Net-zero emissions by 2050

30% reduction embodied carbon of structural materials

Low-carbon mobility

Climate Risk Assessment for all real property

90% waste construction diversion

Carbon sequestration through ecosystem restoration

Conserve and protection wild areas

What is it?

- Government commitments apply to all core gov't departments and agencies.

Supports achieving goals resulting from:

- Paris Agreement
- Pan-Canadian Framework
- Convention on Biological Diversity
- UN Sustainable Development Goals

Aims to:

- Reduce GHG emissions
- Increase resilience through climate adaptation

Greening Government Strategy

Four key focus areas



Mobility and Fleets

Goals: modernizing fleets with zero-emission vehicles and hybrids; switching to lower carbon fuels; promoting and incentivizing lower-carbon employee travel, and commuting.



Climate-Resilient Services and Operations

Goals: anticipating future climate related hazards, risk planning, and minimizing disruptions to our operations; using nature-based solutions to protect physical assets from threats, such as flooding.



Property and Workplaces

Goals: constructing zero carbon buildings, maximizing energy efficiency in existing buildings, reducing water consumption, diverting waste from landfills, and minimizing ecosystem impacts.



Procurement of Goods and Services

Goals: transitioning to a net-zero, circular economy through green procurement and adopting clean technologies, products and services such as 100% clean electricity and low carbon building materials.



“The Treasury Board of Canada Secretariat will require the submission of a life-cycle cost analysis, including the shadow price of carbon, for all major real property funding proposals.” GGS

Canadian Net-Zero Emissions Accountability Act

What is it?

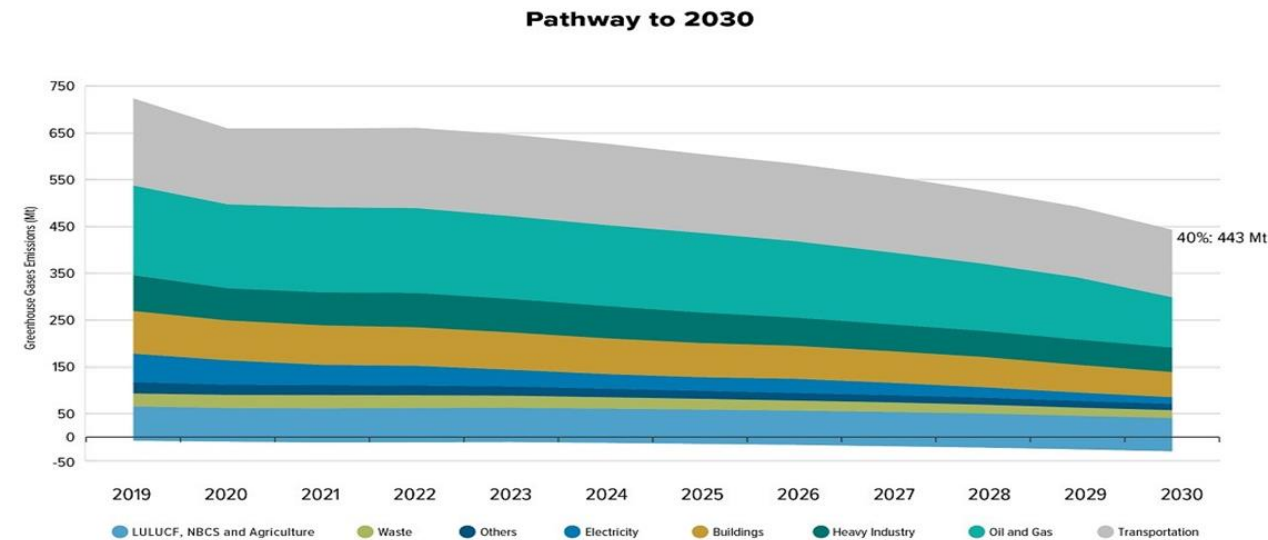
- Law incorporating Canada's net-zero emission by 2050 commitment

Legally binding process for Canada to:

- Set 5-year national emission-reduction targets
- Development of credible, science-based emission-reduction plans
- Submit progress and assessment reports

2030 Emissions Reduction Plan:

- Sets first 5-year target at 40% reduction by 2030
- Establishes sector by sector reduction pathways



2030 Plan Highlights

Price on Carbon rising to \$170/tonne in 2023

Investments to support electricity and clean power development including a Hydrogen Strategy.

Investments to support tree planting, natural infrastructure investments and nature-based climate solutions and protection

Aviation:

Develop approach for long-term decarbonization of aviation, including potentially initiatives to expand production of low-carbon sustainable aviation fuel and decarbonization and electrification of airport operations.

Work to increase ambition in International Civil Aviation Organization (ICAO) emissions goals.

Climate Adaptation Action Plan

What is it?

- Policy and program framework that shows how Government of Canada will implement the National Adaptation Strategy

Five key systems:

- Disaster Resilience
- Health and Well-being
- Nature and Biodiversity
- Infrastructure
- Economy and Workers

Aims to:

- Address current climate change impacts
- Reduce barriers to adaptation
- Lays foundation for transformational action

Example Actions

Create a partnership model for climate action through Indigenous Climate Leadership Agenda

Protecting 25% of Canada's land and waters by 2025 and 30% by 2030

National Program for Ecological Corridors

Investment in climate-resilient infrastructure

National Infrastructure Fund to support nature-based solutions

Investment to accelerate use of climate-informed codes, standards and guidelines

Climate toolkit to increase uptake of climate resilient practices and community investments

Green Municipal Fund to support community-based adaptation initiatives

"...work to enshrine adaptation into everyday decision-making to ensure that all programs, policies, initiatives and departments consider climate change risks and support Canada's national adaptation objectives..." GOCAAP

Climate Action

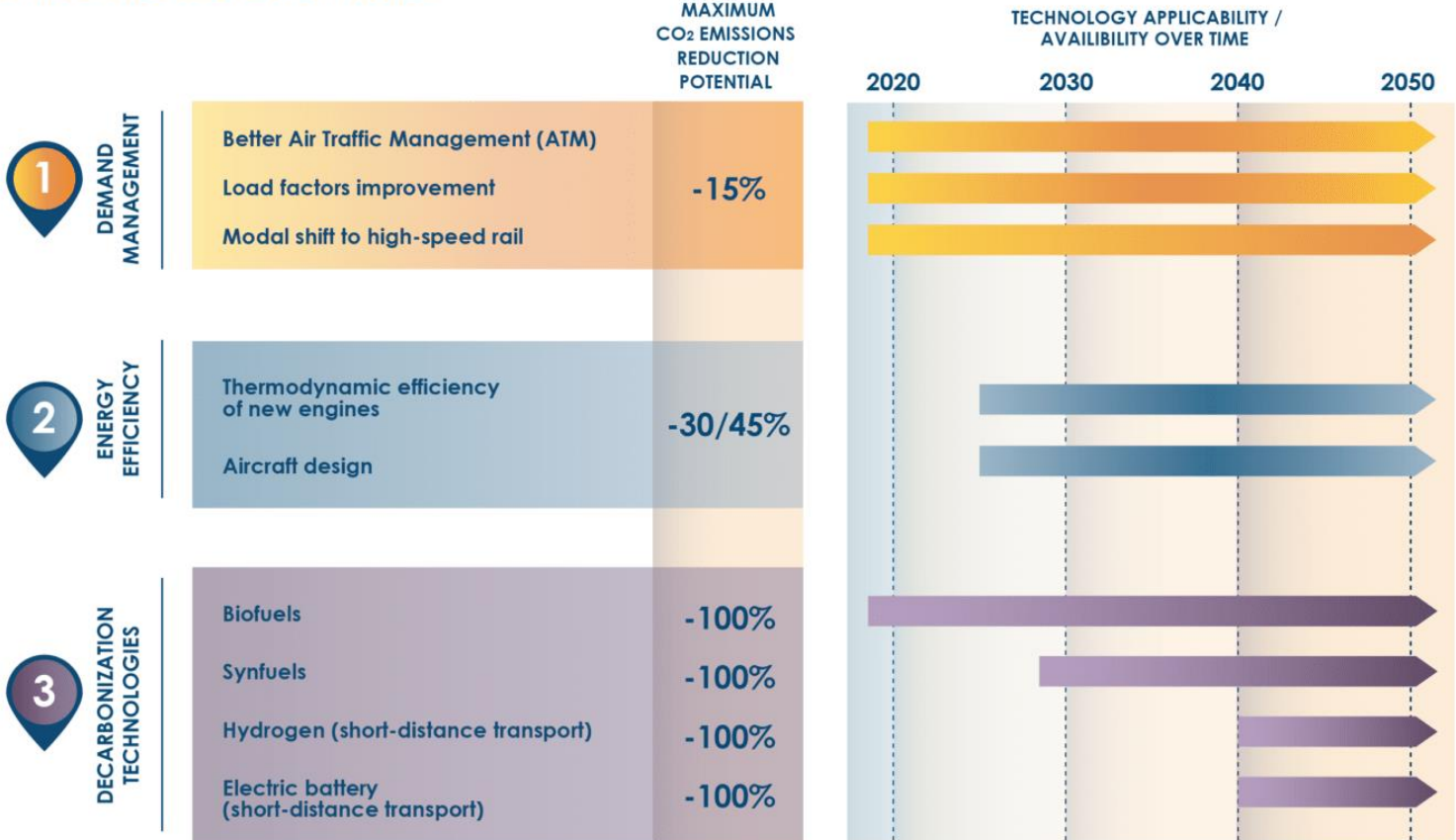


HOW TO REACH NET-ZERO CO₂ EMISSIONS FROM AVIATION

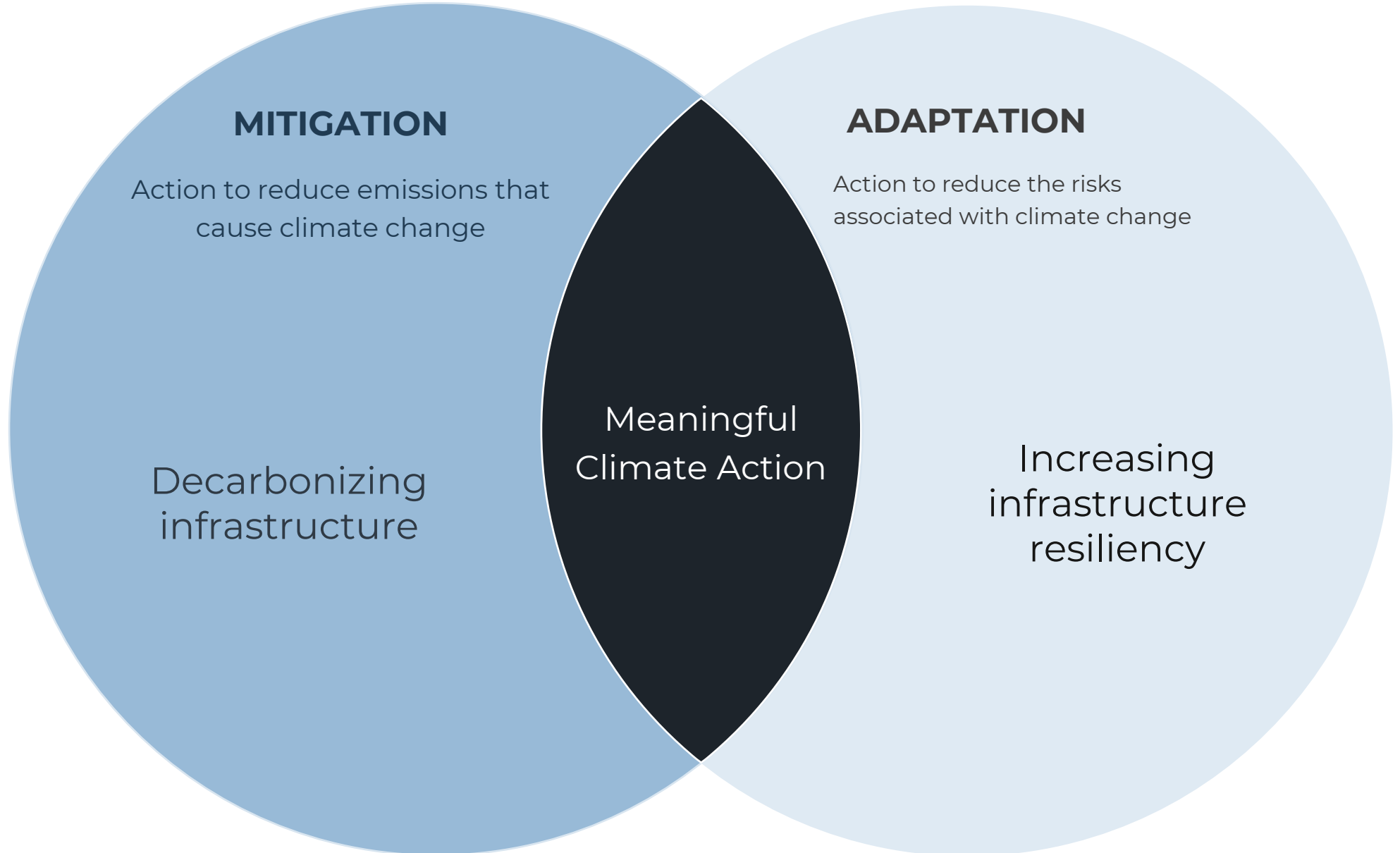


Energy Transitions Commission (ETC) is a global coalition of leaders from across the energy landscape working together to accelerate the transition to a zero-emissions future.

REACHING NET-ZERO CO₂ EMISSIONS FROM AVIATION IS POSSIBLE BY COMBINING 3 MAJOR DECARBONIZATION ROUTES:



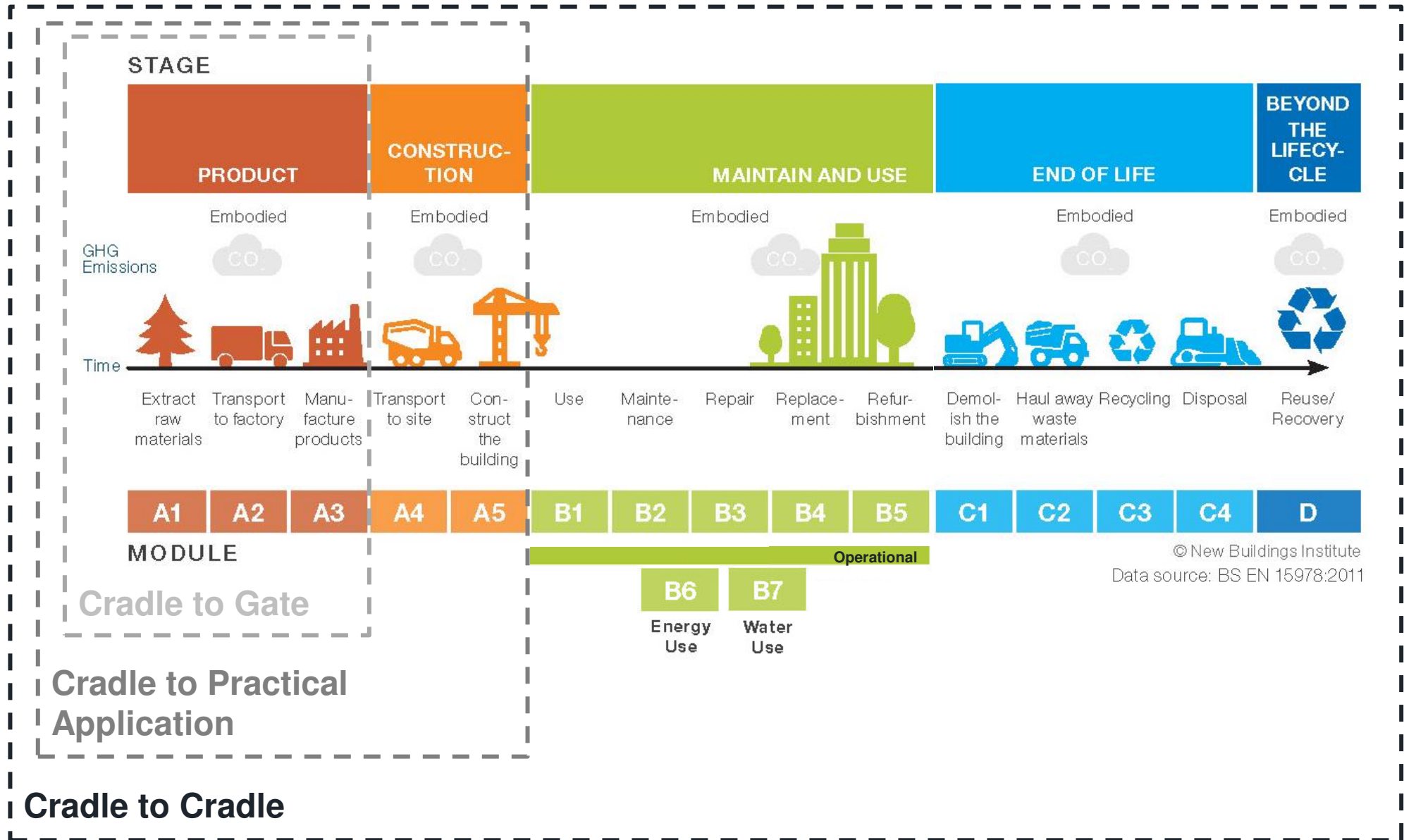
Two Pathways



Climate Mitigation - Lifecycle Approach

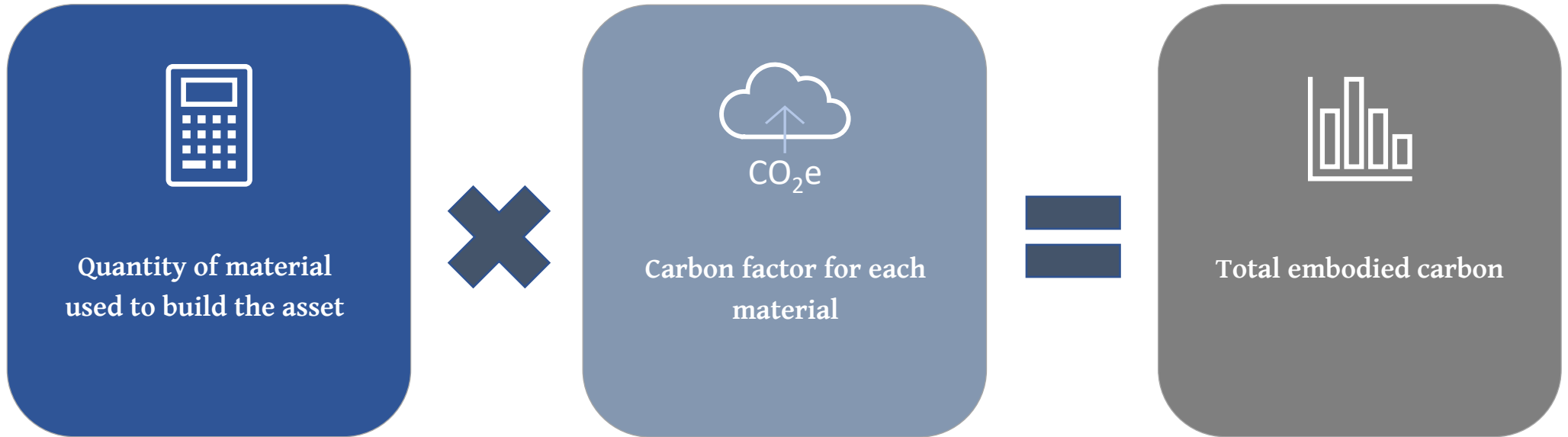


Life Cycle Approach



Embodied Carbon

Embodied carbon includes the **greenhouse gas emissions arising from the life cycle (manufacturing, transportation, installation, maintenance, and disposal) of construction materials**



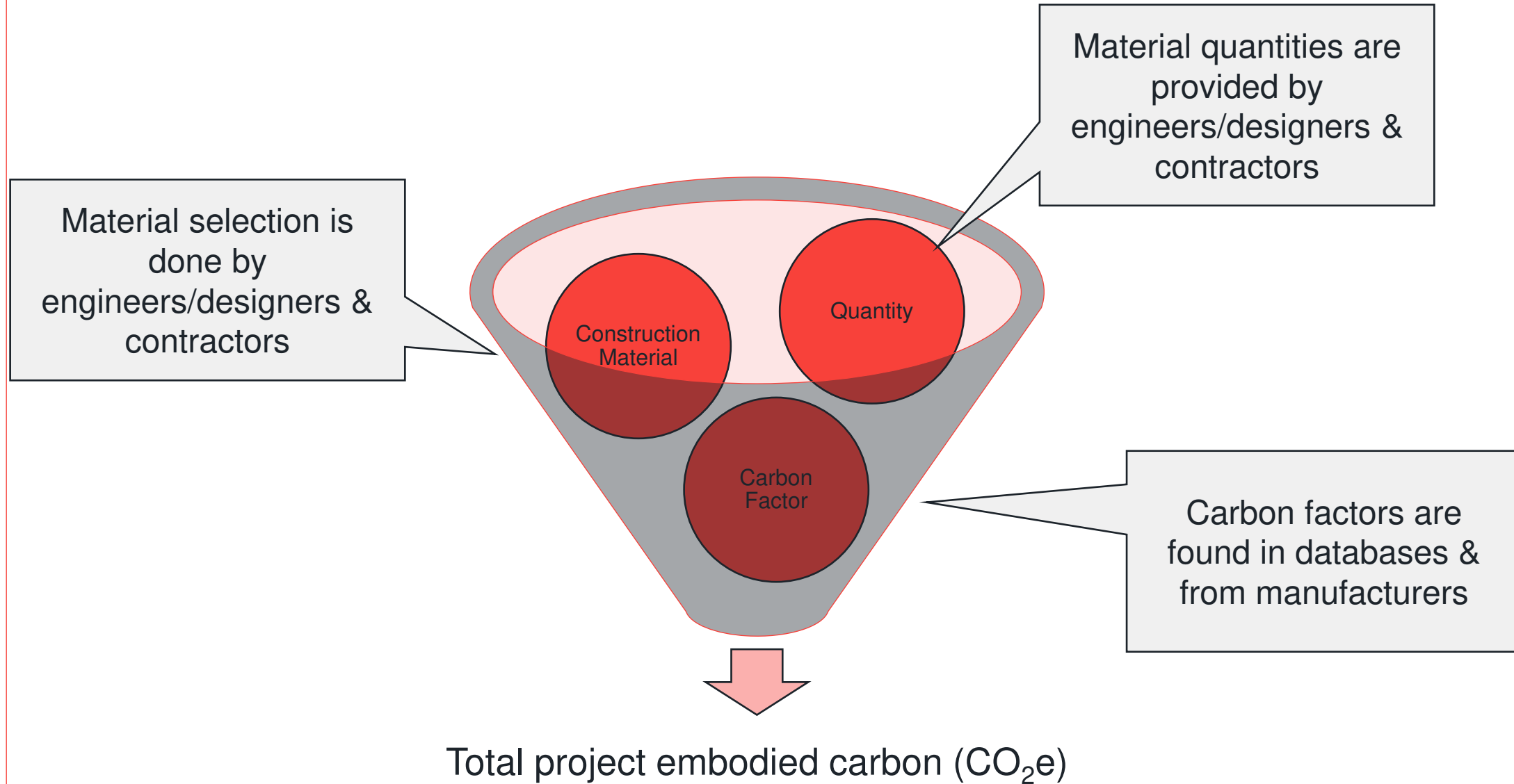
Reduce Embodied Carbon by reducing either:

1. The quantity of material.

OR

2. The carbon factor.

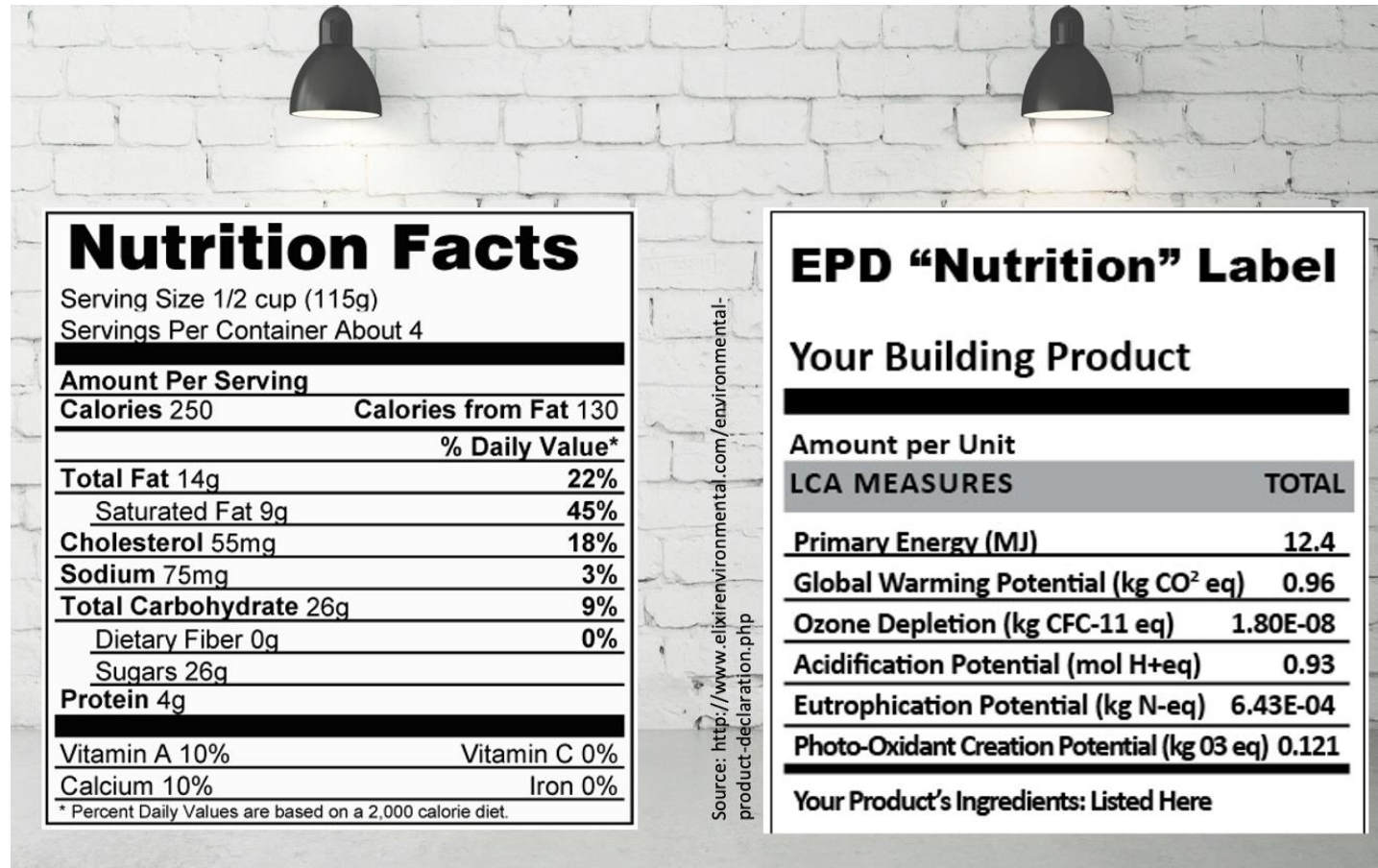
Input Sources



Environmental Product Declarations (EDPs)

Manufacturers report embodied carbon for their products through EPDs (Environmental Product Declarations)

An EPD is a verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products



Nutrition Facts	
Serving Size 1/2 cup (115g)	
Servings Per Container About 4	
Amount Per Serving	
Calories 250	Calories from Fat 130
% Daily Value*	
Total Fat 14g	22%
Saturated Fat 9g	45%
Cholesterol 55mg	18%
Sodium 75mg	3%
Total Carbohydrate 26g	9%
Dietary Fiber 0g	0%
Sugars 26g	
Protein 4g	
Vitamin A 10%	Vitamin C 0%
Calcium 10%	Iron 0%

* Percent Daily Values are based on a 2,000 calorie diet.

EPD "Nutrition" Label	
Your Building Product	
Amount per Unit	
LCA MEASURES	TOTAL
Primary Energy (MJ)	12.4
Global Warming Potential (kg CO ² eq)	0.96
Ozone Depletion (kg CFC-11 eq)	1.80E-08
Acidification Potential (mol H+eq)	0.93
Eutrophication Potential (kg N-eq)	6.43E-04
Photo-Oxidant Creation Potential (kg O ₃ eq)	0.121
Your Product's Ingredients: Listed Here	

Life Cycle Considerations for Airfield Paving

- ✓ Complete a Life Cycle Assessment early to influence design
- ✓ Prolong Service Life (i.e. reduce quantity of material)
- ✓ Consider using Recycled Asphalt Paving (RAP) over traditional or concrete
- ✓ Explore new technologies
- ✓ Divert materials from landfill

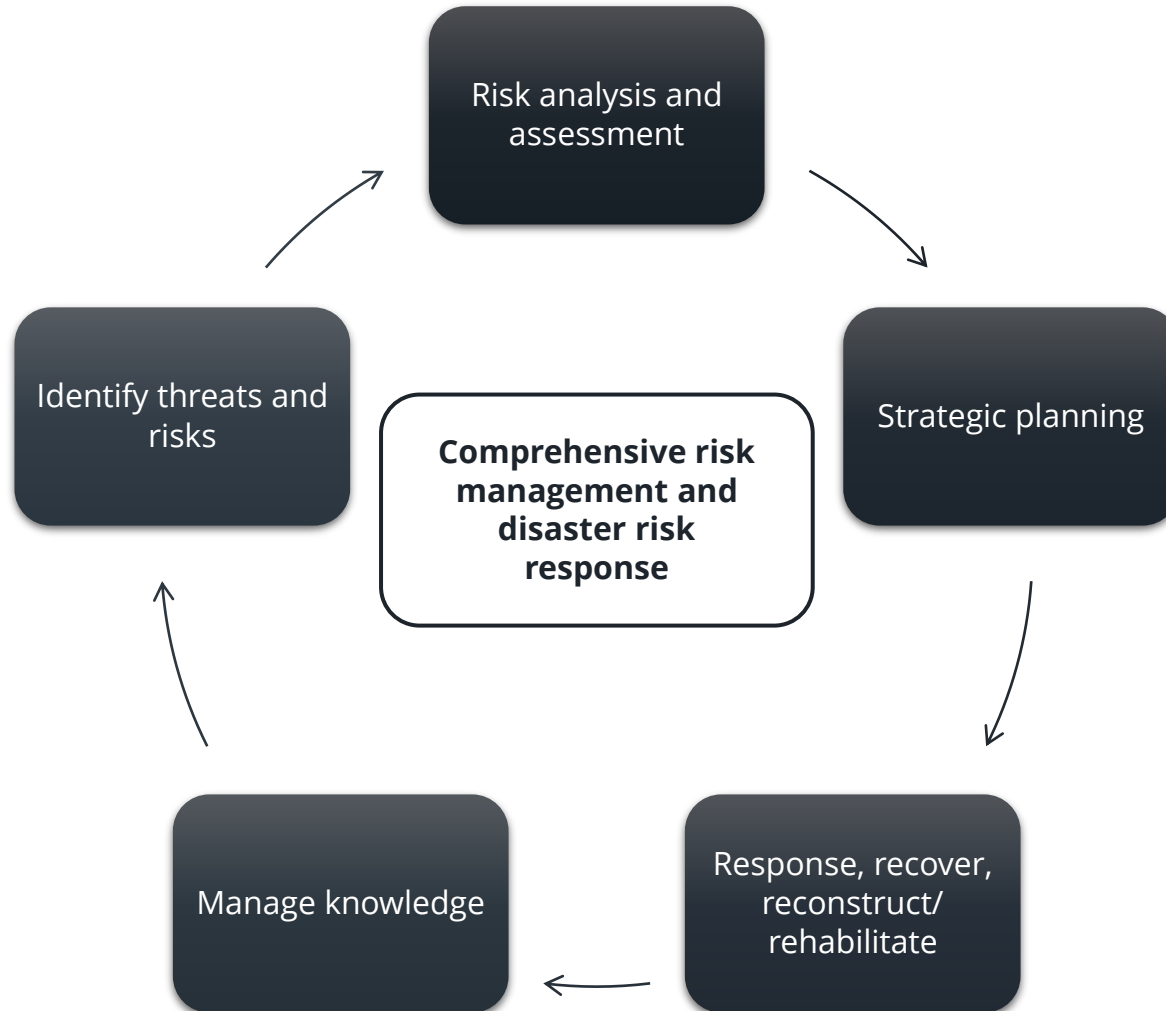
Climate Adaptation – Physical Climate Risk Management



Physical Climate Risk Management

Climate risk assessment identify and quantify the physical and transition risks associated with climate change, and inform strategies to reduce or transfers those risks

Climate risk management and decision-making require a holistic and iterative approach that considers multiple dimensions of risk, uncertainty, values, trade-offs, co-benefits, and governance.



Uncertainties of future climate-related risks may relate to

- Future trajectories of greenhouse gas (GHG) emissions
- Climate system response to GHG emissions
- Magnitude and timing of climate impacts and extremes
- Effectiveness of adaptation and mitigation measures

Climate Physical Risk impacts on airports



Extreme weather events that can damage airport infrastructure have been intensified by climate change.

Airport operations can be disrupted by flooding, sea level rise and landslides due to extreme rainfall and/or rapid snowmelt.

Airport construction and maintenance can be impacted by extreme weather events causing delays.

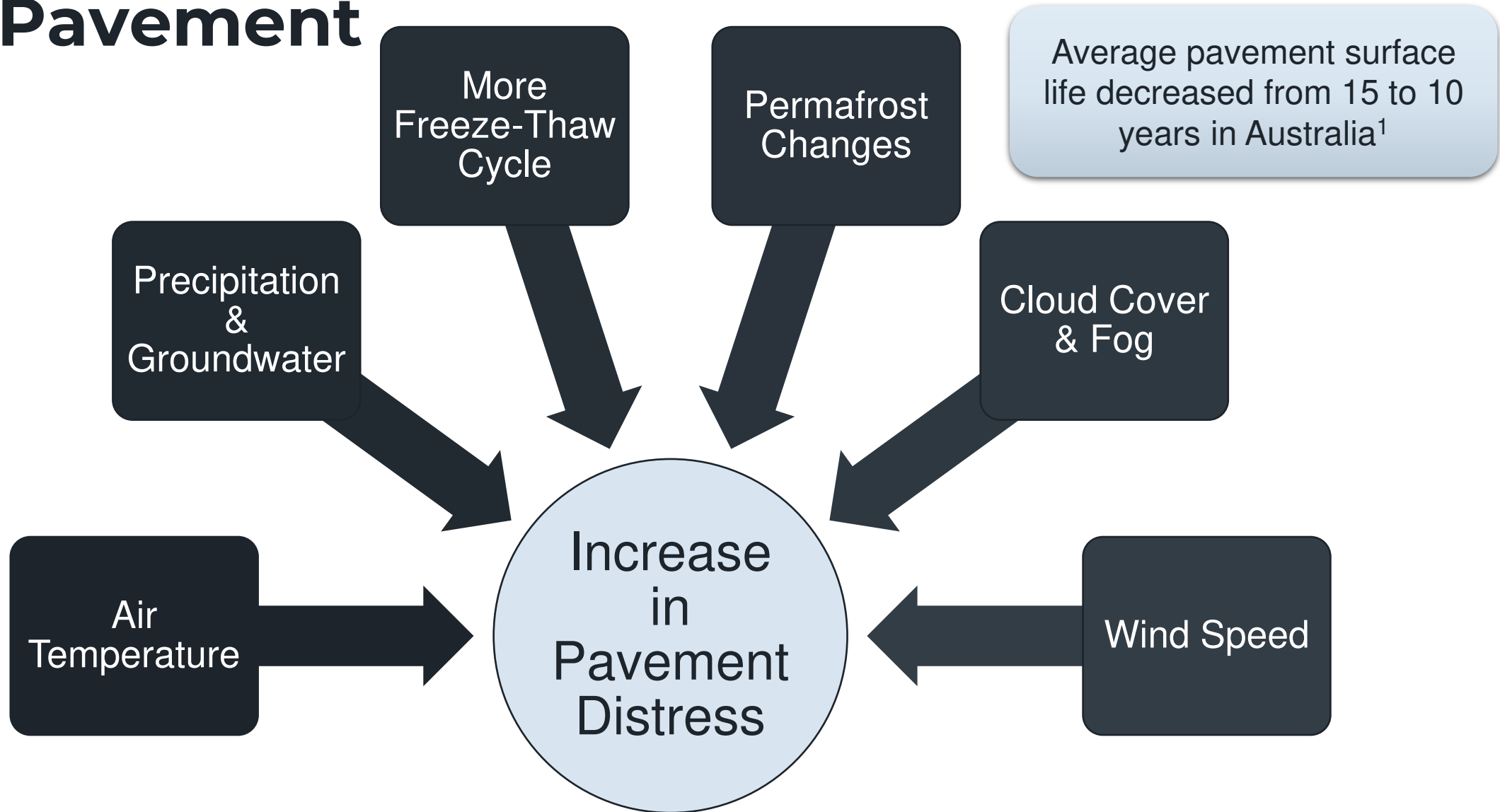
Asphalt deterioration increases with higher temperatures and more extreme weather.

Wildfire and smoke can lead to service disruptions, impact workers and customers health and safety, and infrastructure damages

Climate change mitigation efforts, such as reducing emissions, can affect operations and require new infrastructure.

Climate Changes Impacting Pavement

Climate changes include increases in extremes and severity



Impacts on Runway Design



Increased Runway Length

Runway length
increase of 10-
50meters per 1°C
temperature
increase

Climate Risk Considerations for Airfield Paving

- ✓ Conduct a climate risk assessment
- ✓ Use Predictive Models (vs. historical climate data)
- ✓ Understand the local factors in climate change risk
- ✓ Consider more robust paving materials & designs
- ✓ Consider relocation to manage extreme events
- ✓ Consider construction timing against worker safety



Thank you

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