

ASHRAE
Hellenic Chapter

TEE

ENERGY IN BUILDINGS

EMEA 2024

Europe, the Middle East & Africa

FRIDAY - SATURDAY

NOVEMBER 22-23, 2024

@ 9:00-18:00

SESSIONS:

- SUSTAINABILITY
- HEALTH & SAFETY
- DECARBONIZATION
- TECHNICAL SOLUTIONS
- DIGITAL ENVIRONMENT
- POLICIES & LEGISLATION
- ENERGY EFFICIENCY FIRST
- RESILIENCE TO CLIMATE CRISIS

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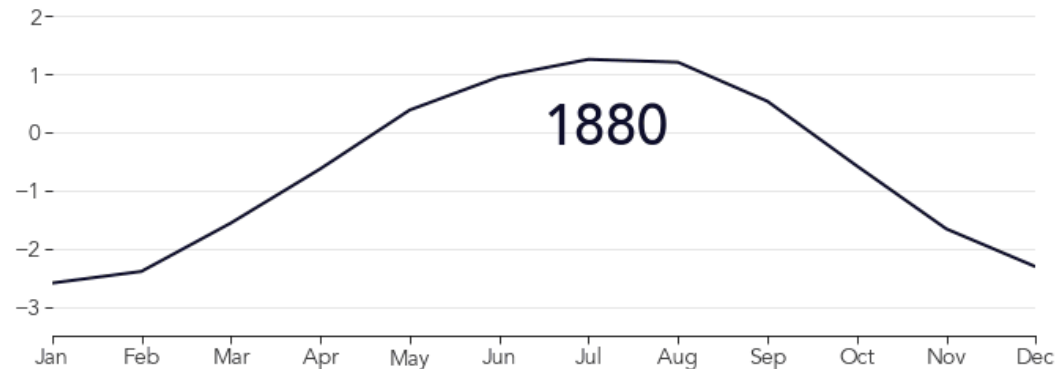
How to Address Requirements for Physical Climate Risks to
Enhance Buildings Resilience

Theodoros Katopodis Meng, MSc, Ph.D

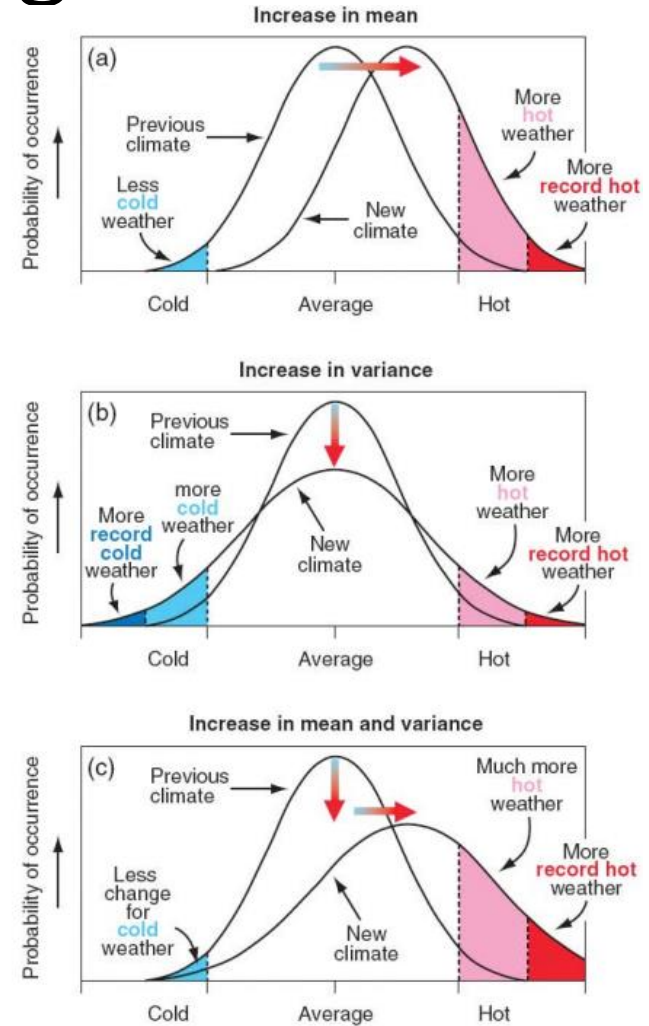


Introduction to climate change

Temperatures Continue to Rise: Top-9 Warmest Years Happened This Decade
 Seasonal Temperature Anomaly (°C compared to the 1980-2015 average)



Source: <https://earthobservatory.nasa.gov/images/147794/2020-tied-for-warmest-year-on-record>



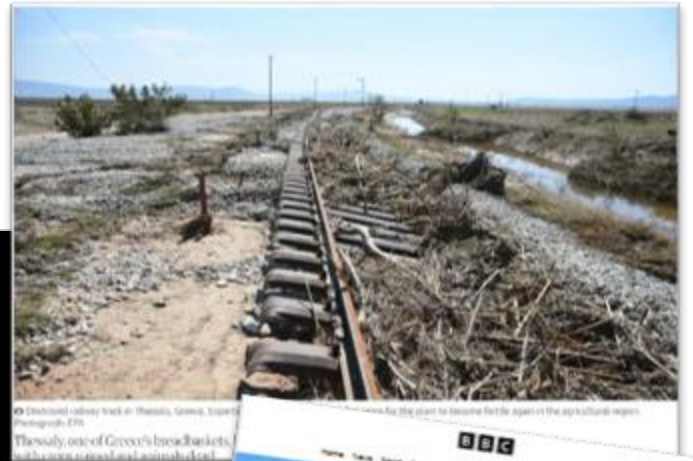
Source: Figure 2.32 in the Intergovernmental Panel on Climate Change, Working Group I report (2001)

Climate change impacts in Greece

Zenon (2017), Zorbas (2018), Ianos (2020)

Daniel Storm in 2023:

The extreme weather event severely impacted several cities with multiple losses and impacts, across value chain affecting people, industries and buildings.



- 

Areas affected in Greece:
Thessaly
- 

Other loss :
< 200k Animals & Poultry killed
- 

Financial loss:
< 5 billion €
- 

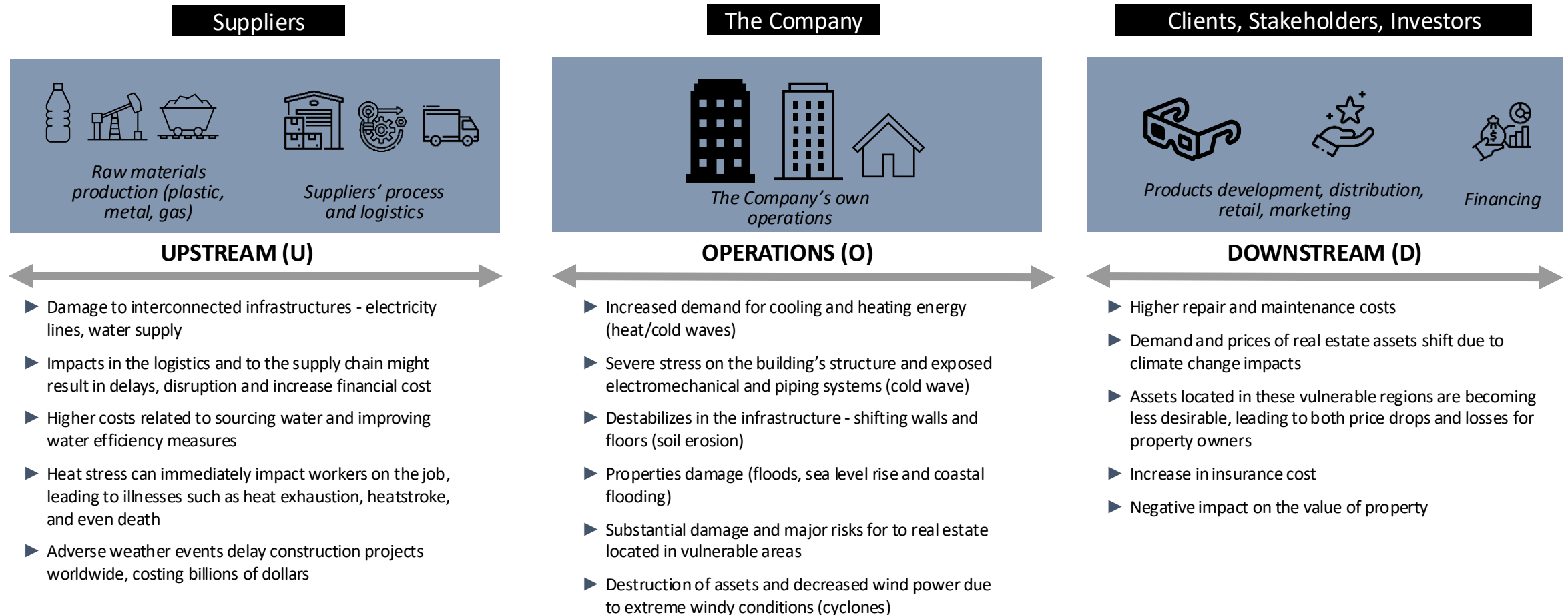
Area flooded:
5,000 houses
- 

Fatalities:
17 Dead People
- 

Industries affected:
**Agri business
Food industries
Transportations**

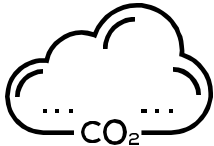


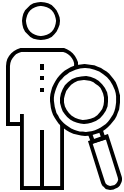
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Indicative disruptions caused by extreme weather events across the value chain



Demand for sustainability integration and climate risk analysis is growing


According to the World Economic Forum, climate change is costing the world \$16 million per hour

Climate change	Mounting regulation	Stakeholders' needs	Investor scrutiny
<ul style="list-style-type: none"> ▶ The increasing frequency of extreme weather events and loss of biodiversity increases the risk profile of companies. ▶ Climate preparedness is becoming a strategic priority across the value chain and requires fundamental long-term investment and planning. 	<ul style="list-style-type: none"> ▶ Governments are accelerating environmental regulation to reduce emissions and meet globally agreed targets. ▶ Uneven regulation in different countries, requires companies to adapt operations, products and supply chains. 	<ul style="list-style-type: none"> ▶ Companies face increasing pressure from consumers who demand that they embed sustainability in their agenda, purpose and products. ▶ Companies increasingly need to consider how their environmental impact will shape consumer and employee perceptions of their brand. 	<ul style="list-style-type: none"> ▶ ESG ratings are becoming more prominent drivers of investment decisions and Long-Term Value. ▶ Impact investors and shareholders are increasingly holding companies to account for their activities in relation to climate security, waste and biodiversity.
			

Drivers


Evolution in Standards & Regulations

New regulations impose measures, requiring companies to report more rigorously.



CSRD / ESRS E1
– Climate Change

Organizations should have a meaningful and in-depth understanding of climate-related risks, with the primary goal of publicizing adaptation plans for the significant economic impacts associated with climate change. Disclose relevant to climate change performance, including Scope 1, 2 & 3, material climate risks and opportunities and their potential financial effects.



EU Taxonomy

Companies should demonstrate that their activities are resilient to material climate-related risks to be considered aligned with the Taxonomy

Companies should demonstrate that they operate within specific thresholds relevant to climate change mitigation and to perform climate risk/ vulnerability analysis to meet the Do Not Significantly Harm Criteria.




TCFD | TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

IFRS

Investors expect companies to disclose information on governance, strategy risk management and metrics & targets

TCFD recommends companies to report on climate-related risks, metrics (Scope 1, 2 and 3) and targets in their annual report

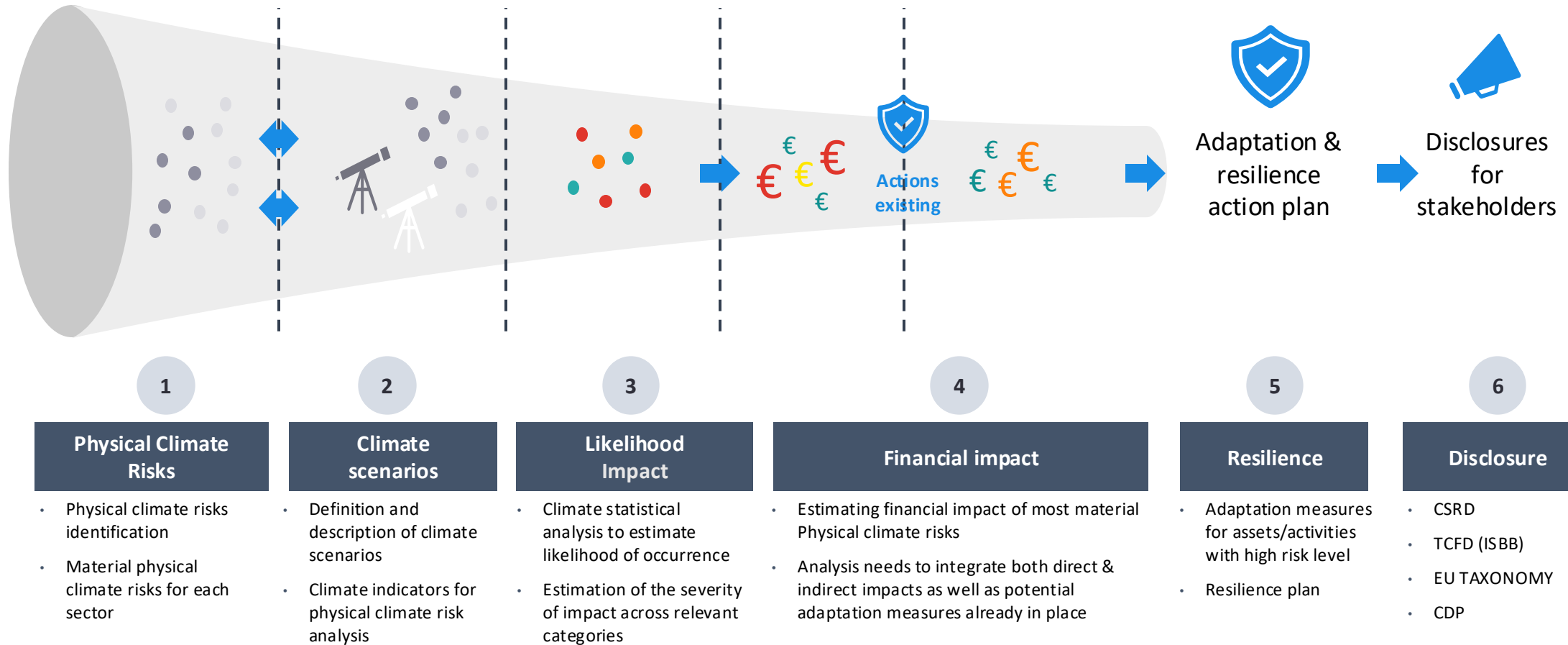


CDP

Carbon footprint performance, target setting and scenario analysis to inform climate risk management is a requisite to integrate the CDP A-list

CDP requires companies to disclose detailed financial impact figures for most material climate-related risks and opportunities, Scope 1, 2 and 3, energy consumption and targets

From identifying climate risks to disclosing a resilience plan



How to calculate physical climate risk?

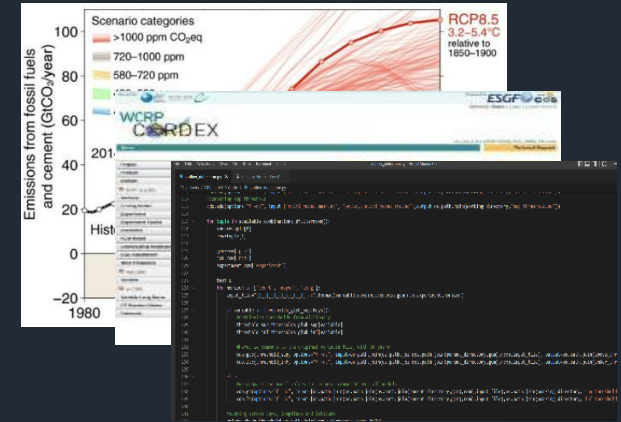
Physical
climate
risk



Likelihood

Probability of occurrence of a hazardous event at asset location

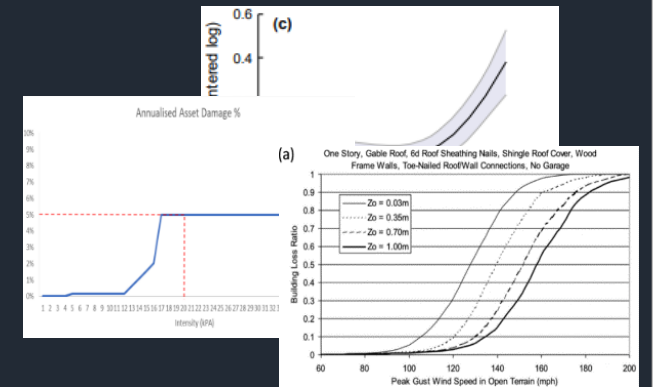
This part of the risk assessment looks at how likely the identified climate hazards are to occur within a given timescale, e.g. the lifetime of the project. Determined thanks to hazard indicators, computed based on the **projections of climate models to asset coordinates**



Impact

consequences if the climate hazard identified occurs

Under quantitative analysis can be determined thanks to **damage functions** which map hazard intensity to expected percentage of loss, by computing hazard value at asset location



Climate risk analysis to assess the financial impact of floods, using damage functions

Modeling approach

Climate parameters

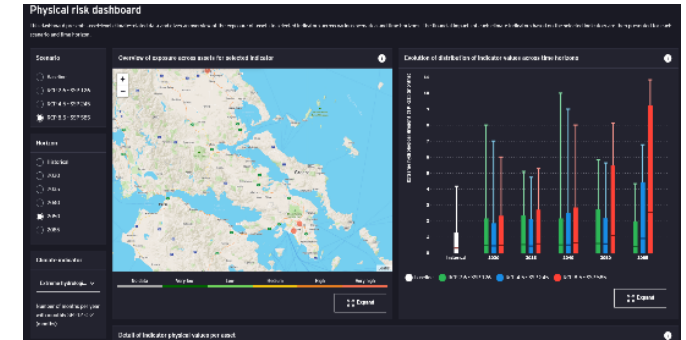
- Heat wave, wildfire, extreme wind, soil erosion, drought, floods

Time horizons

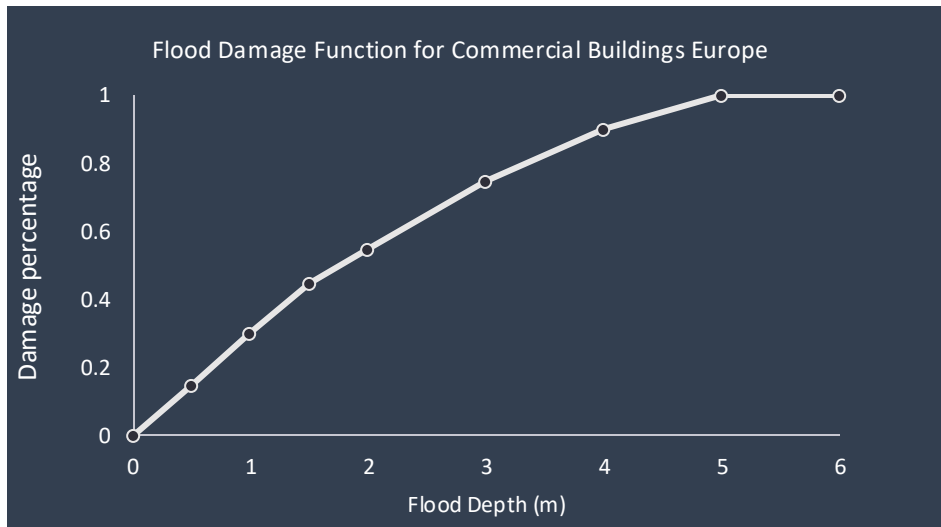
- Base year, 2050 and 2085

Scenarios

- Extreme hot house scenario RCP 8.5 as per the IPCC Fifth Assessment Report



Results



		Extreme	High	Medium	Low	
Physical climate risk matrix						
Overall impact of the essential climate variables and hazards						
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood/Exposure	Very low					
	Low			Extreme wind		
	Medium		Soil erosion Snowfall			
	High	Drought	Wildfire	Floods		
	Very High					

Financial Impact / Indicative climate indicator		
Climate parameters/indicators	Current financial Loss (€)	Projected percentage increase of the financial Loss (€) under the RCP85-SSP585 (2050)
Flood (pluvial)	80k-90k	8-10%

Proactive Climate Change Resilience Strategy

Review, update or develop **resilience strategies** to incorporate new technologies and lessons learned

Stay informed about the latest research and trends in climate change, **weather patterns and resilience planning.**

Invest in **sustainable practices and technologies** that can mitigate the impact, such as renewable energy sources and water conservation systems.

Review and update **insurance policies** to cover damages and business interruptions caused by extreme weather.

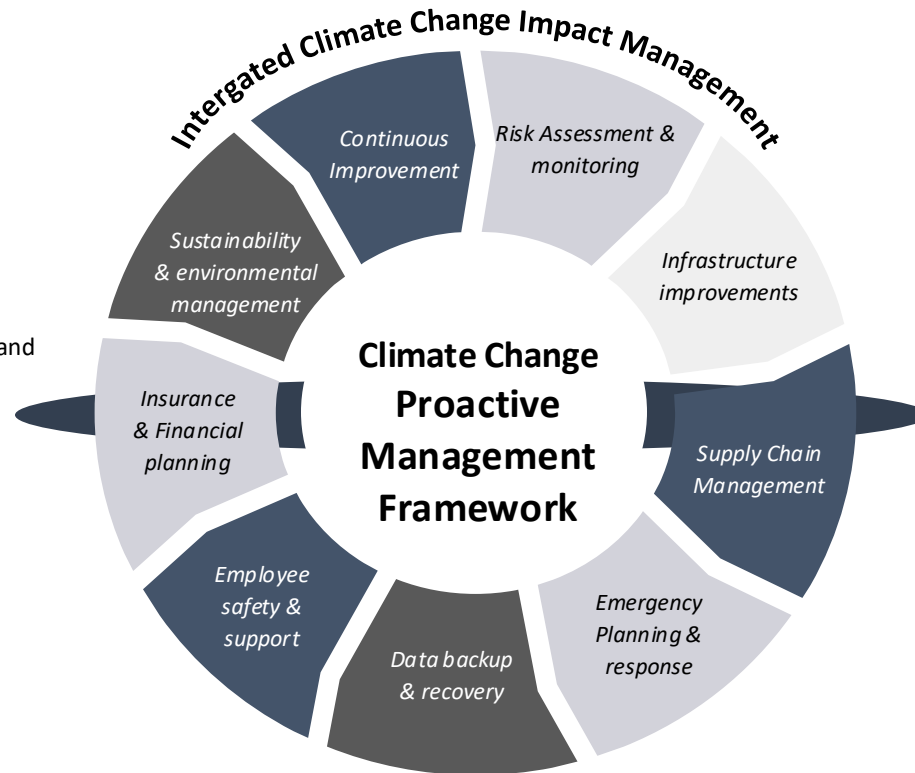
Set aside an **emergency fund** to cover unexpected expenses related to weather events.

Develop policies to ensure the **safety of employees**, including flexible work arrangements.

Provide **support for employees who may be affected**, such as temporary housing or transportation assistance.

Do **data backup -recovery** systems to protect critical business information from being lost or damaged.

Consider cloud-based solutions for data and applications to ensure accessibility from different locations.



Identify, assess and select **adaptation** options

Monitoring and evaluating **adaptation**

Implement **weather monitoring systems** to provide early warnings about potential extreme weather events

Upgrade facilities to withstand extreme weather conditions, such as reinforcing structures, installing storm shutters, and waterproofing buildings and pumps.

Ensure that **critical equipment** is elevated to prevent damage from flooding.

Invest in **backup power systems**, such as generators and UPS systems

Diversify suppliers and logistics options to reduce the risk of disruption from a weather-event in one location.

Maintain a **buffer stock of critical materials** and components to ensure continued production in case of supply chain interruptions.

Develop **alternative transportation routes** and methods to be used in case of weather disruptions.

Create an **emergency response plan** that includes procedures for extreme weather events. Ensure that all employees are trained on this plan.

Conduct **regular training** to ensure that employees know how to react in the event of an emergency.

Establish **communication protocols** to keep employees informed before, during, after an extreme event.

Reactive Climate Change Resilience Strategies

Conduct a thorough **review** to identify what worked well and what could be improved

Update the **emergency response and business continuity plans** based on lessons learned

Comply with all relevant **regulations and reporting requirements** related to environmental spills, structural integrity, and employee safety

Keep accurate **records** of actions taken in response to the event

Ensure cleanup or **repair work** is conducted safely to prevent injuries or health hazards

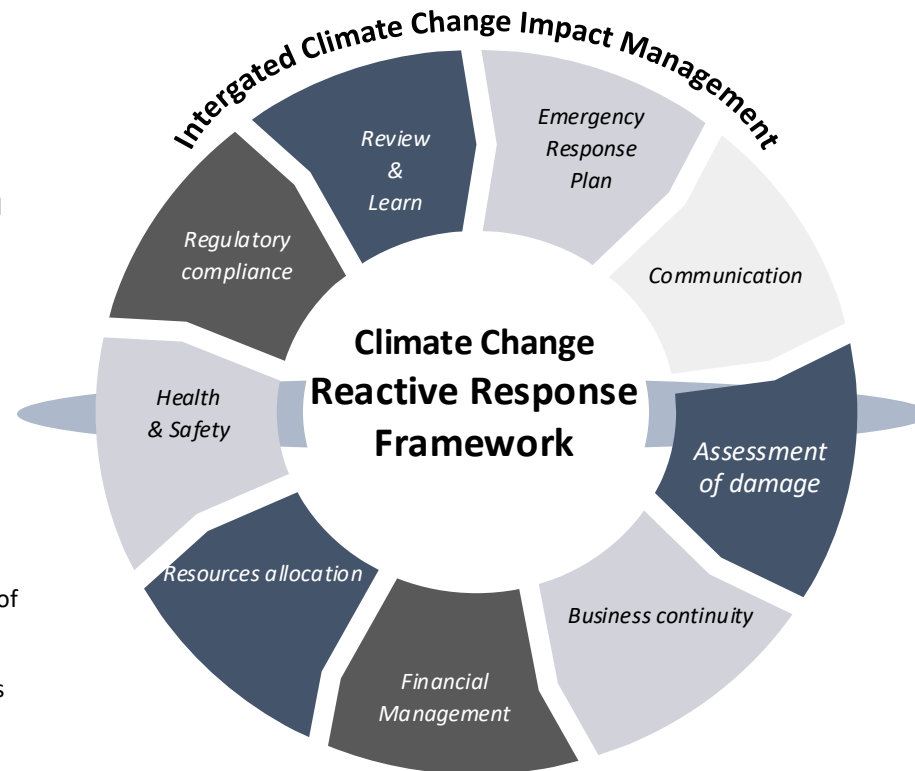
Provide **support and counseling services** to employees who may be affected by the disaster

Prioritize resources to **restore** the most critical aspects of the business first

Allocate manpower, equipment, and financial resources where they are needed most

Assess the financial impact, potential revenue loss, increased expenses, and cash flow issues.

Contact insurers to claims property damage, business interruption, and other coverages



Activate the emergency response plan, which include evacuation procedures, emergency contact information, first-aid measures.

Ensure the **safety** of all employees and customers, which is the top priority during

Establish clear lines of **communication** with employees, customers, suppliers, and stakeholders to inform them about the situation and the steps being taken.

Use **multiple channels** such as emails, text messages, social media, and company websites to disseminate information quickly

Conduct an **initial assessment** of the physical damage to facilities, inventory, equipment.

Document the damage for **insurance** claims and future reference.

Implement the business continuity plan to resume critical operations asap possible.

Identify alternative work sites, temporary office space, or remote work options if the primary location is unusable.

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