STUDY

Requested by the EMPL committee

European Parliament

The effects of extreme weather conditions on workers' health and safety

Policy Department for Transport, Employment and Social Affairs
Directorate-General for Cohesion, Agriculture and Social Policies (CASP)
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The effects of extreme weather conditions on workers' health and safety

Abstract

This study analyses the impacts of extreme weather events (heatwaves, floods, storms, droughts and cold spells) on occupational health and safety (OSH) across the European Union. It explores regional and sectoral vulnerabilities, examines effects on different worker groups, and elaborates on potential economic costs. The study reviews EU and national policy frameworks, identifies implementation gaps, and offers evidence-based recommendations to strengthen OSH systems in a changing climate. This document was prepared at the request of the Committee on Employment and Social Affairs (EMPL).

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CONTENTS

LIST OF ABBREVIATIONS

AC	Air conditioning
AEMET	Agencia Estatal de Meteorología – Spain's State Meteorological Agency
AKI	Acute kidney injury
BUAK	Bauarbeiter-Urlaubs- und Abfertigungskasse – Construction Workers' Leave and Severence Pay Fund in Austria
C3S	Copernicus Climate Change Service
CBA	Collective bargaining agreement
CIOP-PIB	Centralny Instytut Ochrony Pracy - Państwowy Instytut Badawczy – Central Institute for Labour Protection - National Research Institute in Poland
CKD	Chronic kidney disease
CMEMS	Copernicus Marine Environment Monitoring Service
CNSST	Comisión Nacional de Seguridad y Salud en el Trabajo – Spain's National Commission on Safety and Health at Work
DALY	Disability-Adjusted Life Year
EC	European Commission
ECMWF	European Centre for Medium-Range Weather Forecasts
EEA	European Environment Agency
EEC	European Economic Community
EFBWW	European Federation of Building and Woodworkers
EM-DAT	Emergency Events Database
EP	European Parliament

EPSU	European Public Service Union
ERA5	Fifth generation of the European Centre for Medium-Range Weather Forecasts reanalysis
ESAW	European Statistics on Accidents at Work
ESENER	European Survey of Enterprises on New and Emerging Risks
ESF	European Social Fund
ESOTC	European State of the Climate
ETUC	European Trade Union Confederation
ETUI	European Trade Union Institute
EU	European Union
EUCRA	European Climate Risk Assessment
EU-OSHA	European Agency for Safety and Health at Work
EWCS	European Working Conditions Survey
FIOH	Finnish Institute of Occupational Health
FNV	The Netherlands Trade Union Confederation
GDP	Gross Domestic Product
GVA	Gross Value Added
HSA	Health and Safety Authority – the national OSH regulator in Ireland
ILO	International Labour Organisation
INAIL	Istituto Nazionale Assicurazione Infortuni sul Lavoro – Italy's National Institute for Insurance against Accidents at Work

INSST	Instituto Nacional de Seguridad y Salud en el Trabajo – Spain's National Institute for Safety and Health at Work
IPCC	Intergovernmental Panel on Climate Change
ISCED	International Standard Classification of Education
ISCO	International standard classification of occupations
ITSS	Inspección de Trabajo y Seguridad Social – Spain's State Labour Inspectorate
JRC	Joint Research Centre
KNMI	Koninklijk Nederlands Meteorologisch Instituut – the Royal Netherlands Meteorological Institute
LFS	Labour Force Survey
LIFE	Programme for the Environment and Climate Action
MS	Member State
MSDs	Musculoskeletal disorders
NACE	Nomenclature statistique des activités économiques dans la Communauté européenne – EU's statistical classification of economic activities
NECG	National Emergency Co-ordination Group in Ireland
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
OHSA	Occupational Health and Safety Authority of Malta
OSH	Occupational safety and health
OSHA	Occupational Safety and Health Administration – Finnish Labour Inspectorate
PIP	Państwowa Inspekcja Pracy – Poland's National Labour Inspectorate

PPE	Personal protective equipment
PTSD	Post-Traumatic Stress Disorder
RCP	Representative concentration pathway
SAK	Suomen Ammattiliittojen Keskusjärjestö – Central Organisation of Finnish Trade Unions
SER	The Social and Economic Council of the Netherlands
SLIC	Senior Labour Inspector's Committee
SME	Small and medium-sized enterprise
SPI	Standardised Precipitation Index
STTK	The Finnish Confederation of Professionals
TFEU	Treaty on the Functioning of the European Union
UHI	Urban heat island (effect)
UNEP	United Nations Environment Programme
UTCI	Universal Thermal Climate Index
UV	Ultraviolet
VDI	Valstybinė darbo inspekcija – Lithuania's State Labour Inspectorate
VNO-NCW and MKB	Confederation of Dutch Employers and Midden- en Kleinbedrijf (Small and Medium-sized Enterprises) organisation
VSL	Value of a Statistical Life
WBGT	Wet Bulb Globe Temperature
WHO	World Health Organisation

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EXECUTIVE SUMMARY

This study, requested by the European Parliament's Committee on Employment and Social Affairs, assesses how extreme weather conditions (worsening due to climate change) affect occupational safety and health (OSH) across the European Union (EU). It analyses how risks vary by region, sector, and worker group, evaluates the adequacy of existing policy frameworks at the EU and Member State level, and outlines recommendations to better protect workers and workplaces in a changing climate.

Hazards such as heatwaves, wildfires, floods, storms, and cold spells are becoming more common and more intense. These conditions pose not only physical health risks, such as heat stroke, injuries, and respiratory illnesses, but also mental health challenges, including anxiety and stress. The impacts include increased risk of accidents, illnesses, and a loss of productivity across the labour market. Among all weather-related risks, heat has emerged as the most pressing OSH hazard. Research shows that even moderate heat can significantly reduce labour productivity, with costs already rising and likely to grow further in the coming years.

Certain economic sectors are more exposed than others. Agriculture, construction, transport, and emergency services are particularly affected due to the nature of their work. In addition, sectors such as manufacturing, office work, public utilities and waste management, though less visible in policy discussions, face comparable risks, particularly during heatwaves, and deserve greater attention.

Some groups of workers are particularly vulnerable. Outdoor workers face direct exposure to extreme temperatures and adverse weather. Similarly, the self-employed, platform workers, migrants, older individuals, and those with chronic health conditions often have fewer resources to adapt and may be excluded from formal protections. Indoor workers in poorly ventilated or overheated buildings are also increasingly at risk, especially during heatwaves, which are becoming longer and more frequent.

The economic implications of climate-related OSH risks are substantial. Heat-related productivity losses alone are estimated to cost the EU economy approximately EUR 17 billion annually by 2030. When combined with related healthcare expenses, insurance and compensation payouts, administrative burdens, and intangible costs such as reduced quality of life, the overall burden of extreme weather on the EU labour market is considerable and expected to grow.

The current policy framework for managing these risks is built on the EU's occupational safety and health legislation, including the OSH Framework Directive 89/391/EEC and other related directives. These rules require employers to assess and control all workplace risks, which implicitly include heat, cold, storms and floods. In practice, these risks are addressed in a fragmented manner, as national—and in some Member States, regional—policies determine how workers are protected on the ground. In relation to this, four categories of national approaches

have been identified, depending on legal provisions, financial and guidance support, as well as most recent policy responses:

- Type A – Advanced integrated: explicit legal triggers + guidance + some financing (e.g., Belgium, Spain, Austria);
- Type B – Legislation-focused, support-light: prescriptive rules but little targeted funding or large-scale guidance (e.g., Romania; Czechia; mostly indoor standards);
- Type C – Guidance-centric: minimal prescriptive legislation; heavy reliance on guidance, social dialogue and general welfare (e.g., Finland, Denmark); and
- Type D – Emerging/adaptive: rules in flux reacting to recent events (e.g., Greece, Italy, Slovenia).

The study offers the following **recommendations** to strengthen climate resilience in occupational safety and health:

- **Improve data collection and evidence base**: Develop EU-wide guidelines to harmonise data on extreme weather-related OSH impacts.
- **Support enforcement and guidance**: Equip labour inspectorates with training and tools to assess climate-specific risks. Promote user-friendly sectoral risk assessment templates, particularly for SMEs.
- **Invest in applied research and knowledge sharing**: Fund studies and tools that evaluate the effectiveness and cost-efficiency of climate-adaptive OSH interventions.
- **Foster cross-sectoral coordination**: Embed OSH considerations into broader climate adaptation and public health strategies at national and EU levels.
- **Strengthen protection for vulnerable workers**: Ensure communication and training materials are accessible to all workers regardless of contract type, language, or status.
- **Promote social dialogue**: Encourage the inclusion of weather-related protections in collective bargaining agreements and OSH catalogues to tailor responses to sectoral and regional realities.
- **Clarify and enhance EU-level OSH protections**: Introduce a dedicated instrument on occupational heat or adapt existing directives to reflect climate-related risks. Consider harmonised thresholds based on indicators such as the Wet Bulb Globe Temperature (WBGT).
- **Avoid maladaptation**: Prioritise engineering and organisational controls (e.g. shade, ventilation, workload management) over personal responsibility or energy-intensive measures such as air-conditioning.

This study underscores the urgent need to future-proof Europe's OSH systems against the growing risks posed by more frequent extreme weather conditions and events. While responsibility for occupational safety and health primarily lies with national authorities, the

diversity of approaches and uneven capacities among Member States highlight the value of coordinated EU-level action — to ensure consistency in protection standards, foster knowledge exchange, and close existing regulatory and enforcement gaps across the Union.

1. INTRODUCTION

The European Union (EU) is facing an increasing threat to the occupational health and safety (OSH) of its workforce due to the rising frequency and intensity of extreme weather conditions. These are a direct consequence of global climate change[1], which is altering weather patterns and exacerbating natural hazards across the globe[2]. The scientific consensus confirms that climate change is not a future threat but an ongoing reality with tangible and increasingly severe effects on the European environment and its inhabitants. The summer of 2025 stands as a stark warning: a rapid analysis by scientists at the London School of Hygiene and Tropical Medicine and Imperial College London found that climate change intensified heatwaves across 854 European cities, causing around 16,500 additional heat-related deaths and accounting for 68% of all 24,400 heat deaths during the season[3].

Workers, in consequence, face novel and amplified risks within their professional environments. The rise in average ambient temperatures, heightened exposure to ultraviolet (UV) radiation due to changing atmospheric conditions, alterations in typical patterns of air pollution, and the direct impacts of extreme weather events are all contributing to a growing concern for the overall well-being of workers throughout the European Union. The traditional focus of OSH, which has historically addressed hazards related to machinery, chemicals, and physical exertion, is now expanding to encompass climate-related hazards as a critical and rapidly growing category of risk that demands attention from policymakers, employers, and workers alike[4].

OSH risks linked to extreme weather are multifaceted. Heat stress reduces cognitive function, dehydrates the body, and can trigger fatal heat stroke; droughts and wildfires expose workers to smoke, dust and vector-borne diseases; storms and floods create drowning risks, structural collapses and electrical hazards; and cold spells can cause hypothermia and frostbite. Beyond physical harm, extreme weather can exacerbate mental-health issues through anxiety, stress and sleep disruption. Particular sectors that involve outdoor or high-heat indoor work (agriculture, construction, transport, mining, emergency services and manufacturing) are

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1 ETUC (2019). *ETUC Resolution on the Need for EU Action to Protect Workers from High Temperatures*. Available at: https://www.etuc.org/system/files/document/file2019-05/Adopted%20ETUC%20Resolution%20on%20the%20Need%20for%20EU%20Action%20to%20Protect%20Workers%20from%20High%20Temperatures.pdf.

2 Krempl, S. (2024) *Impacts of climate change on occupational safety and health and standardization*. Kommission Arbeitsschutz und Normung – KAN. Available at: https://www.kan.de/en/publications/kanbrief/1/24/impacts-of-climate-change-on-occupational-safety-and-health-and-standardization.

3 Barnes, C., Konstantinoudis, G., Masselot, P., Mistry, M., Gasparrini, A., Vicedo-Cabrera, A.M., Theokritoff, E., Clarke, B. and Otto, F. (2025) Summer heat deaths in 854 European cities more than tripled due to climate change. *Imperial Graham Institute*. https://doi.org/10.25560/123873.

4 EU-OSHA (2023). *Climate change: Impact on occupational safety and health (OSH).* Available at: https://oshwiki.osha.europa.eu/en/themes/climate-change-impact-occupational-safety-and-health-osh. See also: Future (2023) EU-OSHA brings workplace health and safety to the forefront of the conversation. *Sofidel Group Future Magazine.* Available at: https://sustainable-procurement.sofidel.com/future-magazine/2023/12/18/eu-osha-brings-workplace-health-and-safety-to-the-forefront-of-the-conversation.

especially vulnerable to rising temperatures and unpredictable weather. The ageing workforce and growing prevalence of chronic illnesses further amplify the risks.

Evidence from the European Union Agency for Safety and Health at Work (EU-OSHA) OSH Pulse 2025 survey underlines the scale of these challenges: around one third of EU workers are exposed to climate-related risks, with 20% reporting exposure to extreme heat, 19% to poor air quality and more than one in ten experiencing intense sun exposure. Around 7% of workers have already suffered a heat-related illness, and one-third worry that climate change threatens their safety and health[5].

Notably, work-related accidents and illnesses (of all causes) already cost the EU economy about EUR 476 billion per year[6]; as climate change amplifies risks to workers, a growing share of this burden will stem from extreme weather. Overall, the scale of extreme weather-related OSH impacts is significant and can incur different types of costs: on productivity, healthcare, insurance, administration, and quality-of-life losses. For example, the predicted global costs from lost work time due to occupational heat stress alone are projected to reach an estimated EUR 2.2 trillion by the year 2030[7].

OSH legislation has been implemented in all EU Member States (MS) with the Directive 89/391/EEC (OSH Framework Directive) at the core of this worker protection framework[8]. Employers must carry out workplace risk assessments and implement preventative measures to protect workers from any workplace risk. While some OSH risks are addressed by specific Directives complementing the OSH Framework Directive, national regulations have also been a crucial component in tackling different OSH risks, including those stemming from extreme weather conditions. That has led to heterogeneous approaches among MS with some implementing more comprehensive legislation, while others rely on the general-duty obligations set by the core framework[9].

This report examines how extreme weather affects OSH in Europe and how policy frameworks can mitigate these impacts. Chapter 2 outlines the study's methodology and the research questions addressed. Chapter 3 quantifies and analyses the impacts of heatwaves, cold spells, floods, storms and droughts on workers and the economy. Chapter 4 reviews national and EU

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5 Belli, S., and De Keulenaer, F. (2025) *OSH Pulse 2025: Occupational safety and health in the era of climate and digital change, European Agency for Safety and Health at Work*. Publications Office of the European Union. Available at: https://doi.org/10.2802/0978422.

6 Drescher, K. and Janzen, B. (2025) When weather wounds workers: The impact of temperature on workplace accidents. *Journal of Public Economics*, 241, 105258. Available at: https://doi.org/10.1016/j.jpubeco.2024.105258.

7 International Labour Organisation (2019) *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_711919.pdf.

8 European Climate and Health Observatory (2021) *Effects on occupational health and safety*. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/occupational-health-safety

9 EU-OSHA (2023) *Climate Change and Occupational Risks: Policies and Prevention Measures*. Available at: https://oshwiki.osha.europa.eu/en/themes/climate-change-and-occupational-risks-policies-and-prevention-measures

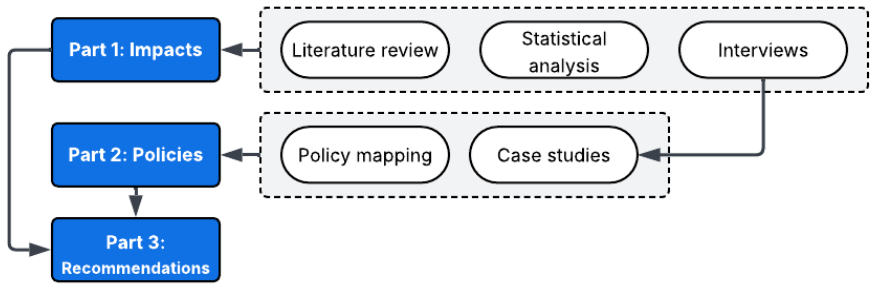
policies on extreme weather and OSH, identifying good practices and gaps. Chapter 5 synthesises findings to formulate recommendations for further action. Together, these sections aim to guide evidence-based policy for a climate-resilient future of work.

2. METHODOLOGY

This chapter summarises the methodological approach underpinning the study. The research was designed to provide an evidence base on how extreme weather events affect occupational safety and health (OSH) across the European Union, how Member States respond through legislation and policy, and what lessons can be drawn for future action. The study combined quantitative and qualitative methods, integrating statistical, documentary, and interview insights to enable both breadth and depth of analysis.

The project was structured into three main components — Part 1: Impacts, Part 2: Policies, and Part 3: Recommendations — corresponding to the analytical flow of the study (see *Figure 1*). Part 1 assessed how extreme weather events affect occupational safety and health across sectors, regions, and worker groups; Part 2 mapped and analysed the policy and institutional responses at EU and national levels; and Part 3 synthesised the findings to formulate practical recommendations.

Figure 1: Parts and methods of the study

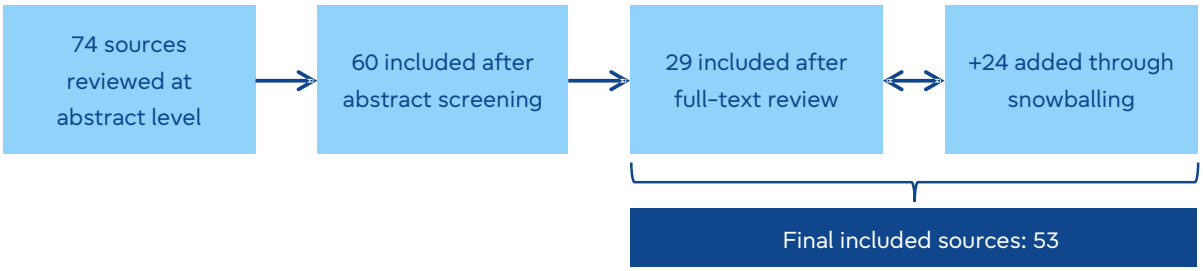


Source: Author's own elaboration.

Data collection and analytical methods

The analytical process combined several complementary methods. First, a narrative literature review synthesised 53 key sources on the OSH effects of heat, cold, storms, floods, and droughts across the EU. The review covered all major sectors (such as agriculture, construction, manufacturing and emergency services) and population groups (including outdoor, older, migrant and precarious workers) across EU Member States. The literature search focused on the period 2005–2025 and included both peer-reviewed academic sources and grey literature.

Figure 2: Narrative literature review process and results



Source: Author's own elaboration.

To complement desk research, 31 semi-structured interviews (and 4 written responses received) were conducted with EU and national-level stakeholders, including EU-level agencies and social partners, labour inspectorates, ministries, and researchers, ensuring coverage of multiple sectors (e.g. construction, agriculture, forestry, emergency services) and perspectives. The interviews provided qualitative information on the institutional response to extreme-weather-related OSH risks, including data collection practices, enforcement challenges and examples of good practice.

Moreover, the statistical analysis drew on datasets such as European Statistics on Accidents at Work (ESAW), EU Labour Force Survey (LFS), European Working Conditions Survey (EWCS), European Survey of Enterprises on New and Emerging Risks (ESENER), European Environment Agency (EEA) data, and Copernicus to estimate sectoral and regional exposure, visualised through descriptive indicators and heatmaps. This helped identify data gaps, particularly the limited systematic linkage between accidents and specific weather phenomena.

Finally, the policy mapping and seven national case studies (Lithuania, Poland, the Netherlands, Finland, Italy, Spain, and Ireland) provided an in-depth comparative analysis of how Member States regulate and operationalise OSH measures related to extreme weather. Each case study analysed national regulations, enforcement mechanisms, inter-institutional coordination, social-partner roles, and data systems.

Case-study selection and representativeness

To ensure that the case studies were both diverse and representative of the wider EU context, the selection followed a structured, three-step process.

First, a hierarchical cluster analysis of EU27 Member States was performed using six socio-economic and OSH-related indicators: gross domestic product (GDP) per capita (in purchasing power standards)[10], employment rate[11], prevalence of work-related health problems[12], fatal[13] and non-fatal[14] accident rates, and perceived health or safety risks at work[15]. This statistical grouping produced three broad clusters:

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10 Eurostat (data code: sdg_10_10). Available at: https://ec.europa.eu/eurostat/databrowser/view/sdg_10_10/default/table?lang=en.

11 EU labour force survey (LFS) and Eurostat (data code: lfsi_emp_a). Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsi_emp_a__custom_16424367/default/table.

12 Eurostat (data code: hsw_pb6b). Available at: http://ec.europa.eu/eurostat/databrowser/view/hsw_pb6b__custom_16424685/default/table.

13 EU OSHA and Eurostat (data code: hsw_n2_02). Available at: https://ec.europa.eu/eurostat/databrowser/view/hsw_n2_02$defaultview/default/table. Note: adjusted to per capita using population data from Eurostat for 2020 (data code: demo_pjan; available at: https://ec.europa.eu/eurostat/databrowser/view/demo_pjan__custom_16571432/default/table?lang=en).

14 EU OSHA and Eurostat (data code: hsw_n2_01). Available at: https://ec.europa.eu/eurostat/databrowser/view/hsw_n2_01$defaultview/default/table. Note: adjusted to per capita using population data from Eurostat for 2020 (data code: demo_pjan; available at: https://ec.europa.eu/eurostat/databrowser/view/demo_pjan__custom_16571432/default/table?lang=en).

15 Eurofound (2021) *European Working Conditions Telephone Survey 2021*. Available at: https://www.eurofound.europa.eu/en/surveys-and-data/surveys/european-working-conditions-survey/ewcts-2021.

- Cluster 1 — lower- to mid-income MS with elevated accident rates and structural labour-market vulnerabilities;
- Cluster 2 — southern and transitional economies with mixed occupational risk indicators; and
- Cluster 3 — higher-income MS with stronger institutional capacity and lower accident rates.

Table 1: Overview of clusters of EU Member States based on socio-economic characteristics and work-related risk indicators

Cluster	EU MS[16]	Common characteristics
Cluster 1	**Lithuania**, Malta, Cyprus, Bulgaria, Latvia, Estonia, Hungary, Slovakia, Czech Republic	– Mostly lower to mid-GDP per capita – Elevated workplace accident rates (per capita) – Medium-to-high perceived risks – Some catching up in digitalisation – Structurally diverse but share risk- and employment-related characteristics *Note: A cluster with shared structural vulnerabilities and labour challenges*
Cluster 2	Croatia, Romania, **Italy**, Greece, France, Slovenia, Portugal, **Spain**	– Mid-sized to large economies, many in Southern Europe – Elevated or mixed occupational risk indicators (accidents and perception) – Variable levels of digitalisation, moderate employment performance – Shared features of transitional or mixed welfare and labour systems *Note: A hybrid group reflecting both legacy structural challenges and partial convergence*
Cluster 3	**Poland**, Sweden, **Ireland**, Luxembourg, Austria, Belgium, **Finland**, Denmark, Germany, **Netherlands**	– High-income, high-GDP countries (except Poland) – Low or moderate accident rates per capita

[16] Countries in bold are the ones selected for case studies.

Cluster	EU MS[16]	Common characteristics
		- High digitalisation and institutional capacity - Strong labour protections and employment levels *Note: Poland was clustered with higher-income Western and Northern countries due to relatively moderate accident rates, solid employment figures, and mid-level perceived OSH risks.*

Source: Author's own elaboration.

Second, to reflect the climatic and geographic diversity of Europe, the selected MS case studies cover all major European regions: Boreal (Finland, Lithuania – Northern Europe and the Baltics), Continental (Poland – Central and Eastern Europe), Atlantic (Ireland, the Netherlands – Western and North-Western Europe), and Mediterranean (Italy, Spain – Southern Europe). This ensured that different climatic stressors — heatwaves, cold spells, floods, and storms — were captured across the sample.

Third, the selection accounted for the variety of national policy approaches to managing weather-related OSH risks. The final sample, therefore, includes MS with comprehensive regulatory frameworks (e.g. the Netherlands, Finland), guidance-oriented systems (e.g. Ireland), and those where approaches are still evolving (e.g. Lithuania, Poland).

This multi-dimensional design ensured that the study reflects the diversity of economic structures, institutional capacities, and climate-related challenges across the EU, providing a sound basis for cross-country comparison and generalisation of findings.

Findings from the literature, statistical data, interviews and case studies were systematically triangulated to identify converging patterns, data limitations, and areas of good practice. The synthesis of these results underpins the analytical conclusions and policy recommendations presented in the final part of the report.

3. IMPACTS OF EXTREME WEATHER CONDITIONS ON OCCUPATIONAL HEALTH AND SAFETY IN THE EU

This Chapter provides a comprehensive assessment of how extreme weather events affect occupational safety and health across Europe. It brings together quantitative evidence, literature findings, and stakeholder insights to show how climate-driven extremes are already influencing workers' health, productivity, and safety. The discussion is presented as follows:

- Section 3.1 presents an overview of the main types of extreme weather events and examines how each affects OSH. For each hazard, we summarise key climatic trends, identify the most common occupational health outcomes and illustrate them with stakeholder perspectives collected through the study;
- Section 3.2 explores the geographical variation of these risks across European regions, linking exposure patterns to local climatic, structural, and institutional factors that explain why similar extreme weather events can yield different outcomes;
- Section 3.3 analyses sectoral specificities, identifying which branches of the economy face the greatest exposure and why. It highlights highly affected sectors such as agriculture, construction, transport, and emergency services, as well as less visible but vulnerable sectors like utilities and waste management;
- Section 3.4 focuses on differential impacts among worker groups, including those most vulnerable to climate-related OSH risks, drawing on both statistical data and stakeholder interviews; and
- finally, section 3.5 assesses the economic dimension of these impacts, showcasing estimates for the productivity, healthcare, insurance, administrative, and quality-of-life costs associated with weather-related occupational injuries and illnesses across the EU.

3.1. Overview of OSH risks related to extreme weather conditions

Extreme weather events are becoming more frequent and intense across Europe due to climate change. Europe is warming faster than the global average, contributing to earlier heatwaves, intensifying drought, and increasing the risk of natural disasters[17]. Data from various sources indicates a sharp rise in the frequency, cost, and impact of these events[18]. Different regions are affected differently, with southern Europe facing a higher risk of severe heatwaves, droughts, and wildfires, while northern Europe is likely to see increased heavy rainfall and floods, and central Europe is expected to experience lower summer rainfall but harsher extremes like heavy precipitation and droughts. Additionally, Northern regions of Europe are still susceptible to cold

[17] Atkinson, M. (2025) Climate change and extreme weather – Is Europe experiencing more natural disasters? *Carbo Europe*. Available at: https://www.carboeurope.org/climate-change-and-extreme-weather/.

[18] European Environment Agency (2024). *Extreme weather: Foods, droughts and heatwaves.* Available at: https://www.eea.europa.eu/en/topics/in-depth/extreme-weather-floods-droughts-and-heatwaves.

waves, despite data indicating that their frequency is diminishing due to climate change[19]. *Table 2* below illustrates the characteristics of the main extreme weather events in Europe, which we discuss further in this section.

Table 2: Summary of the impact areas of weather events

Weather phenomenon	Heatwaves	Droughts	Floods and storms	Cold conditions
Most affected regions	South and Southeastern Europe	Southern Europe	Central and Eastern Europe	Northern Europe
Main occupational health outcomes	Heat strokes Impairment of cognitive functions Exacerbation of existing underlying conditions Long-term health issues (i.e. infertility) Increased skin absorption of hazardous substances Reduction in personal protective equipment (PPE) use Psychological stress / mental health issues (e.g., post-traumatic stress	Increased diffusion of soil and dust-borne diseases Psychological stress / mental health issues (e.g., PTSD) Issues caused by reduced public water supply Increased fire risk and connected health outcomes (e.g., smoke inhalation) Outcomes connected to poor ecosystem health (e.g., high levels of contaminants)	Drowning Risk of physical injury (e.g., from being struck by falling or moving objects) Electrocution Increased exposure to water-, rodent- and vector-borne diseases Heightened risk of infectious diseases Psychological stress / mental health issues (e.g., PTSD)	Frostbite, frostnip, chilblains, and cold urticaria Hypothermia Musculoskeletal disorders (MSDs) Slipping accidents and related injuries Cardiovascular and respiratory issues are increased or aggravated by cold exposure, including ischaemic heart disease, cardiac arrhythmias, hypertension, and respiratory diseases

[19] Naumann G., Russo S., Formetta G., Ibarreta D., Forzieri G., Girardello M., and Feyen L. (2020) *Global warming and human impacts of heat and cold extremes in the EU.* JRC Technical Report. Luxembourg: Publications Office of the European Union. Available at: https://joint-research-centre.ec.europa.eu/system/files/2020-05/pesetaiv_task_11_heat-cold_extremes_final_report.pdf.

Weather phenomenon	Heatwaves	Droughts	Floods and storms	Cold conditions
	disorder (PTSD))			

Source: Author's own elaboration.

3.1.1. Heatwaves

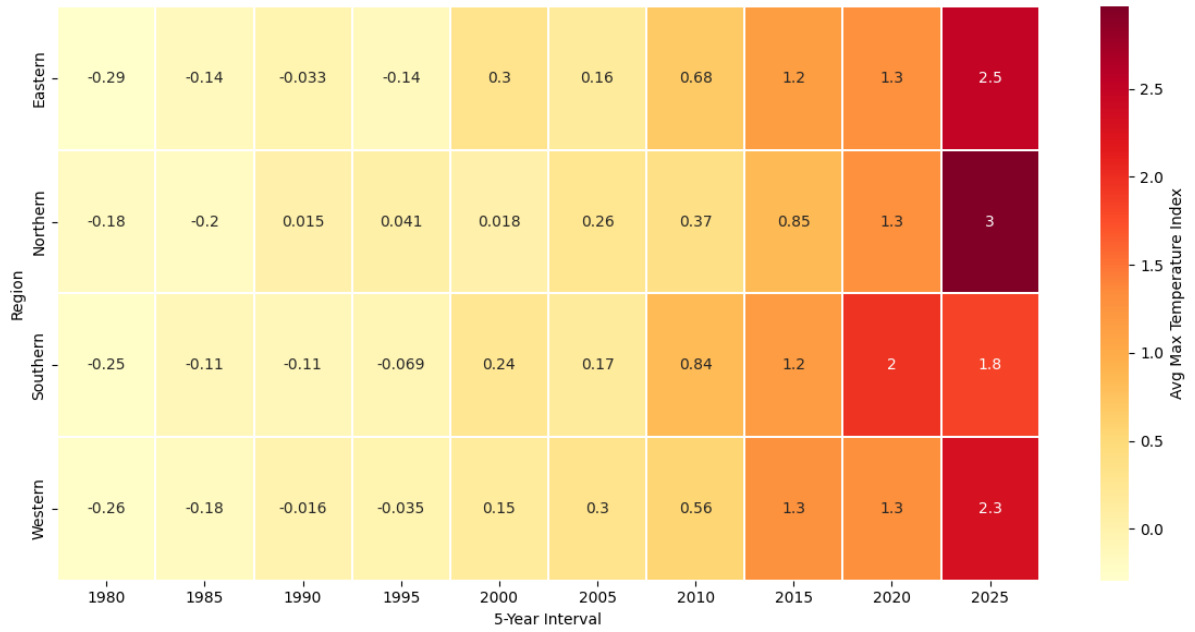
Main climatic trends

Europe has experienced a notable surge in the frequency, intensity, and duration of heatwaves in recent years, with 2024 being recognised as the hottest year on record[20]. Data from various independent sources, including national meteorological services and European environmental agencies[21], consistently corroborate the growing severity and frequency of heatwaves affecting Europe. This is due to the increasing extreme maximum temperatures across all EU regions. As the heatmap below shows, this upward trend has been evident since the 1980s. Northern Europe shows the steepest increase, peaking at 3.0 index units in 2025, while Eastern and Western Europe also reach high anomaly values (2.5 and 2.3, respectively). Southern Europe, although historically warmer, experiences a sharp spike around 2020 (2.0). Values before 2000 remain close to or below zero, highlighting a clear warming trend in recent decades.

[20] World Meteorological Organisation (2025) *European state of the climate: Extreme events in warmest year on record*. Europe, Copernicus Climate Change Service. Available at: https://wmo.int/news/media-centre/european-state-of-climate-extreme-events-warmest-year-record.

[21] European Environment Agency (2024). *Extreme weather: floods, droughts and heatwaves.* Available at: https://www.eea.europa.eu/en/topics/in-depth/extreme-weather-floods-droughts-and-heatwaves.

Figure 3: EU regional maximum temperature trends (5-year intervals)

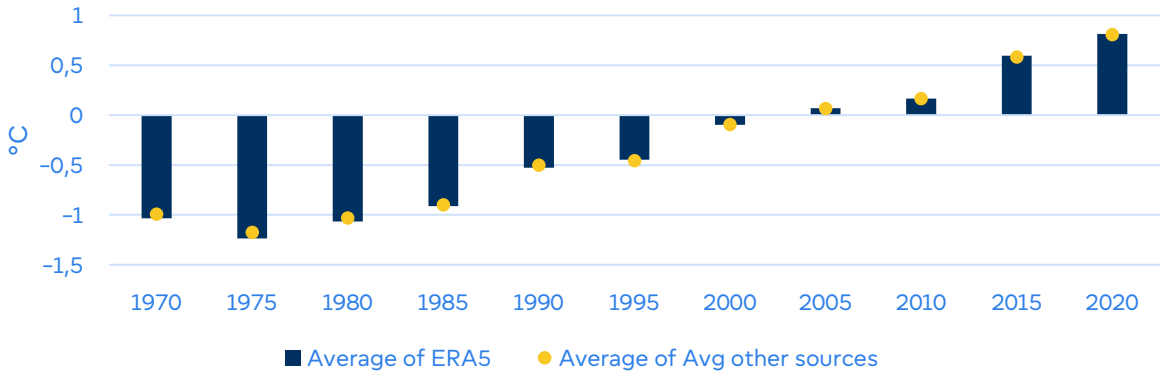


Source: Author's own elaboration based on data from the European Extreme Events Climate Index. Available at: https://datastation.climateindex.eu/en/max-temperature/2025/04.

Note: The figure displays the Average Maximum Temperature Index, which expresses deviations in maximum daily temperatures from the long-term regional baseline (in standardised anomaly units rather than degrees Celsius). Positive values indicate warmer-than-average conditions, while negative values show cooler periods relative to the 1991–2020 reference.

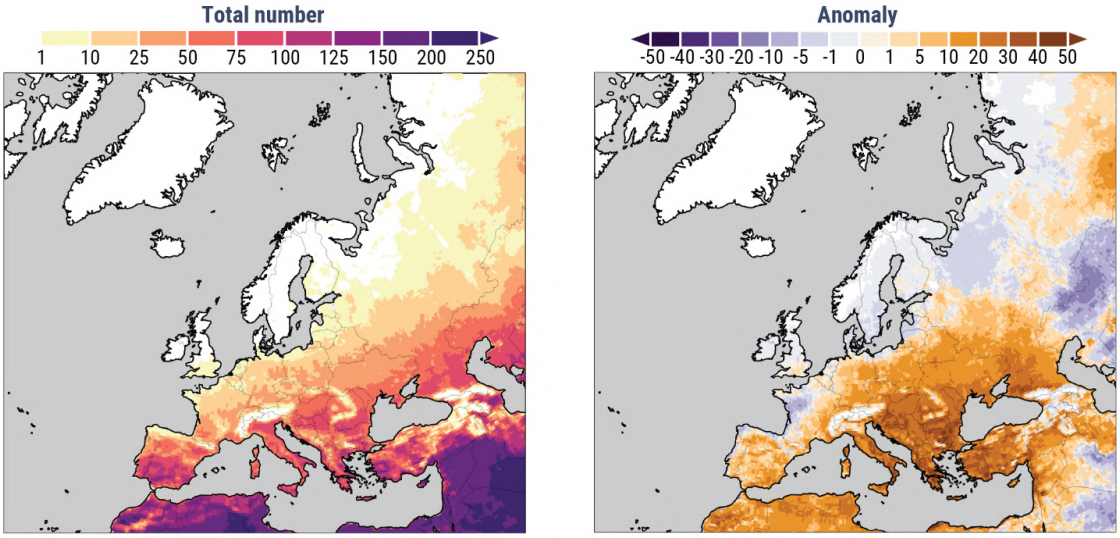
Complementary evidence from the Copernicus Climate Change Service (C3S) further highlights this pattern. As illustrated in *Figure 4*, five-year average near-surface air temperature anomalies (expressed in °C relative to the 1991–2020 baseline) show a clear and continuous increase since the mid-1990s. It also provides robust confirmation of Europe's rapid warming trajectory. The Intergovernmental Panel on Climate Change (IPCC) and the European State of the Climate 2024 report project that heatwaves will continue to grow more frequent, longer, and more severe, with Southeastern Europe facing the highest levels of heat-related stress, discomfort, and mortality, as shown in *Figure 5* below.

Figure 4: Five-year average temperature anomalies over European land (1970–2020)



Source: Author's own elaboration based on data from Copernicus Climate Change Service (C3S). Note: other sources include multiple datasets (JRA-3Q, GISTEMPv4, NOAAGlobalTempv6, and Berkeley Earth) converged.

Figure 5: The spatial distribution and the anomaly (increase or decrease) in the number of strong heat-stress days experienced across Europe in 2024 (days per year)



A day with at least 'strong heat stress' has a maximum feels-like temperature (UTCI) of at least 32°C[22]. Data: ERA5-HEAT UTCI. Reference period: 1991-2020 (right). Source: European Commission, Copernicus and European Centre for Medium-Range Weather Forecast (ECMWF) (2024) *European State of the Climate 2024*. Available at: https://climate.copernicus.eu/esotc/2024/graphics-gallery/thermal-stress.

These climatic developments are reflected in the concerns expressed by stakeholders across Europe. Interviewees from EU and national institutions, as well as social partners, unanimously described heat as the most widespread and pressing OSH challenge, affecting both outdoor and indoor workers. Many emphasised its immediate and acute impacts on health, citing rising cases of heat stress and exhaustion during summer months. Representatives from trade unions

[22] Notably, UTCI is a heat stress indicator primarily used for public health (i.e., non-occupational settings).

and employer organisations referred to heat exposure as the "most pervasive climate-related threat to worker safety"[23].

Taken together, the climatic evidence and stakeholder perspectives paint a coherent picture: heatwaves are Europe's most pervasive extreme-weather hazard, already imposing tangible OSH risks across sectors and geographies.

OSH risks related to heatwaves

Heatwaves and, in general, increased exposure to heat present a wide array of OSH risks that impact workers in different sectors. Workplace heat stress, shaped by environmental and personal factors, can overwhelm the body's thermoregulation during physically demanding work in stressful conditions, creating an imbalance between heat production and dissipation[24]. This heat strain affects workers' health and, as recent research shows, also reduces productivity and well-being, with wider implications for long-term economic resilience under climate change. It has also been shown that individuals working a single shift under heat stress were, on average, four times more likely to develop heat-related illnesses compared to those working in normal environmental conditions[25]. As explained in the previous part of the section, the temperature and thus the rate of heatwaves is rapidly increasing as a result of climate change. Crucially, however, 90% of workers' exposure to heat stress and 80% of heat-related injuries happen outside of heatwaves[26]. This will consequently intensify the risk of workers experiencing heat stress in both indoor and outdoor working conditions throughout the year.

The main OSH risks according to the literature related to heat exposure include various physiological health impacts, increased risk of accidents and injuries and associated issues, as well as mental and psychosocial impacts – all discussed below in more detail.

Direct health impacts (physiological). Heat stress, heat exhaustion, and heat stroke are major concerns, with extreme heat leading to dehydration, exhaustion, heat syncope (fainting), and heat cramps[27]. If not adequately mitigated by reducing exertion or limiting exposure, these conditions can escalate into severe and potentially life-threatening heat stroke[28]. Heat exposure also aggravates cardiovascular and respiratory conditions, increasing strain on the heart and

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[23] See *ANNEX 4. List of stakeholders consulted*.

[24] Vanos, J., Moyce, S., Lemke, B. and Kjellstrom, T. (2021) Extreme heat exposure and occupational health in a changing climate, in Castillo, F., Wehner, M. and Stone, D.A. (eds.) *Extreme events and climate change: A multidisciplinary approach*. Springer. https://doi.org/10.1002/9781119413738.ch10.

[25] Flouris, A., D. et al. (2018) Workers' health and productivity under occupational heat strain: a systematic review and meta-analysis, *The Lancet Planetary Health*, 2 (12), e521 - e531. https://doi.org/10.1016/S2542-5196(18)30237-7.

[26] International Labour Organisation (2024). *Heat at work: Implications for safety* and health. Available at: https://www.ilo.org/sites/default/files/2024-07/ILO_OSH_Heatstress-R16.pdf.

[27] International Labour Organisation (2024). *Heat at work: Implications for safety and health.* Available at: https://www.ilo.org/sites/default/files/2024-07/ILO_OSH_Heatstress-R16.pdf.

[28] Vanos, J., Moyce, S., Lemke, B. and Kjellstrom, T. (2021) Extreme heat exposure and occupational health in a changing climate, in Castillo, F., Wehner, M. and Stone, D.A. (eds.) *Extreme events and climate change: A multidisciplinary approach*. Springer. https://doi.org/10.1002/9781119413738.ch10.

circulation, particularly during heavy physical work[29]. Evidence links combined heat and exertion to clot formation and impaired vascular function, heightening the risk of a heart attack[30]. Kidney dysfunction, specifically acute kidney injury (AKI) and chronic kidney disease (CKD)[31], has been increasingly associated with recurrent occupational heat exposure ("heat stress nephropathy"), particularly as climate change drives rising temperatures[32]. Other effects include enhanced absorption of chemicals through warm, moist skin[33], rhabdomyolysis (muscle damage)[34], heat rash, burns, and possible reproductive impacts[35], with studies also noting temporary infertility among male workers chronically exposed to high heat[36].

Accident and injury risks. Physical and mental fatigue, decreased productivity, and reduced vigilance – all may increase the likelihood of accidents and injuries[37]. Findings from the European Trade Union Institute indicate that workplace accident risks rise by 5–7% when temperatures surpass 30°C, and by 10–15% once they exceed 38°C[38]. Higher temperatures are integral to creating conditions for lightning, leading to an increased number of strikes and posing a risk of severe injuries, burns, nervous system damage, or death, particularly for construction workers in open spaces or near tall objects[39].

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29 World Health Organisation and World Meteorological Organisation (2025) *Climate change and workplace heat stress: technical report and guidance*. Available at: https://iris.who.int/server/api/core/bitstreams/5334aba1-063d-4163-94ae-a1154bb48e83/content.

30 Hunter, A.L., Shah, A.S.V., Langrish, J.P., Raftis, J.B., Lucking, A.J., Brittan, M., Venkatasubramanian, S., Stables, C.L., Stelzle, D., Marshall, J., Graveling, R., Flapan, A.D., Newby, D.E. and Mills, N.L. (2017). Fire simulation and cardiovascular health in firefighters. *Circulation,* 135(14), pp. 1284–1295. Available at: https://doi.org/10.1161/circulationaha.116.025711.

31 Vanos, J., Moyce, S., Lemke, B. and Kjellstrom, T. (2021) Extreme heat exposure and occupational health in a changing climate, in Castillo, F., Wehner, M. and Stone, D.A. (eds.) *Extreme events and climate change: A multidisciplinary approach*. Springer. https://doi.org/10.1002/9781119413738.ch10.

32 Schulte, P.A., Jacklitsch, B.L., Bhattacharya, A., Chun, H., Edwards, N., Elliott, K.C., Flynn, M.A., Guerin, R.J., Hodson, L., Lincoln, J.M., MacMahon, K., Pendergrass, S.M., Siven, J. and Vietas, J. (2023). Updated Assessment of Occupational Safety and Health Hazards of Climate Change. *Journal of Occupational and Environmental Hygiene.* 20(5-6), pp. 183–206. https://doi.org/10.1080/15459624.2023.2205468.

33 Parent-Thirion, A., Weber, T., and Cabrita, J. (2024). *Job quality side of climate change*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/job-quality-side-climate-change.

34 Ibid.

35 Karthick, S., Kermanshachi, S. and Ramaji, I. (2022). Health and Safety of Construction Field Workforce Active in Extreme Weather Conditions. In: *Construction Research Congress.* U.S.A, Virginia: American Society of Civil Engineers. Available at: https://doi.org/10.1061/9780784483978.

36 Cefaliello, A. (2024). Heat Stress at Work—a Political Emergency. *Social Europe*. Available at: https://www.socialeurope.eu/heat-stress-at-work-a-political-emergency.

37 Lyu, P., Song, S. and Khorshid, S. (2024). Exploring the Influence of Extreme Weather on Construction Worker Safety. *Construction Research Congress 2022*, 2(1), pp. 508–517. https://doi.org/10.1061/9780784485293.051.

38 Narocki, C. (2021). *Heatwaves as an Occupational Hazard: The Impact of Heat and Heatwaves on Workers' Health, Safety and Wellbeing and on Social Inequalities*. ETUI Report 2021.06. Available at: https://www.etui.org/sites/default/files/2021-11/Heatwaves%20as%20an%20occupational%20hazard%20The%20impact%20of%20heat%20and%20heatwaves%20on%20workers'%20health%2C%20safety%20and%20wellbeing%20and%20on%20social%20inequalities-2021.pdf.

39 Schulte, P.A., Jacklitsch, B.L., Bhattacharya, A., Chun, H., Edwards, N., Elliott, K.C., Flynn, M.A., Guerin, R.J., Hodson, L., Lincoln, J.M., MacMahon, K., Pendergrass, S.M., Siven, J. and Vietas J. (2023). Updated Assessment of Occupational Safety and Health Hazards of Climate Change. *Journal of Occupational and Environmental Hygiene*, 20(5-6), pp. 183–206. https://doi.org/10.1080/15459624.2023.2205468.

Mental and psychosocial impacts. Heat exposure can lead to higher irritability, anger, and other psychosocial risks[40]. High temperatures, especially during "tropical nights" (when temperatures do not fall below 20°C), disrupt sleep and recovery, further reducing concentration and reflexes the following day, thereby increasing accident risk[41]. Prolonged exposure may contribute to anxiety, depression and post-traumatic stress disorder, especially among emergency or outdoor workers[42].

It is important to note that the discomfort caused by working in hot conditions can sometimes lead to workers improperly using or altogether avoiding the use of personal protective equipment (PPE), ironically reducing the level of protection that the equipment is intended to provide[43].

3.1.2. Droughts

Main climatic trends

Droughts are becoming more widespread throughout Europe. The European Environment Agency[44] (EEA) reports that between 2000 and 2022, the area impacted by droughts grew significantly, with over 630,000 km² affected in 2022 alone: nearly four times the annual average of the previous two decades. Droughts are also often accompanied by wildfires, as the increasing drought frequency and severity will impact the incidence of wildfires and broaden the at-risk areas, particularly in the Mediterranean and Atlantic regions, but extending to central, eastern and, to a lesser extent, northern Europe[45]. *Figure 6* below shows the most affected areas according to EEA predictions following two different scenarios of climate change intensity. Showing both Representative Concentration Pathway (RCP) 4.5 and RCP 8.5 projections illustrates how drought frequency could evolve under moderate versus high-emission pathways, highlighting the range of possible futures and how strongly impacts depend on the level of climate mitigation.

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40 Parent-Thirion, A., Weber, T., and Cabrita, J. (2024). *Job quality side of climate change*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/job-quality-side-climate-change.

41 Ibid; Vanos, J., Moyce, S., Lemke, B. and Kjellstrom, T. (2021) Extreme heat exposure and occupational health in a changing climate, in Castillo, F., Wehner, M. and Stone, D.A. (eds.) *Extreme events and climate change: A multidisciplinary approach*. Springer. https://doi.org/10.1002/9781119413738.ch10.

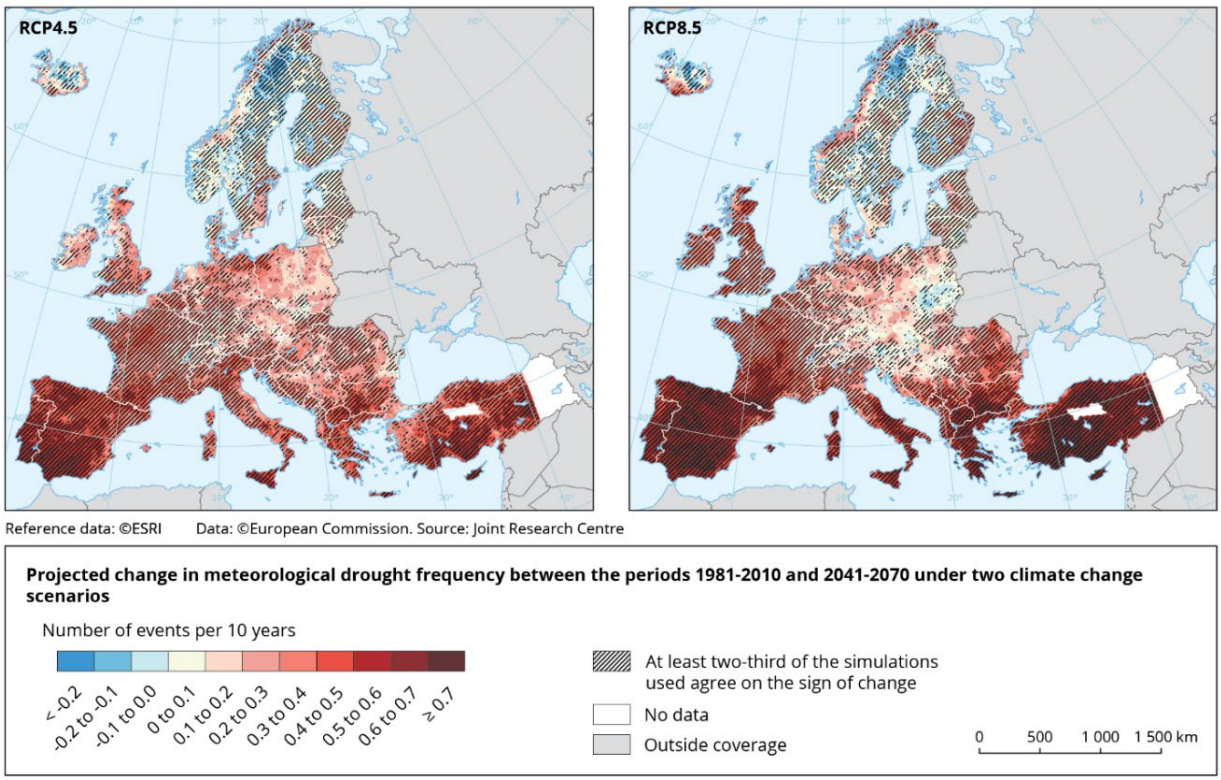
42 International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate.

43 Krempl, S. (2024) *Impacts of climate change on occupational safety and health and standardization*. Kommission Arbeitsschutz und Normung – KAN. Available at: https://www.kan.de/en/publications/kanbrief/1/24/impacts-of-climate-change-on-occupational-safety-and-health-and-standardization

44 European Environment Agency (2024). *Drought impact on ecosystems in Europe*. Availableat: https://www.eea.europa.eu/en/analysis/indicators/drought-impact-on-ecosystems-in-europe.

45 Rossi, L., Wens, M., De Moel, H., Cotti, D., Sabino Siemons, A., Toreti, A., Maetens, W., Masante, D., Van Loon, A., Hagenlocher, M., Rudari, R., Naumann, G., Meroni, M., Avanzi, F., Isabellon, M. and Barbosa, P. (2023) *European Drought Risk Atlas*. Luxembourg: Publications Office of the European Union. https://dx.doi.org/10.2760/608737.

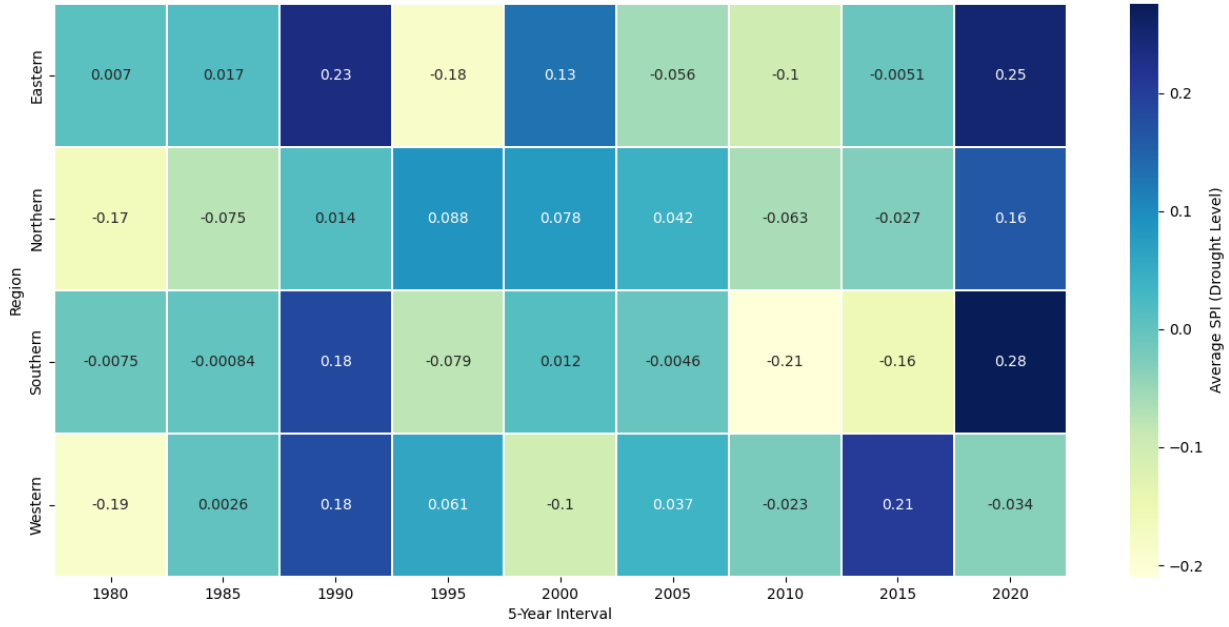
Figure 6: Projected change in meteorological drought frequency between the periods 1981–2010 and 2041–2070 under two climate change scenarios



Source: European Environment Agency (2023) *Projected change in meteorological drought frequency between the periods 1981–2010 and 2041–2070 under two climate change scenarios.* Available at: https://www.eea.europa.eu/en/analysis/maps-and-charts/projected-change-in-meteorological-drought-1.

This data is further corroborated by the heatmap below. It shows average drought levels (Standardised Precipitation Index, SPI) across EU regions in 5-year intervals from 1980 to 2025. The SPI measures drought severity based on precipitation anomalies over time, capturing both the duration and intensity of dry or wet periods relative to the long-term regional average. Eastern and Southern Europe show relatively wetter conditions by 2025 (SPI around +0.25–0.28), while Western Europe fluctuates around neutral values and Northern Europe remains comparatively stable. Overall, the data suggest regional variability rather than a consistent increase in drought intensity across the EU.

Figure 7: EU regional drought level (average SPI) in 5-year intervals



Source: Author's own elaboration based on data from European Extreme Events Climate Index. Available at: https://datastation.climateindex.eu/en/max-temperature/2025/04.

Stakeholder insights largely confirm that, while drought-related OSH risks are less visible than those from heat, they are emerging as a growing concern. Several interviewees emphasised the connection between droughts and respiratory illnesses, citing longer exposure to dust, allergens, wildfire smoke and ground-level ozone, all of which irritate airways and impair visibility[46]. In agricultural contexts, respondents noted that prolonged droughts severely affect mental health, with farmers and forestry workers facing anxiety and stress linked to crop failures and financial losses[47]. For small and medium-sized businesses (SMEs), a key difficulty presented by droughts is ensuring a sufficient water supply and cooling of machinery[48], rather than specific OSH risks.

OSH risks related to droughts

Given that droughts are often accompanied by or worsen high temperatures and heatwaves, many of the heatwave-related OSH risks can also be experienced during droughts. In addition, the main drought-specific occupational health outcomes can be both direct (e.g., increased possibility of inhaling fine dust and particles) and indirect (e.g., mental health issues connected to water scarcity in certain sectors).

Direct health impacts (physiological). Dry conditions increase the concentration of airborne silicate and organic dust, leading to respiratory illnesses such as allergic diseases, occupational

[46] Interviews with Marouane Laabbas el Guennouni from ETUI [17 July 2025] and a representative from EFBWW [8 July 2025].

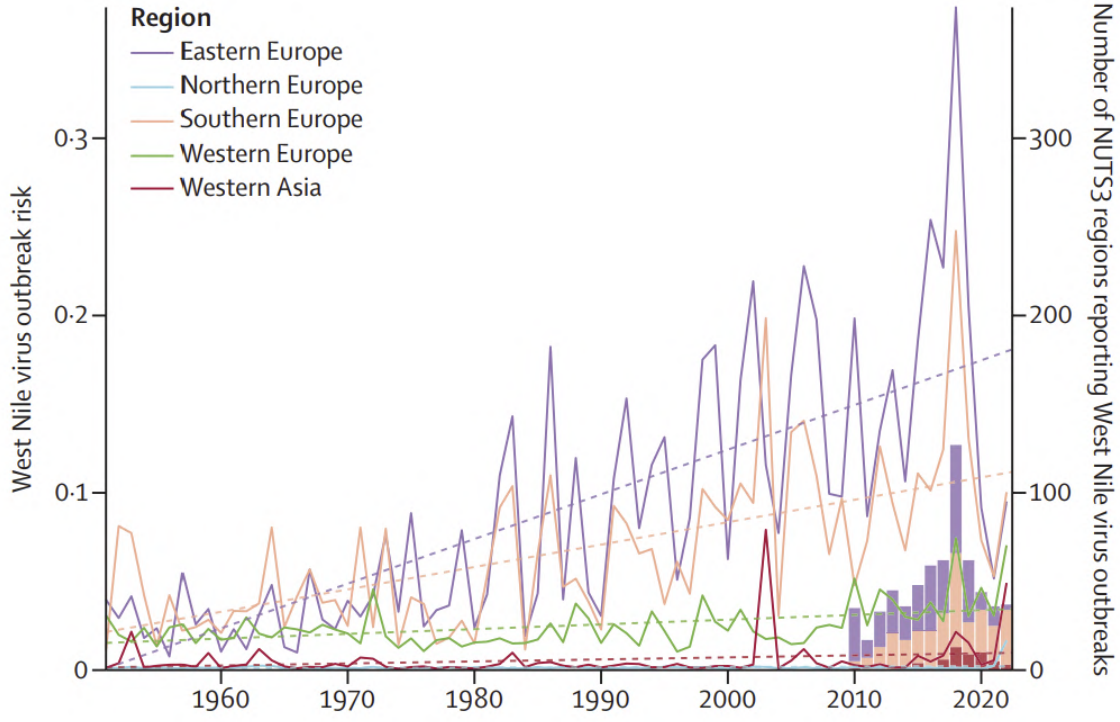
[47] Interview with an EU institution representative [21 August 2025].

[48] Interview with a representative from an EU-level SME organisation [2 July 2025].

asthma, hypersensitivity pneumonitis, chronic lung disease, and, in some cases, lung cancer[49]. Wildfires, which become more frequent and severe during droughts, further intensify these risks by releasing fine particulate matter and toxic chemicals into the air[50]. Prolonged inhalation of wildfire smoke has both acute and long-term health effects, including coughing, bronchitis, reduced lung function, and exacerbation of asthma[51].

Droughts followed by heavy rains can create stagnant water bodies suitable for mosquito breeding, increasing the risk of vector-borne diseases such as cryptosporidiosis and West Nile virus infections[52]. The relative increase in West Nile virus transmission risk in 2013-2022 compared to the 1951-1960 baseline was 256%, with the highest relative risk increase seen in eastern Europe (516%) and southern Europe (203%)[53] (see *Figure 8*).

Figure 8: West Nile virus risk and outbreaks in Europe from the 1960s to 2022



Source: Adapted by author from *The 2024 Europe report of the Lancet Countdown on health and climate change: unprecedented warming demands unprecedented action*. Available at: https://www.thelancet.com/action/showPdf?pii=S2468-2667%2824%2900055-0.

[49] EU-OSHA (2021). *The Future of Agriculture in Europe and Its Impact on Occupational Safety and Health (OSH)*. Available at: https://oshwiki.osha.europa.eu/en/themes/future-agriculture-europe-and-its-impact-occupational-safety-and-health-osh. See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[50] European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[51] Ibid.

[52] Ibid.

[53] Ibid.

Reduced water quality is another critical concern: lower dissolved oxygen and higher salinity levels during droughts concentrate pollutants and pathogens[54]. This can heighten exposure to harmful microorganisms, including Leptospira spp., Legionella spp. (linked to Legionnaires' disease), E. coli, enterococci, and parasites responsible for cercarial dermatitis[55]. Finally, droughts often drive greater reliance on pesticides and herbicides to protect crops under water stress, increasing workers' exposure to these toxic substances, particularly in agriculture and forestry[56].

Mental and psychosocial impacts. Beyond physical health effects, droughts impose considerable psychological stress on workers and communities. Prolonged heat, water scarcity, and uncertainty about livelihoods can lead to chronic stress and anxiety, especially among those in weather-dependent sectors. Farmers and foresters are particularly vulnerable, as prolonged droughts threaten both income and professional identity. Research links such conditions to higher rates of depression, mood disorders, substance abuse, and even suicide ideation. These effects are compounded by the cumulative strain of repeated drought events and by the social isolation often experienced in rural or agricultural work environments[57].

3.1.3. Floods and storms

Main climatic trends

Another type of increasingly frequent extreme weather event is floods, sometimes coinciding with storms. Their frequency and severity are rising in many regions across Europe, a trend that is largely attributed to changes in precipitation patterns and intensified by the broader impacts of climate change[58]. Floods are the most common and costly natural disasters in Europe. The Copernicus Climate Change Service's 2023 European State of the Climate (ESOTC) report notes that one-third of Europe's river network exceeded the "high" flood threshold in 2023, with 16% hitting "severe" levels[59].

Flooding is not a geographically isolated issue but rather a widespread challenge. As we can see from *Figure 9* below, the phenomenon affects most of the continent, with risk hotspots concentrated in Italy, Croatia, the Benelux countries, and most of central and Eastern Europe.

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54 Ibid.

55 Ibid. European Climate and Health Observatory (2021) *Effects on occupational health and safety*. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/occupational-health-safety.

56 Schulte, P.A., Jacklitsch, B.L. and Bhattacharya, H. (2016). Updated assessment of occupational safety and health hazards of climate change: Climate change and the potential impact on occupational exposure to pesticides, *Annali dell'Istituto Superiore di Sanità,* 52(3), 374-385. Available at: https://annali.iss.it/index.php/anna/article/view/484. See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

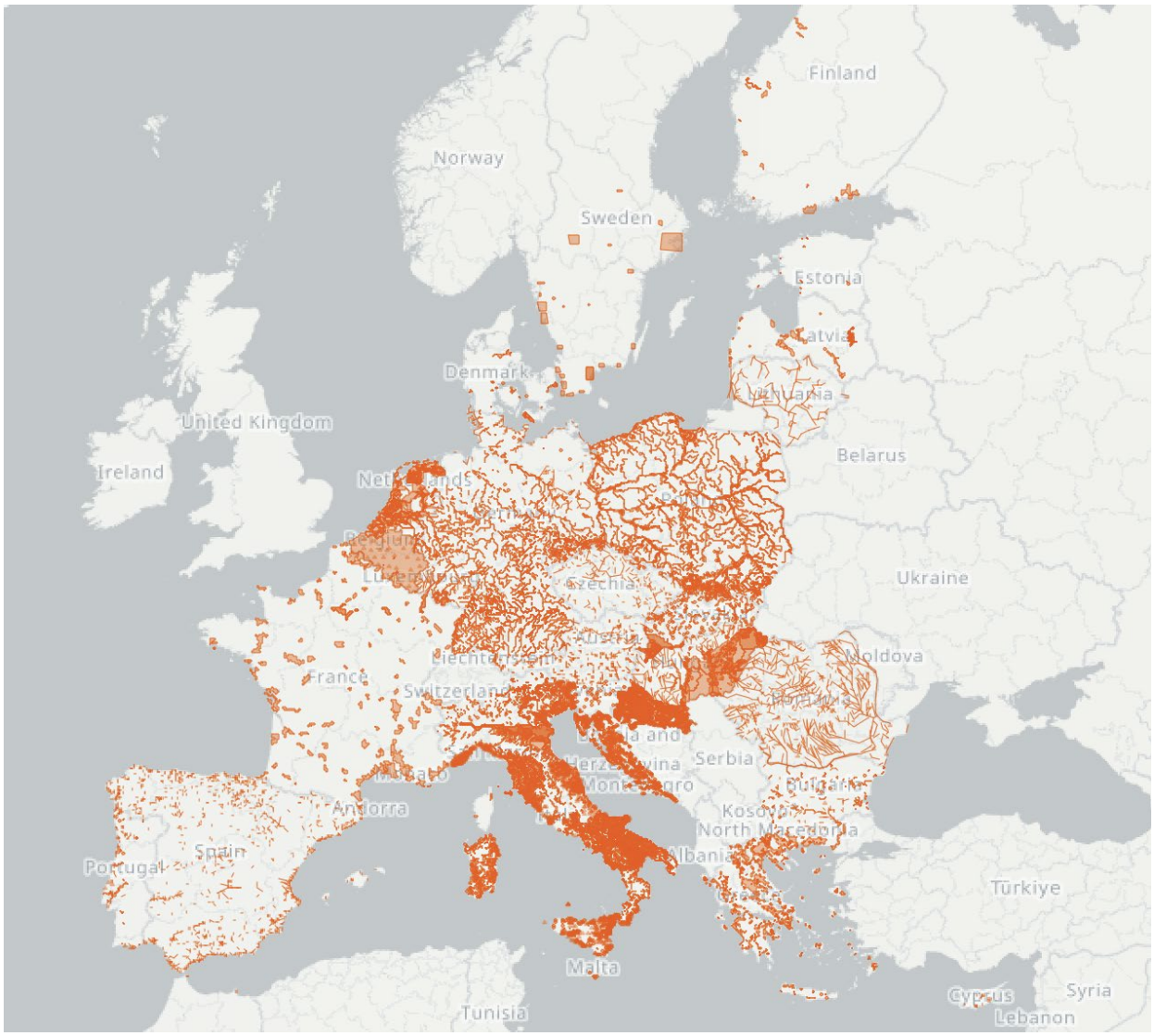
57 Ibid.

58 Bertola, M., Viglione, A., Lun, D., Hall, J. and Blöschl, G. (2020). Flood trends in Europe: Are changes in small and big floods different? *Hydrology and Earth System Sciences*, 24(4), pp. 1805–1822. Available at: https://doi.org/10.5194/hess-24-1805-2020.

59 Copernicus Climate Change Service (2023). *European State of the Climate Report 2023*. Available at: https://climate.copernicus.eu/esotc/2023.

Nevertheless, recent flood events (such as the Valencia floods in 2024) have shown that many regions of Europe remain potentially unprepared, with heavy consequences to lives, infrastructure, and properties[60].

Figure 9: Areas of potentially significant flood risk (shown with orange colour), identified by each Member State as part of the Floods Directive implementation



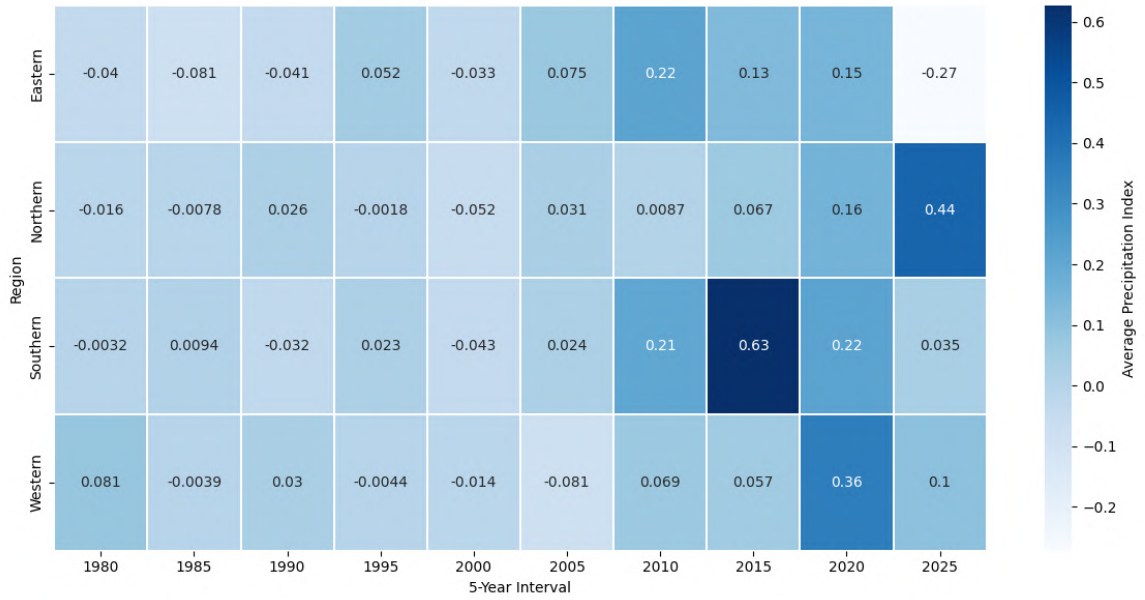
Source: European Commission, Flood Risk Area Viewer. Available at: https://discomap.eea.europa.eu/floodsviewer/.

Recent climate data further supports these concerns. *Figure 10* shows that most European regions have seen increasing average precipitation over recent decades, with particularly sharp rises in Southern Europe between 2015–2020 (+0.63 index points) and in Northern Europe by 2025 (+0.44). These changing rainfall patterns are a major driver of flood risk, overwhelming drainage infrastructure and increasing river discharge volumes. While Eastern Europe shows a

[60] Szabò, K., Maltepioti, K. and Zafeiropoulous, K. (2024) *Troubled waters: The multiple devastating impacts of floods across Europe*. European Data Journalism. Available at: https://www.europeandatajournalism.eu/flood_en.html.

drop in precipitation in 2025, the general trend remains upward in prior intervals, reinforcing the need for long-term preparedness.

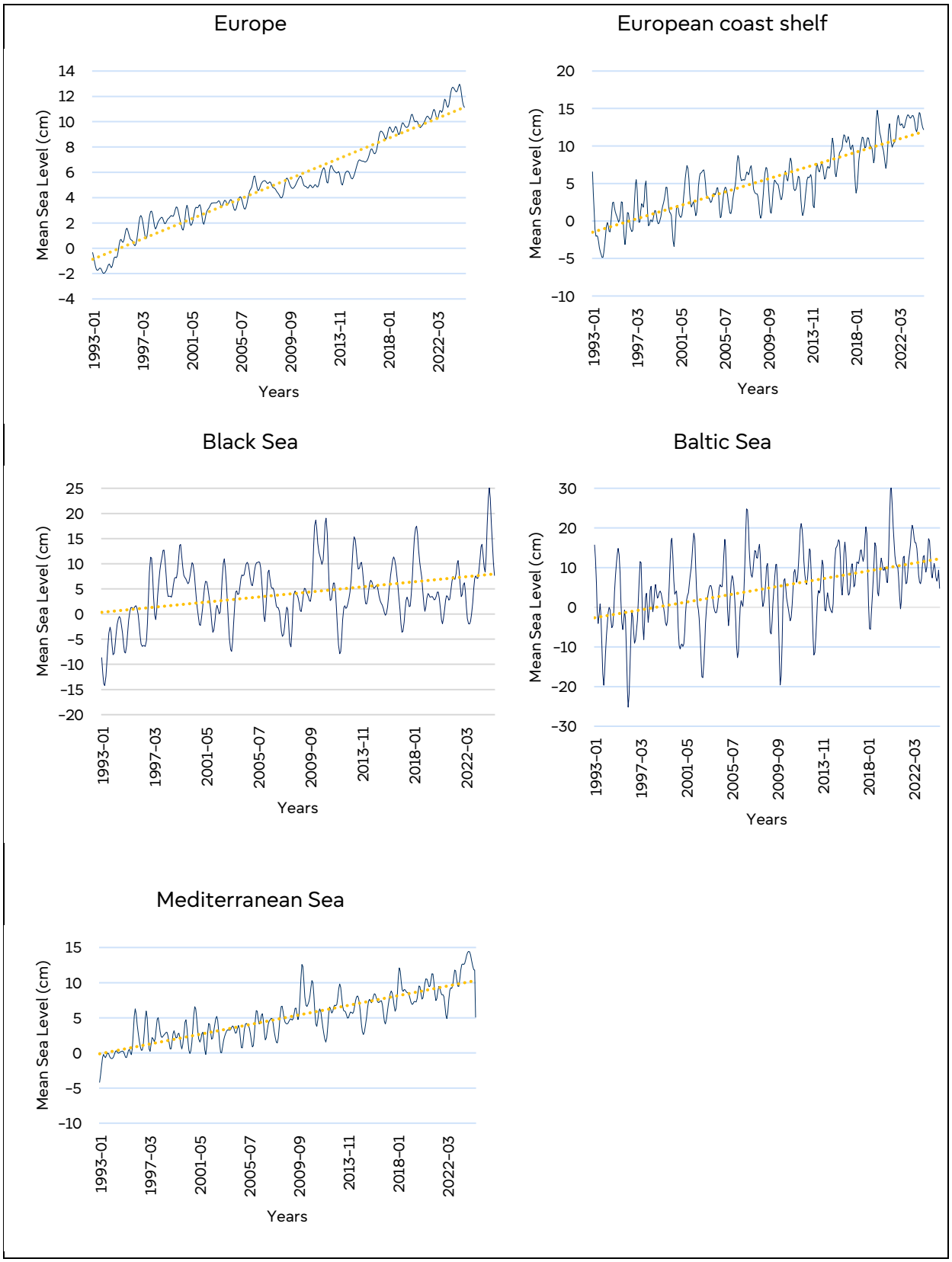
Figure 10: EU regional precipitation trends in 5-year intervals



Source: Author's own elaboration based on data from European Extreme Events Climate Index. Available at: https://datastation.climateindex.eu/en/max-temperature/2025/04.

In coastal regions, flood risk is also compounded by sea level rise. As shown in *Figure 11*, satellite records from 1993 to 2024 reveal a steady increase in mean sea levels across European coastal zones, generally between 2 and 4 mm per year. This includes vulnerable areas such as the Mediterranean and Baltic Seas, where even moderate sea level rise can amplify storm surge impacts. These coastal dynamics are particularly concerning for southern Europe, which faces both rising precipitation and accelerated sea level trends.

Figure 11: Sea level change across Europe (1993–2024, mm/year)



Source: Author's own elaboration based on data from C3S, European Centre for Medium-Range Weather Forecasts (ECMWF), and Copernicus Marine Environment Monitoring Service (CMEMS).

OSH risks related to floods and storms

Floods and storms bring generalised health challenges that can involve workers as well as the general population. The outcomes include direct health impacts like injuries and fatalities, issues caused by exposure to biological and chemical hazards, and mental and psychosocial impacts.

Direct health impacts (physical injuries and fatalities). Floods and storms expose workers to multiple acute physical hazards, often resulting in serious injury or death. Drowning is a primary cause of fatality, particularly during transport or emergency evacuation efforts[61]. Workers are also at high risk of traumatic injuries caused by submerged debris, collapsing structures, or falling trees, as well as electrocution from contact with waterlogged electrical systems[62]. Storm-related explosions or industrial accidents can result in burns and fire-related injuries, while slips, trips, and falls (common in flooded or debris-covered areas with poor visibility) are among the leading causes of non-fatal workplace injuries in the EU[63]. Extended exposure to cold or contaminated water also increases the risk of hypothermia, especially in water temperatures below 20°C[64], and carbon monoxide poisoning may occur if generators or ventilation systems are improperly used during power outages[65]. Lastly, lightning strikes during storm events can seriously injure or kill outdoor or rooftop workers, causing burns and nervous system damage[66].

Exposure to biological and chemical hazards. Floodwaters are often heavily contaminated with sewage, decaying organic matter, and industrial pollutants, exposing workers to waterborne pathogens such as Leptospira spp., Norovirus, Hepatitis A virus, and Legionella spp. These pathogens increase the risk of infections like leptospirosis, Legionnaires' disease, and gastrointestinal illnesses[67]. As stagnant waters persist after floods, vector-borne diseases such

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[61] European Climate and Health Observatory (2021). *Flooding.* Climate ADAPT. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/flooding/flooding; See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and* water *quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[62] Curtis, S., Fair, A., Wistow, J., Val, D. V., and Oven, K. (2017) Impact of extreme weather events and climate change for health and social care systems. *Environmental Health*, 16(Supply 1), 128. https://doi.org/10.1186/s12940-017-0324-3. See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts; EU-OSHA (2023). *Climate change: Impact on occupational safety and health (OSH)*. Available at: https://oshwiki.osha.europa.eu/en/themes/climate-change-impact-occupational-safety-and-health-osh.

[63] Bonafede, M., Marinaccio, A., Asta, F., Schifano, P., Michelozzi, P. and Vecchi, S. (2016) The association between extreme weather conditions and work-related injuries and diseases: A systematic review of epidemiological studies. *Annali dell'Istituto Superiore di Sanità,* 52(3), pp. 357–367. https://doi.org/10.4415/ann_16_03_07.

[64] European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[65] Ibid.

[66] Lyu, P., Song, S. and Khorshid, S. (2024). Exploring the influence of extreme weather on construction worker safety. *Construction Research Congress* 2022, 2(1), pp. 508–517. Available at: https://doi.org/10.1061/9780784485293.051. See also: Moulds, C. (2025). The climate change gender gap. *IOSH Magazine*. Available at: https://www.ioshmagazine.com/2025/03/03/climate-change-gender-gap.

[67] International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate. See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

as dengue and West Nile virus may also proliferate due to increased mosquito breeding (see also sub-section 3.1.2). Workers in clean-up and recovery operations frequently face respiratory irritation or poisoning from chemical spills, industrial contaminants, and residual firefighting substances[68]. Additionally, damp and poorly ventilated environments create ideal conditions for mould growth, leading to fungal infections and mycotoxin exposure, which can result in chronic respiratory conditions[69].

Mental and psychosocial impacts. Experiencing flooding has been shown to increase the likelihood of mental health problems by up to 50%, with workers often reporting stress, anxiety, depression, burnout, and post-traumatic stress disorder[70]. The emotional burden is compounded by exposure to death or destruction, long working hours in high-risk environments, and persistent concern for family and community well-being[71].

3.1.4. Extreme cold

Main climatic trends

Europe's warming climate has led to a marked decline in extreme cold events over recent decades. Observations show fewer cold spells, frost days, and bitterly cold nights compared to the mid-20th century[72]. This trend is evident across the continent: the frequency, intensity, and duration of cold spells have all decreased. For example, the occurrence of a typical winter cold wave (such as the one in 2009/2010, where the associated cold spells caused exceptional snowfall[73]) is now about half as likely as it would be without climate change[74]. The coldest winter nights have warmed considerably, and the number of days with sub-zero temperatures has shrunk. In 2024, the area of European land with fewer than 90 frost days (i.e. less than three

[68] International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate.

[69] Butsch, C., Beckers, L.M., Nilson, E., Frassl, M., Brennholt, N., Kwiatkowski, R. and Söder, M. (2023). Health impacts of extreme weather events: Cascading risks in a changing climate. *Journal of Health Monitoring*, 8 (Supply 4), pp. 33–56. https://doi.org/10.25646/11652.

[70] EU-OSHA (2011). *Emergency services: A literature review on occupational safety and health risks. Effects on occupational health and safety*. European Risk Observatory Report. Available at: https://osha.europa.eu/en/publications/emergency-services-occupational-safety-and-health-risks. See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[71] EU-OSHA (2011). *Emergency services: A literature review on occupational safety and health risks. Effects on occupational health and safety*. European Risk Observatory Report. Available at: https://osha.europa.eu/en/publications/emergency-services-occupational-safety-and-health-risks.

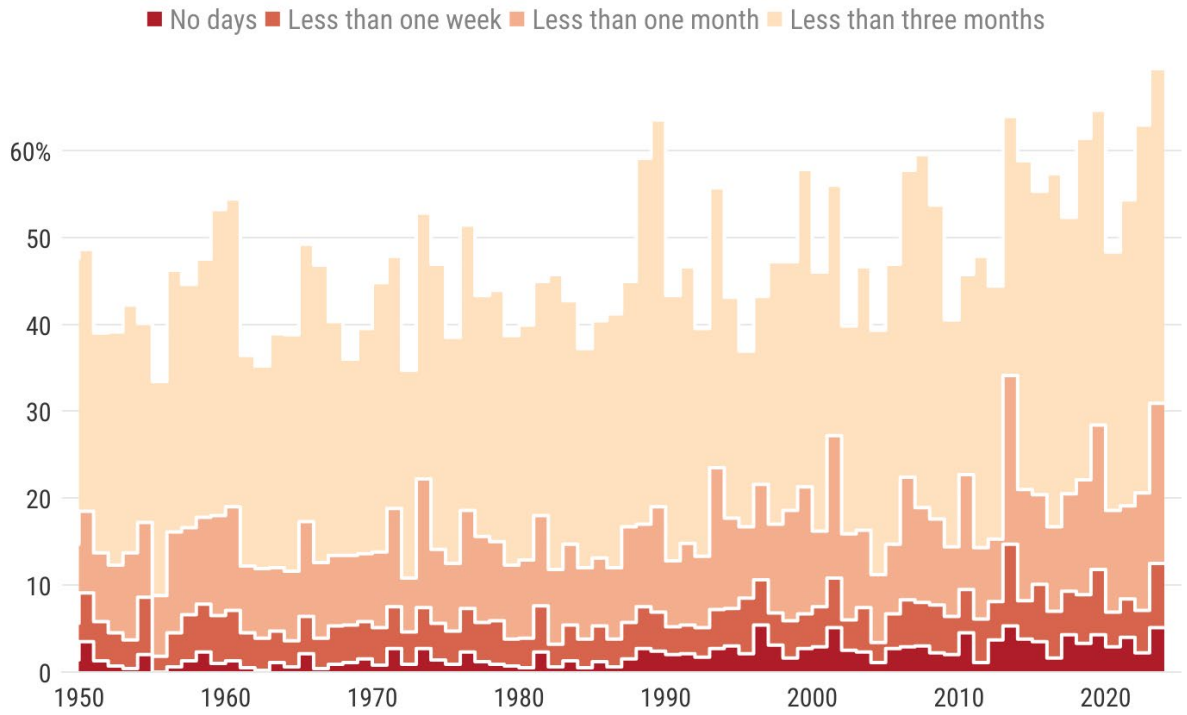
[72] Intergovernmental Panel on Climate Change (2021). *Sixth assessment report – Regional fact sheet – Europe*. Geneva: IPCC/WHO/UNEP. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf.

[73] Bissolli, P., Cassou, C., Chen, L., Kiktev, D., Kryjov, V., Pattanaik, D. R., Schneider, M., and Vinit, F. (2010) *Assessment of the observed extreme conditions during the 2009/2010 boreal winter*. World Meteorological Organisation. Available at: https://www.dwd.de/DE/leistungen/besondereereignisse/verschiedenes/20100921_winter2009-2010_td1550_en_web.pdf?__blob=publicationFile&v=3.

[74] Intergovernmental Panel on Climate Change (2023) 'Weather and Climate Extreme Events in a Changing Climate', in *Climate Change 2021 – The Physical Science Basis: Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press, pp. 1513–1766. https://doi.org/10.1017/9781009157896.013.

months of near-freezing conditions) expanded to ~69% – the largest on record (the 1991–2020 average is ~50%) (see *Figure 12*). Consistent with these milder winters, 2024 also saw a record low number of days with intense cold stress reported[75].

Figure 12: Percentage of European land experiencing 'frost days' for specific time periods

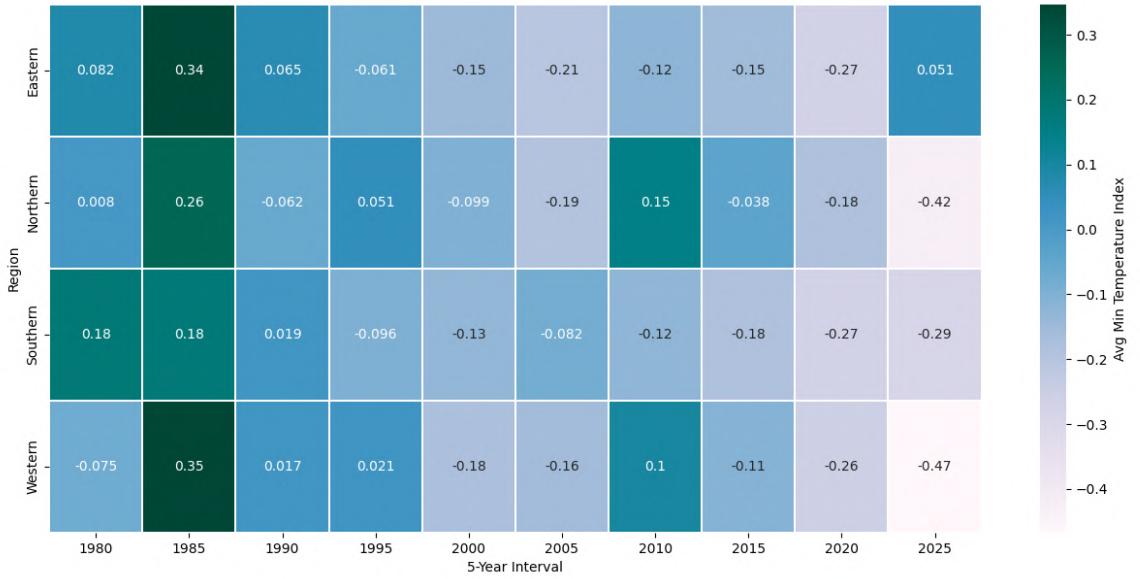


Source: ESOTC 2024 | Europe (2024). *3. Temperature*. Available at: https://climate.copernicus.eu/esotc/2024/temperature?utm_source=socialmedia&utm_medium=FB&utm_campaign=esotc/2024/temperature&fbclid=IwY2xjawMvyM5leHRuA2FlbQIxMAABHiREr4l60nFNHcE7fWh-JTaDCri0yvqnlQWIT7xOTKx9yWv-79pA0jeVpxqz_aem_-nwErxs-IP8VP4vvd-I7Eg.
Credit: C3S/ECMWF/Koninklijk Nederlands Meteorologisch Instituut (KNMI).

Europe's climate data shows a steady warming of extreme minimum temperatures, meaning the coldest days and nights are becoming less severe. As *Figure 13* illustrates, most EU regions have seen negative values in recent decades, signalling a reduction in the intensity of extreme cold. For instance, Western and Northern Europe record sharp declines around 2025 (–0.47 and –0.42, respectively), while Southern and Eastern Europe also show consistent downward shifts. Earlier intervals (1980s) displayed occasional positive anomalies, but since the 2000s, the overall pattern is one of increasingly milder minimum temperatures across all regions. This confirms the broader trend that cold extremes are weakening over time, with the largest declines in Western and Northern Europe.

[75] ESOTC 2024 | Europe (2024). *3. Temperature*. Available at: https://climate.copernicus.eu/esotc/2024/temperature?utm_source=socialmedia&utm_medium=FB&utm_campaign=esotc/2024/temperature&fbclid=IwY2xjawMvyM5leHRuA2FlbQIxMAABHiREr4l60nFNHcE7fWh-JTaDCri0yvqnlQWIT7xOTKx9yWv-79pA0jeVpxqz_aem_-nwErxs-IP8VP4vvd-I7Eg.

Figure 13: EU regional extreme minimum temperature trends (5-year intervals)



Source Author's own elaboration based on data from European Extreme Events Climate Index. Available at: https://datastation.climateindex.eu/en/max-temperature/2025/04.

Stakeholders interviewed for this study broadly corroborated these findings. While cold was not as widely discussed as heat, several respondents emphasised that it remains a relevant OSH concern, particularly in Northern Europe[76]. Representatives from trade unions and inspectorates noted that even as severe cold spells become rarer, warmer winters may paradoxically introduce new safety hazards. For instance, a European Trade Union Confederation (ETUC) representative observed that temperatures slightly below 0 °C create a layer of thick water, posing a significant risk for slippery surfaces, whereas temperatures around −5 °C with snow and ice can be safe[77]. This comment reflects a broader point raised in multiple interviews: that milder winters do not eliminate cold-related OSH risks but can, in fact, shift their nature: from deep-freeze hazards to more frequent freeze-thaw cycles, black ice, and unstable footing conditions.

Looking ahead, projections suggest an even sharper reduction in cold spells and frost days across Europe in the coming decades[78]. Although this will likely reduce cold-related morbidity and heating demands, such aspects are expected to be far outweighed by the rapid increase in heat-related extremes (see section 3.1.1)[79]. This also does not mean winters will be completely

[76] Interviews with representatives from Eurofound [6 August 2025] and EFBWW [8 July 2025].

[77] Interview with a representative from ETUC [27 June 2025].

[78] Intergovernmental Panel on Climate Change (2021). *Sixth assessment report – Regional fact sheet – Europe*. Geneva: IPCC/WHO/UNEP. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf.

[79] H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.) (2022) *Climate Change 2022: Impacts, adaptation and vulnerability. Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* IPCC, Cambridge University Press. Available at: https://www.ipcc.ch/report/ar6/wg2.

free of extreme weather – rather, the definition of "extreme cold" will adjust (a cold day in 2080 might be equivalent to an average winter day in 1960)[80].

OSH risks related to cold conditions

Despite the overarching warming trends, cold climatic conditions and cold spells are expected to continue to pose problems in northern latitudes, where very low temperatures can still occur for extended periods[81]. In general, cold conditions in Europe pose a range of significant OSH risks affecting workers primarily in outdoor settings and certain indoor environments.

Direct health impacts (physiological). Exposure to extreme or prolonged cold can cause a wide range of physiological health problems. The most immediate risks are cold-induced extremity injuries, including frostbite and trench foot or immersion foot, resulting from long exposure to cold, wet environments even above freezing[82]. Risk of frostbite on bare skin is minor above -10°C, but wind, contact with cold objects or liquids (e.g., petroleum, oil) significantly increases this risk[83]. Another major health outcome is hypothermia, which can quickly become fatal without prompt warming and medical intervention[84]. Lastly, a non-freezing cold injury important to note is chilblains/perniosis that can cause painful, inflammatory skin lesions[85].

Inhalation of very cold air can also trigger respiratory distress or worsen asthma, especially during heavy exertion in sub-zero conditions[86]. In addition, cold exposure places strain on the cardiovascular system, elevating blood pressure and exacerbating disorders such as hypertension, angina, and Raynaud's phenomenon[87]. Prolonged cold conditions also contribute to musculoskeletal disorders by increasing muscle tension and reducing flexibility, heightening

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80 Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.) (2021). *Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* IPCC, Cambridge University Pres. Available at: https://www.ipcc.ch/report/ar6/wg1/.

81 Makri, E., Walters, D., Wadsworth, E., Devereux, H., & van den Burg, S. W. K. (2024). Occupational health and safety in aquaculture: Organisation of work and employment in small seaweed farms in North West Europe. *The Economic and Labour Relations Review*, 35(1), 27–44. https://doi.org/10.1017/elr.2024.7; see also: Lyu, P., Song, S. and Khorshid, S. (2024). Exploring the Influence of Extreme Weather on Construction Worker Safety. Construction *Research Congress 2022*, 2(1), pp. 508–517. https://doi.org/10.1061/9780784485293.051; Karthick, S., Kermanshachi, S. and Ramaji, I. (2022). Health and Safety of Construction Field Workforce Active in Extreme Weather Conditions. In: *Construction Research Congress.* U.S.A, Virginia: American Society of Civil Engineers. https://doi.org/10.1061/9780784483978.

82 Makri, E., Walters, D., Wadsworth, E., Devereux, H., & van den Burg, S. W. K. (2024). Occupational health and safety in aquaculture: Organisation of work and employment in small seaweed farms in North West Europe. *The Economic and Labour Relations Review*, 35(1), 27–44. https://doi.org/10.1017/elr.2024.7.

83 Ibid., see also: Holmér, I. (2009). Evaluation of cold workplaces: An overview of standards for assessment of cold stress. *Industrial Health. 47*(3), pp. 228–234. https://doi.org/10.2486/indhealth.47.228.

84 Ibid.

85 Kapnia, A. K., Ziaka, S., Ioannou, L. G., Flouri, I., Dinas, P. C., and Flouris, A. D. (2022) Population Characteristics, Symptoms, and Risk Factors of Idiopathic Chilblains: A Systematic Review, Meta-Analysis, and Meta-Regression. *Biology*, 11(11), 1651. https://doi.org/10.3390/biology11111651.

86 Karthick, S., Kermanshachi, S. and Ramaji, I. (2022). Health and safety of construction field workforce active in extreme weather conditions. In: *Construction Research Congress*. U.S.A, Virginia: American Society of Civil Engineers. Available at: https://doi.org/10.1061/9780784483978.

87 Holmér, I. (2009). Evaluation of cold workplaces: An overview of standards for assessment of cold stress. *Industrial Health. 47*(3), pp. 228–234. https://doi.org/10.2486/indhealth.47.228.

the risk of back, neck, and joint pain, especially during repetitive or heavy work[88]. Workers may also experience skin conditions, such as dryness, irritation, dermatitis, or cracking due to cold and damp conditions, and in some cases, abdominal discomfort or diarrhoea linked to physiological stress from cold exposure[89].

Increased risk of accidents and injuries. Cold environments create conditions that heighten the likelihood of accidents, such as slipping. Machinery-related incidents are more common during cold weather, as equipment and vehicles can malfunction or lose efficiency due to freezing components or lubrication failure[90]. Poor driving conditions from lack of visibility and snow-covered or icy roads also increase risks and accidents and injuries[91]. Moreover, reduced physical performance and impaired coordination are common outcomes of cold exposure. Cold exposure decreases manual dexterity, muscle control, reaction time, and concentration[92]. Workers may experience numb or clumsy hands, slower movements, and reduced attention, all of which increase the likelihood of mistakes and accidents[93]. Thick clothing and personal protective equipment can further interfere with movements, perception, and sensations[94].

Psychosocial and mental health impacts. Long, dark, and cold working conditions can lead to depression, sleep disruption, and emotional distress, particularly in isolated or harsh environments[95]. Physical exhaustion from working in cold conditions also lowers morale and raises the risk of errors and injuries[96].

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88 Bonafede, M., Marinaccio, A., Asta, F., Schifano, P., Michelozzi, P. and Vecchi, S. (2016) The association between extreme weather conditions and work-related injuries and diseases: A systematic review of epidemiological studies. *Annali dell'Istituto Superiore di Sanità*, 52(3), pp. 357–367. https://doi.org/10.4415/ann_16_03_07.

89 Karthick, S., Kermanshachi, S. and Ramaji, I. (2022). Health and Safety of Construction Field Workforce Active in Extreme Weather Conditions. In: *Construction Research Congress.* U.S.A, Virginia: American Society of Civil Engineers. https://doi.org/10.1061/9780784483978.

90 Anttonen, H., Pekkarinen, A. and Niskanen, J. (2009) Safety at work in cold environments and prevention of cold stress. *Industrial Health*, 47(3), pp. 254–261. https://doi.org/10.2486/indhealth.47.254.

91 International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate.

92 Risikko, T., Mäkinen, T.M., Påsche, A., Toivonen, L. and Hassi, J. (2003). A model for managing cold-related health and safety risks at workplaces. *International Journal of Circumpolar Health,* 62(2), 204–215. https://doi.org/10.3402/ijch.v62i2.17557.

93 Holmér, I. (2009) Evaluation of cold workplaces: An overview of standards for assessment of cold stress. *Industrial Health*, 47(3), pp. 228–234. https://doi.org/10.2486/indhealth.47.228. See also: Anttonen, H., Pekkarinen, A. and Niskanen, J. (2009) Safety at work in cold environments and prevention of cold stress, *Industrial Health*, 47(3), pp. 254–261. https://doi.org/10.2486/indhealth.47.254.

94 Ibid.; see also: Karthick, S., Kermanshachi, S. and Ramaji, I. (2022). Health and safety of construction field workforce active in extreme weather conditions. In: *Construction Research Congress.* U.S.A, Virginia: American Society of Civil Engineers. https://doi.org/10.1061/9780784483978.

95 Anttonen, H., Pekkarinen, A. and Niskanen, J. (2009) Safety at work in cold environments and prevention of cold stress, *Industrial Health*, 47(3), pp. 254–261. https://doi.org/10.2486/indhealth.47.254.

96 Lyu, P., Song, S. and Khorshid, S. (2024). Exploring the influence of extreme weather on construction worker safety. *Construction Research Congress 2022*, 2(1), pp. 508–517. https://doi.org/10.1061/9780784485293.051. See also: Karthick, S., Kermanshachi, S. and Ramaji, I. (2022). Health and safety of construction field workforce active in extreme weather conditions. In: Construction Research Congress. U.S.A, Virginia: American Society of Civil Engineers. https://doi.org/10.1061/9780784483978.

3.2. Geographical variation

Building on the analysis above, this section provides a synthesis and complements the hazard-first analysis by showing, at a glance, which European regions face the greatest climate-related OSH pressures and why broadly similar hazards can still yield different outcomes.

Table 3: Overview of European regional OSH pressures from extreme weather events

Region	Heatwaves	Cold	Floods and storms	Droughts and wildfires
Southern Europe				
Western/North-Western Europe				
Central/Eastern Europe				
Northern Europe and the Baltics				

Source: Author's own elaboration. Note: orange = dominant hazard / high risk; yellow = moderate risk / relevant hazard; green = less significant hazard / lower risk.

3.2.1. Southern Europe

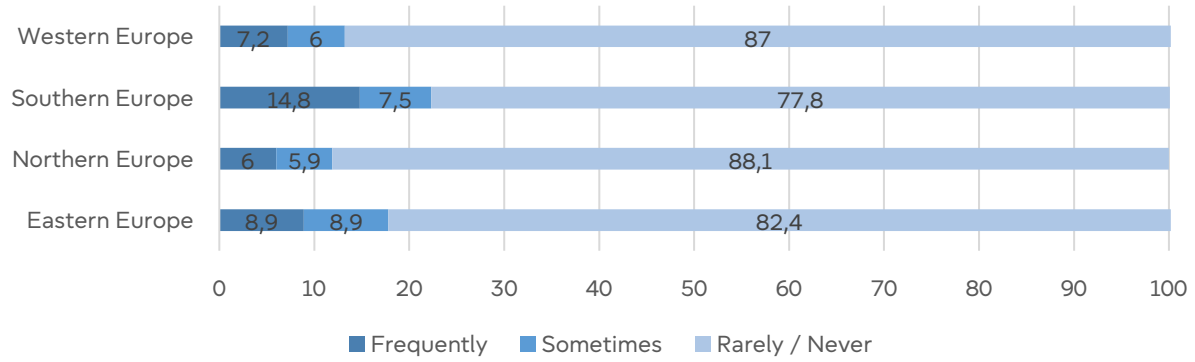
The most significant extreme weather conditions in Southern Europe are heat, drought (with wildfire), and pluvial/coastal flooding. According to the European Working Conditions Survey (EWCS 2024), workers report the highest heat exposure, which aligns with rising heat-related mortality among the general population since 2000 (see *Figure 14 and 15* below). Notably, average estimates of labour productivity losses due to heat across Europe range from virtually no impact in the Northern countries to more than 2% productivity losses in the South by the 2080s[97]. Within-country differences can also be stark: in MS like Spain, France, Italy, Greece and Romania, productivity losses range from less than 0.5% in the north to more than 8% in their southern regions in the 2080s[98]. In addition, drought and summer–autumn water stress is chronic (≈30% of the population in permanent stress; up to 70% seasonal), fuelling wildfire danger and smoke-related respiratory risks; recent years saw widespread water restrictions in France and Italy[99]. Flood risk remains salient across parts of Italy and the Mediterranean coast, compounded by sea-level rise (see flood risk and sea-level figures).

[97] Szewczyk, W., Mongelli, I. and Ciscar, J.-C. (2021). Heat stress, labour productivity and adaptation in Europe—a regional and occupational analysis. *Environmental* Research *Letters.* 16(10), 105002. Available at: https://doi.org/10.1088/1748-9326/ac24cf.

[98] Ibid.

[99] European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

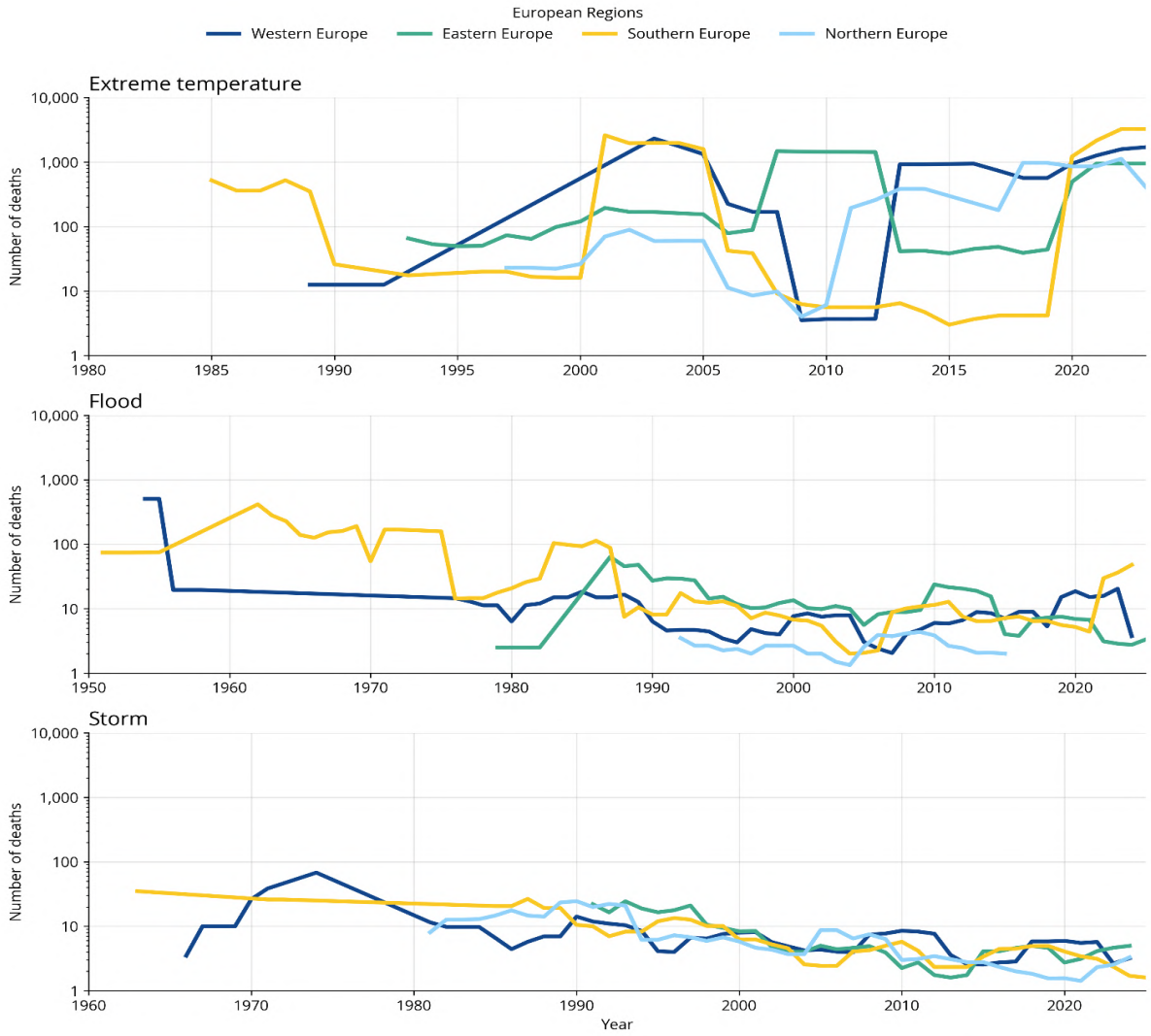
Figure 14: Exposure to high temperatures by EU regions (EU27, 2024)



Source: Author's own elaboration based on data from Eurofound (EWCS 2024, Physical environment "How often are you exposed at work to high temperatures which make you perspire even when not working?")[100].

[100] The dataset contains MS-level results. They have been grouped to calculate regional averages. The regional composition used: Northern Europe (Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden); Western Europe (Austria, Belgium, France, Germany, Luxembourg, The Netherlands); Southern Europe (Cyprus, Greece, Italy, Malta, Portugal, Spain); and Eastern Europe (Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia).

Figure 15: Regional variation in deaths from extreme weather events in Europe[101]



Source: Author's own elaboration based on data from EM-DAT, The International Disaster Database – Disaster Classification System. Available at: https://public.emdat.be.

3.2.2. Western/North-Western Europe

Principal extreme weather pressures in Western and North-Western Europe are extreme precipitation, riverine/coastal flooding, and Atlantic windstorms. For example, Germany experiences approximately 20 to 60 tornadoes annually and large-scale storm events from Atlantic low-pressure vortices (e.g., cyclones Lothar, Jeanett, Kyrill, Zeynep), with winds up to

[101] It is important to note that this data does not show occupational morbidity due to extreme weather events; rather, the data is available for general public.

200 km/h[102]. One in eight Europeans lives in flood-prone zones[103], with dense clusters of industrial sites and wastewater plants in potential inundation areas; catastrophic 2021 floods in Benelux countries/Western Germany[104] and 2023 Danish storm surges are emblematic[105]. Despite rising exposure, long-run mortality from floods and storms has generally declined, which is likely evidence of robust warning-to-response systems (see section 4.1). However, local catastrophes still produce lethal spikes (*Figure 15*).

3.2.3. Central/Eastern Europe

Central and Eastern Europe is a "mixed-hazard" zone: the worker self-reported heat exposure is the second highest in Europe (*Figure 14)*; summers are trending drier with expanding drought and wildfire seasons in some regions (e.g. Eastern Germany)[106], while heavy precipitation and flood risks rise in many basins (see section 3.1.3). Eastern European regions tend to have large shares of physically demanding work[107] – a factor that can influence a higher mortality rate due to exposure to extreme temperatures (see *Figure 15*). Indeed, recent analysis shows that the rise of heat-related fatal injuries in this region has been drastic, exceeding 50% over the past two decades[108]. By contrast, for floods and storms, the pattern is partly decoupled: exposure has increased in parts of central Europe, but long-run mortality has generally fallen. Notably, these countries have become particularly suitable for vector-borne diseases (e.g., West Nile: +516%, see *Figure 8*), a downstream effect of warmer temperatures and hydrology shifts rather than a specific extreme weather event.

3.2.4. Northern Europe and the Baltics

Reported cold exposure is quite evenly distributed across different regions, according to data from the EWCS 2024 (*Figure 16*), even though historically Northern European and Baltic countries were the regions most exposed to extreme cold. Given that cold extremes declined with warming winters, the related morbidity rates have likely fallen, even though concrete data are missing. Nonetheless, episodic cold waves still create acute risks, especially where work is

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[102] Butsch, C., Beckers, L.M., Nilson, E., Frassl, M., Brennholt, N., Kwiatkowski, R. and Söder, M. (2023) Health impacts of extreme weather events: Cascading risks in a changing climate. *Journal of Health Monitoring*, 8 (Supply 4), pp. 33–56. Available at: https://doi.org/10.25646/11652.

[103] European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[104] European Centre for Disease Prevention and Control (2021). *Extreme rainfall and catastrophic floods in western Europe.* Available at: https://www.ecdc.europa.eu/sites/default/files/documents/RRA-20210720-1799.pdf.

[105] Euronews with AP (2023). *Flooding and destruction as Storm Babet hit northern Europe*. Euronews. Available at: https://www.euronews.com/2023/10/20/widespread-flooding-and-destruction-as-storm-babet-hits-northern-europe.

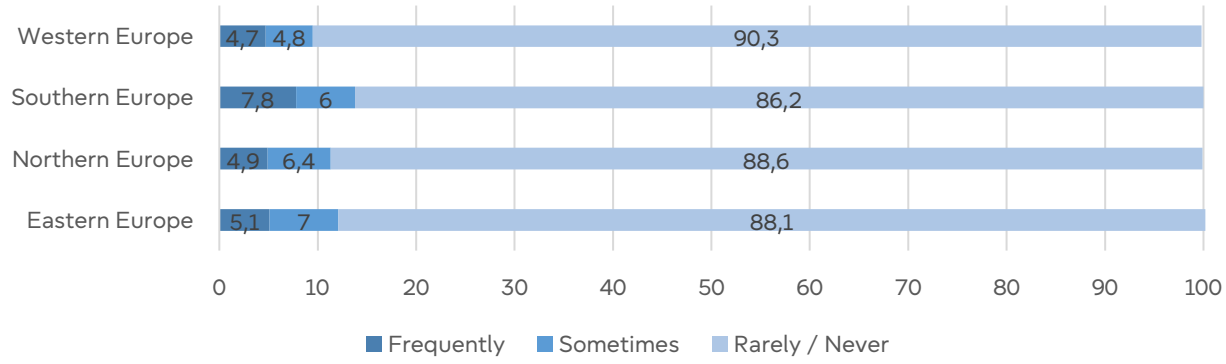
[106] Butsch, C., Beckers, L.M., Nilson, E., Frassl, M., Brennholt, N., Kwiatkowski, R. and Söder, M. (2023) Health impacts of extreme weather events: Cascading risks in a changing climate. *Journal of Health Monitoring*, 8 (Supply 4), pp.33–56. https://doi.org/10.25646/11652.

[107] Szewczyk, W., Mongelli, I. and Ciscar, J.-C. (2021). Heat stress, labour productivity and adaptation in Europe—a regional and occupational analysis. *Environmental Research Letters*, 16(10), 105002. https://doi.org/10.1088/1748-9326/ac24cf.

[108] International Labour Organisation (2024) *Heat* at work*: Implications for safety and health*. Available at: https://www.ilo.org/sites/default/files/2024-07/ILO_OSH_Heatstress-R16.pdf.

remote, outdoors or at night due to prolonged cold exposure, high wind speeds, ice, blizzards, and darkness[109].

Figure 16: Exposure to low temperatures by EU regions (EU27, 2024)



Source: Author's own elaboration based on data from Eurofound (EWCS 2024, Physical environment "How often are you exposed at work to low temperature whether indoors or outdoors?").

Overall, reported worker exposure does not always reflect the actual weather conditions of different regions, suggesting potential discrepancies driven by sectoral structures, mitigation practices, and policy implementation. Some mediators may help explain the **divergent regional outcomes** under comparable hazard trends in different Member States:

- Occupational and sectoral composition: Regions with a higher proportion of workers in physically demanding, vulnerable occupations usually working outside (e.g., moderate and heavy physical work) experience greater OSH risk[110];
- Institutional factors: some Member States (Belgium, Spain, Cyprus, Hungary, Latvia) have explicit temperature thresholds and workload-specific measures (with monitoring duties), while others rely on general duty-of-care or have gaps[111] (see more in Chapter 4); stakeholders also cite limited and varied enforcement capacity among different Member States (MS)[112]; and
- Policy priorities: Southern European countries, being more exposed particularly to heat, droughts and wildfires, tend to be more aware and proactive in addressing climate-

[109] Anttonen, H., Pekkarinen, A. and Niskanen, J. (2009) Safety at work in cold environments and prevention of cold stress. *Industrial Health*, 47(3), pp. 254–261. Available at: https://doi.org/10.2486/indhealth.47.254.

[110] Szewczyk, W., Mongelli, I. and Ciscar, J.-C. (2021). Heat stress, labour productivity and adaptation in Europe—a regional and occupational analysis. *Environmental Research Letters*, 16(10), 105002. Available at: https://doi.org/10.1088/1748-9326/ac24cf.

[111] Parent-Thirion, A., Weber, T. and Cabrita, J. (2024) *Job quality side* of climate *change*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/job-quality-side-climate-change.

[112] Interviews with representatives from Spanish *la Inspección de Trabajo y Seguridad Social* [26 August 2025], HSA [19 August 2025], EFBWW [8 July 2025], ETUC [27 June 2025], ETUI [17 July 2025], and IOSH [26 June 2025].

related OSH risks, while Northern European countries may acknowledge the changes but are less motivated to address the effects, given the lower exposure[113].

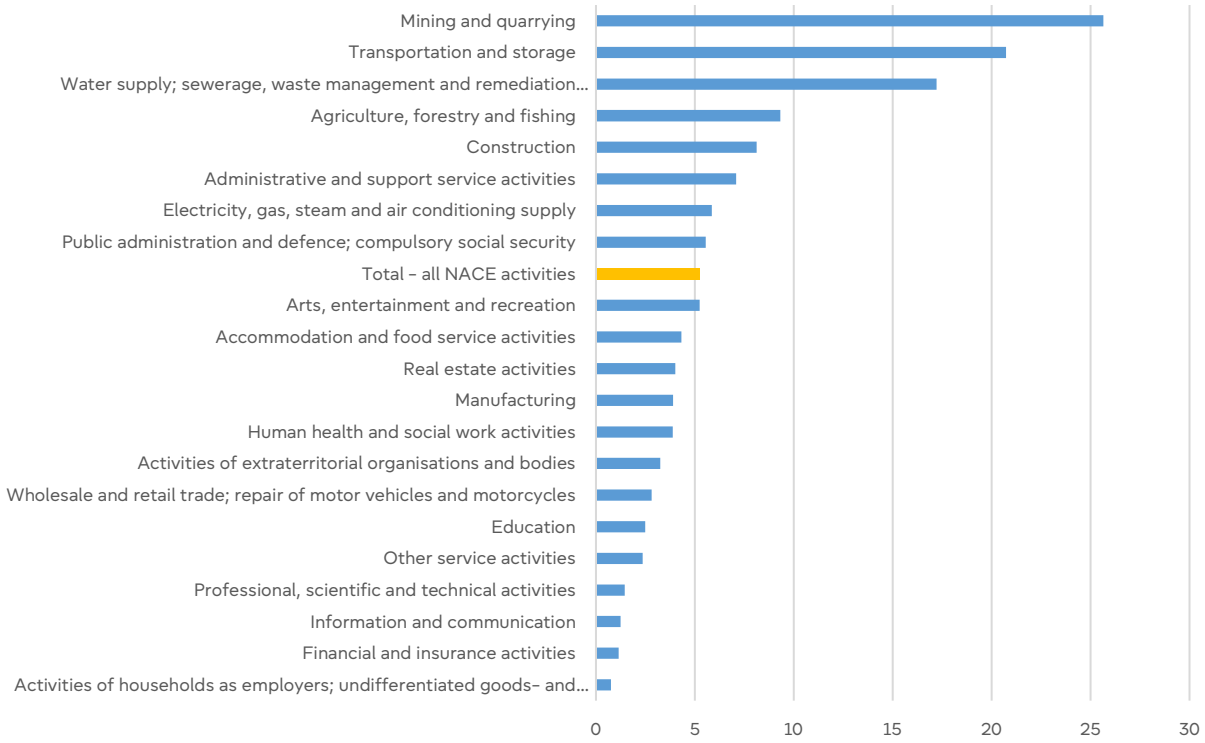
3.3. Sectoral specificities

Extreme weather events – including heatwaves, cold spells, floods, windstorms and droughts – do not impact all economic sectors equally in terms of occupational safety and health risks. Sectors with a high share of outdoor work or weather-dependent activities tend to face greater exposure. For instance, *Figure 17* below provides a rough proxy of sectoral vulnerability, based on the European Statistics on Accidents at Work (ESAW) data on the incidence of workplace accidents. This data includes weather-related causes (such as heat, cold, storms, and floods) but also non-weather agents (like noise, radiation, and fire), meaning it does not isolate climate impacts. However, it is the closest approximation available with a sectoral breakdown and thus provides a useful (if imperfect) context for understanding where elevated risks are concentrated. The chart shows that sectors such as mining and quarrying, transport, water and waste, agriculture, and construction report the highest incidence rates of such accidents, broadly aligning with literature-based assessments of high climate-related OSH exposure.

The analysis that follows builds on these patterns using complementary data to assess exposure more precisely, ordered from most to least affected. For each sector, we consider both its economic relevance (in terms of employment and gross value added), employment structure and the sector's vulnerability to weather-related hazards. The distinction between highly affected and underrepresented yet highly affected sectors is based on how consistently these risks are recognised in the literature and stakeholder interviews, with the latter referring to sectors where significant OSH risks exist but receive less policy or research attention.

[113] Parent-Thirion, A., Weber, T. and Cabrita, J. (2024). *Job quality side of climate change*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/job-quality-side-climate-change.

Figure 17: Workplace accidents associated with natural/physical phenomena (≥4 days absence), incidence rate by the statistical classification of economic activities (NACE) (EU27, average 2014–2022)



Source: Author's own elaboration based on data from Eurostat (online data code: hsw_ph3_07). Note: material agent "Physical phenomena and natural elements", incidence rates per 100,000 employed people, severity ≥4 days absence. Values are averaged for 2014–2022.

3.3.1. Highly affected sectors

a. Mining and quarrying

The mining and quarrying sector, though now very small in terms of employment (0.3% of EU employment with a minor share of gross value added (GVA))[114], is inherently high-risk, and those risks are exacerbated by extreme weather. Many mining operations involve heavy physical work either outdoors (open-pit mines, quarries) or underground in environments that can be affected by surface weather. Heat is a serious hazard in mining[115] – deep mines can become dangerously

[114] Eurostat (2024) *EU relies on over 360,000 professional firefighters.* Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240823-1.
Eurostat (2025) *Police, court and prison personnel statistics.* Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Police,_court_and_prison_personnel_statistics.

[115] Marchetti, E., Capone, P. and Freda, D. (2016) Climate change impact on microclimate of work environment related to occupational health and productivity. *Annali dell'Istituto Superiore di Sanità*, 52(3), pp. 197–203. Available at: https://doi.org/10.4415/ann_16_03_05.

hot, and surface mines face intense sun exposure; during heatwaves, miners are prone to heat exhaustion, and ventilation systems struggle to keep underground temperatures safe.

The sector's workforce profile further shapes its vulnerability. As shown in *Table 4*, mining is overwhelmingly male (85.7%), with a high share of older workers (34.1% aged 50 or more) and low levels of part-time or temporary employment. This demographic pattern indicates a relatively stable but ageing workforce engaged in heavy manual labour — factors that heighten susceptibility to heat stress, fatigue, and other physical outcomes.

Table 4: Demographic and employment structure in mining and quarrying (EU27, 2024)

Indicator	Value
Share of 50+ years old employees (%)	34.10%
Share of male employees (%)	85.70%
Share of part-time employees (%)	3.20%
Share of temporary employees (%)	6.10%
Overqualification rate (%)	25.00%

Source: Author's own elaboration based on data from Eurostat (online data codes: lfsq_eegan2 (1), lfsa_eisn2 (2), lfsa_epgan2 (3), lfsa_etgan2 (4), lfsa_eoqgan2 (5). Note: Overqualification rate refers to the percentage of employees with tertiary education (i.e. International Standard Classification of Education (ISCED) levels 5–8) who are working in occupations that do not require tertiary education.

Intense rainfall presents another threat: it can trigger mine flooding and landslides, or pit wall collapses in open pits, endangering miners[116] (these events can cause fatal accidents, contributing to high relative accident rates in this sector). An interview respondent noted that flooding and heavy rains are becoming more of an issue, given the potential resurgence of mining across Europe in the search for critical raw materials[117]. Cold weather can affect machinery and make outdoor quarry work more perilous (e.g. slippery rock, freezing of explosives or equipment)[118].

Although mining's overall economic importance is low, any accidents can be severe; indeed, Eurostat data on fatal workplace accidents due to natural phenomena show mining among the sectors with non-zero fatality rates in this category (see *Figure 17*). With climate change likely

[116] European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality.* Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[117] Interview with a representative from European trade union [23 July 2025].

[118] Anttonen, H., Pekkarinen, H. and Niskanen, J., 2009. Safety at work in cold environments and prevention of cold stress. *Industrial Health,* 47(3), pp. 228–234. Available at: https://doi.org/10.2486/indhealth.47.254.

increasing heavy precipitation events, the sector faces emerging OSH challenges (e.g. more frequent flooding in mines) that warrant attention despite mining's limited workforce.

Transportation and storage

The transportation and storage sector (covering freight and passenger transport, warehousing, etc.) employs roughly 5.4% of the EU workforce[119] and forms a core part of the economy (it falls under a broad grouping including trade and tourism that together contribute about 18.9% of EU GVA[120]). Transport activities are highly exposed to extreme weather, which can jeopardise both infrastructure and worker safety.

The transport sector is increasingly affected by heatwaves, causing infrastructure damage and accidents. During the 2019 and 2022 heatwaves, several EU MS, including France and Germany, reported railway disruptions caused by extreme temperatures[121]. Passengers and staff have also remained stranded inside vehicles during such incidents, representing a risk to their health and safety[122]. In road transport, heat stress can impair drivers' concentration, raising accident risk[123]. Cold waves and winter storms likewise impact this sector: icy or snow-covered roads, as well as frozen rail switches, create dangerous conditions for drivers, pilots, and rail operators[124]. Many road accidents in winter are linked to weather, and Eurostat data on work accidents (which include road traffic accidents during work) reflect these hazards (see *Figure 17*). Floods and heavy precipitation events are another major concern – flooded roads and rail lines can lead to crashes or strand transport workers, while strong winds can topple trucks or disrupt air and sea transport. These risks are especially relevant for the sector's workforce composition: over 40% of employees are plant and machine operators and assemblers—occupations with high direct exposure to heat, cold, and storm-related hazards, given their operational and lower-skill roles (see *Figure 18*). In summary, the transport sector's reliance on infrastructure that is directly affected by weather makes its workforce particularly vulnerable to extreme heat, cold, storms and floods, despite the sector's significant economic importance.

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119 Eurostat (2025) *Employment by sex, age, occupation and economic activity (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eisn2/default/table?lang=en.

120 Eurostat (2025) *Gross value added and income by main industry (NACE Rev.2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10/default/table?lang=en.

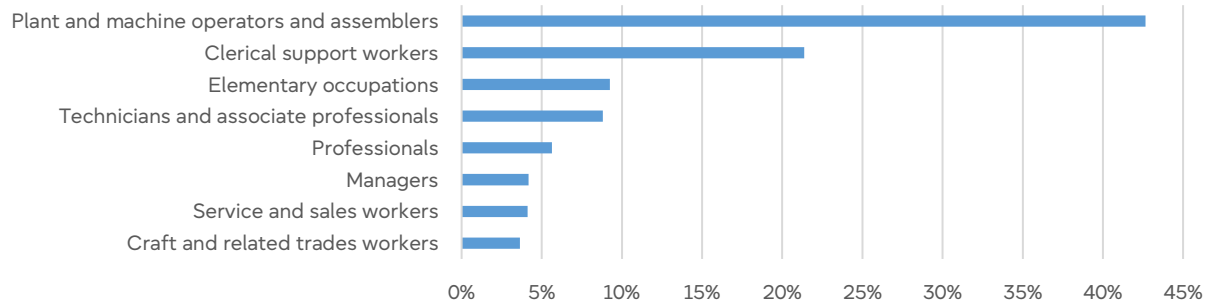
121 Chiu, A. (2022). With extreme heat, we can't build roads and railways as we used to. *Washington Post.* Available at: https://www.washingtonpost.com/climate-environment/2022/07/20/heat-wave-road-railway-buckling/.

122 Deidda, C., Khanna, A., Schade, W. and Thiery, W. (2025). Is Europe's transport infrastructure ready to face climate change? *EGU Sphere*, 2(1) [preprint]. Available at: https://doi.org/10.5194/egusphere-2025-1697.

123 Marchetti, E., Capone, P. and Freda, D. (2016) Climate change impact on microclimate of work environment related to occupational health and productivity. *Annali dell'Istituto Superiore di Sanità*, 52(3), pp. 197–203. Available at: https://doi.org/10.4415/ann_16_03_05.

124 International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate.

Figure 18: Distribution of employees by different occupations (ISCO-08) in transportation and storage (EU27, 2024)



Source: Author's own elaboration based on data from Eurostat (online data code: lfsa_eisn2).

Agriculture, forestry and fishing

Agriculture (including forestry and fishing) is among the smallest economic sectors by size – employing about 3.3% of the EU workforce[125] and contributing only ~1.8% of EU27 gross value added (GVA)[126] – yet it faces the highest OSH exposure to extreme weather. Eurofound survey data show this sector has one of the largest shares of workers exposed to high temperatures and to low temperatures, reflecting the heavy reliance on outdoor labour[127]. Various stakeholders cited agricultural workers as among the most exposed groups, given the outdoor work settings[128]. Notably, these sectors are also among the most socio-economically vulnerable ones, with over 50% of workers self-employed and 34% aged over 50 (see *Table 5*).

Table 5: Demographic and employment structure in agriculture, forestry and fishing (EU27, 2024)

Indicator	Value
Share of 50+ years old employees (%)	34.00%
Share of male employees (%)	69.50%
Share of part-time employees (%)	15.30%

[125] Eurostat (2023) *Employment by sex, age, occupation and economic activity (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eisn2/default/table?lang=en.

[126] Eurostat (2025) *Gross value added and income by main industry. (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10/default/table?lang=en.

[127] Eurofound, EWCS 2024, Physical environment "How often are you exposed at work to high temperatures which make you perspire even when not working?" (37% of respondents said frequently or sometimes) and "How often are you exposed at work to low temperatures whether indoors or outdoors?" (27% of respondents said frequently or sometimes) – filtered for Sector – Agriculture. Available at: https://www.eurofound.europa.eu/en/surveys-and-data/surveys/european-working-conditions-survey.

[128] For example, see interviews with Dr Ivan Williams Jimenez [26 June 2025], Marouane Laabbas el Guennouni [17 July 2025], and ETUC representative [27 June 2025].

Indicator	Value
Share of self-employed (%)	50.60%
Share of temporary employees (%)	11.20%
Overqualification rate (%)	71.20%

Source: Author's own elaboration based on data from Eurostat (online data code: lfsq_eegan2 (1), lfsa_eisn2 (2), lfsa_epgan2 (3), lfsa_esgan2 (4), lfsa_etgan2 (5), lfsa_eoqgan2 (6). Note: Overqualification rate refers to the percentage of employees with tertiary education (i.e. ISCED levels 5–8) who are working in occupations that do not require tertiary education.

In terms of specific extreme weather events, heatwaves pose a particularly acute hazard: agricultural workers often endure prolonged heat exposure, leading to heat stress and safety risks, and in Southern Europe, effective labour input is projected to decline significantly on hot days[129]. Droughts further compound the risk by threatening crop yields and livelihoods – agriculture is highlighted as a sector incurring major economic losses from drought, with water shortages jeopardising both production and farm workers' physical and mental well-being[130]. At the other climatic extreme, frost and extreme cold events can devastate crops and expose farm and forestry workers to frigid conditions, especially in Nordic countries[131]. Severe storms and floods also directly endanger agricultural and forestry workers (e.g. injuries during field work or forestry operations in storms). In sum, despite its modest economic footprint, agriculture faces a disproportionate burden of OSH risks from all forms of extreme weather.

Notably, the OSH Pulse 2025 data indicated that agriculture is among the sectors where the highest share of workers reported different measures being implemented in their workplace to prevent heat stress and climate change-related risk factors. For example, 66% of workers reported adjustments to the organisation of work (e.g., flexible working time, regular breaks, job rotation), and 36% of workers reported that information and training were implemented in their workplace – the highest shares among different sectors[132]. Other measures like thermal insulation, cooling systems, and climate-appropriate PPE were also used among agricultural

[129] European Climate and Health Observatory (2021). *Effects on occupational health and safety.* Climate ADAPT. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/occupational-health-safety. See also: Szewczyk, W., Mongelli, I. and Ciscar, J. C. (2021). Heat stress, labour productivity and adaptation in Europe—A regional and occupational analysis. *Environmental Research Letters,* 16(10), 105002. https://doi.org/10.1088/1748-9326/ac24cf.

[130] Butsch, C., Beckers, L.M., Nilson, E., Frassl, M., Brennholt, N., Kwiatkowski, R. and Söder, M. (2023) Health impacts of extreme weather events: Cascading risks in a changing climate, *Journal of Health Monitoring*, 8(Suppl 4), pp. 33–56. https://doi.org/10.25646/11652. See also: European Environment Agency (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality*. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[131] Mattila-Wiro, P., Samant, Y., Husberg, W., Falk, M., Knudsen, A. and Sæmundsson, E. (2020). *Work today and in the future: Perspectives on occupational safety and health challenges and opportunities for the Nordic labour inspectorates*. Finnish Ministry of Social Affairs and Health. Available at: https://urn.fi/URN:ISBN:978-952-00-7172-1.

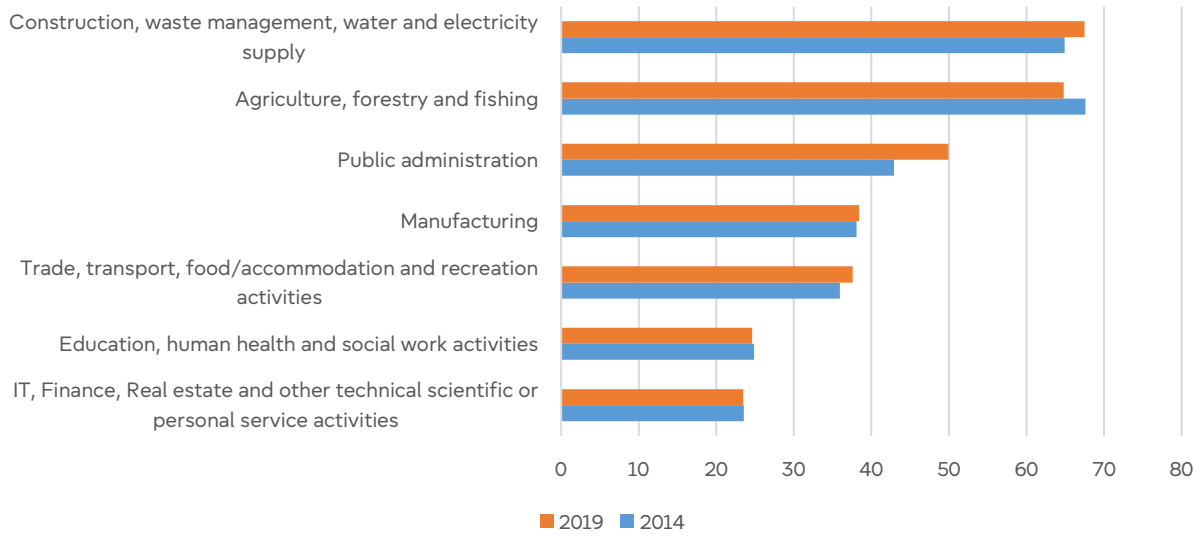
[132] EU-OSHA (2025). *OSH Pulse 2025: Climate change at work.* Available at: https://osha.europa.eu/en/tools-and-publications/infographics/osh-pulse-2025-climate-change-work.

workers (58% of workers reported doing so). This shows that while the sector is among the most exposed and vulnerable to heat and other extreme weather events, the prevention measures are also being adopted to a growing extent.

Construction

The construction industry, which accounts for 6.8% of EU employment[133] and about 5.6% of GVA[134], is highly vulnerable to weather extremes due to the nature of its work. A large portion of construction activities occur outdoors, and both Eurofound[135] and EU-OSHA data confirm that construction has among the highest rates of worker exposure to both high and low temperatures, as well as droughts on the job (see *Figure 19*). It is also the sector that most commonly received policy support in various MS, further reiterating its vulnerability (see section 4.2.1).

Figure 19: Presence of the risk of heat, cold or draught at the workplace by NACE sectors (EU27, %)



Source: Author's own elaboration based on data from EU-OSHA (ESENER 2019 and 2014).

According to both literature and interviews, heat is a central hazard: during summer heatwaves, construction workers face increased risk of heat exhaustion and dehydration, and these

[133] Eurostat (2023) *Employment by sex, age, occupation and economic activity (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eisn2__custom_6705580/default/table?lang=en

[134] Eurostat (2025) *Gross value added and income by main industry (NACE Rev.2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10/default/table?lang=en

[135] Eurofound, EWCS 2024, Physical environment "How often are you exposed at work to high temperatures which make you perspire even when not working?" (28% of respondents said frequently or sometimes) and "How often are you exposed at work to low temperatures whether indoors or outdoors?" (26% of respondents said frequently or sometimes) – filtered for Sector – Agriculture. Available at: https://www.eurofound.europa.eu/en/surveys-and-data/surveys/european-working-conditions-survey.

conditions impair productivity[136]. As construction workers frequently operate in areas affected by the urban heat island (UHI) effect[137], the impact on their OSH is further exacerbated. Alongside heat, other extreme events like storms, floods and high winds pose safety threats on construction sites – for instance, strong winds can destabilise cranes or scaffolding, and heavy rainfall or floods can cause site collapses or expose workers to electrical hazards[138]. Extremely cold temperatures can also result in OSH accidents for construction workers; construction sites can face hazards such as slippery conditions for forklifts, dump trucks, and other construction vehicles[139]. Overall, construction's heavy manual labour and outdoor exposure make it one of the sectors most at risk of weather-related OSH problems, despite its substantial economic role.

The sector's workforce profile compounds its exposure to climatic hazards. As shown in *Table 6*, construction employs a predominantly male workforce (89.4%), with a relatively high proportion of older workers (32.3% aged 50+) and a notable share of self-employed workers (23.9%), who often operate outside formal OSH protections. The rate of overqualification (33.8%) also suggests skill mismatches that may limit proper risk prevention and adaptation practices on-site. These demographic and employment characteristics, combined with widespread subcontracting and temporary work arrangements (8.9%), create a labour environment where consistent enforcement of OSH standards can be challenging, particularly for smaller contractors.

Table 6: Demographic and employment structure in construction (EU27, 2024)

Indicator	Value
Share of 50+ years old employees (%)	32.30%
Share of male employees (%)	89.40%
Share of part-time employees (%)	7.20%
Share of self-employed (%)	23.90%

[136] Orlov, A., Sillmann, J., Aaheim, A., Aunan, K., and de Bruin, K. (2019) Economic losses of heat-induced reductions in outdoor worker productivity: A case study of Europe. *Economics of Disasters and Climate Change*, 3(3), pp. 191–211. Available at: https://doi.org/10.1007/s41885-019-00044-0.

[137] ADAPTHEAT (2024). *Collective bargaining and social dialogue to protect workers' health and safety at work against heat and heat waves*. Available at: https://istas.net/sites/default/files/2024-09/Folleto_ADAPTHEAT_ENG-corregido_compressed.pdf.

[138] Lyu, P., Song, S. and Khorshid, S. (2024). Exploring the influence of extreme weather on construction worker safety. *Construction Research Congress 2022*, 2(1), pp. 508–517. Available at: https://doi.org/10.1061/9780784485293.051.

[139] Ibid.

Indicator	Value
Share of temporary employees (%)	8.90%
Overqualification rate (%)	33.80%

Source: Author's own elaboration based on data from Eurostat (online data code: lfsq_eegan2 (1), lfsa_eisn2 (2), lfsa_epgan2 (3), lfsa_esgan2 (4), lfsa_etgan2 (5), lfsa_eoqgan2 (6). *Note*: Overqualification rate refers to the percentage of employees with tertiary education (i.e. ISCED levels 5–8) who are working in occupations that do not require tertiary education.

Similar to the agricultural sector, construction was among the top 3 sectors taking preventative measures to tackle some risks stemming from heat stress and other climate change-related risks. For instance, workers reported that some preventative measures like adjustments to the organisation of work (61%), information and training (34%), as well as consultation of workers about climate-change-related concerns (29%) were quite widespread[140]. This indicates a positive trend of wider adoption of various preventative measures to support workers in this highly affected sector.

Emergency services

Emergency services are a distinct high-exposure group due to their unique role during and after extreme weather events (especially floods and storms), as well as their simultaneous exposure to multiple hazards[141]. In 2023, the EU had roughly 362,000 professional firefighters[142] and over 1.5 million police officers[143]; together with ambulance/paramedic personnel, these first responders form part of the public service workforce (broadly ~16% of EU employment[144]). Their essential function – protecting life, property and public order – becomes most critical under extreme weather events, when they must operate directly in hazardous conditions rather than

[140] EU-OSHA (2025) *OSH Pulse 2025: Climate change at work.* Available at: https://osha.europa.eu/en/tools-and-publications/infographics/osh-pulse-2025-climate-change-work.

[141] Chirico, F. and Taino, G. (2018). Climate change and occupational health of outdoor workers: An urgent call to action for European policymakers. *Environmental Disease.* 3(4), 77-79. https://doi.org/10.4103/ed.ed_15_18. See also: Parent-Thirion, A., Weber, T., and Cabrita, J. (2024). *Job quality side of climate change*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/job-quality-side-climate-change; International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate; Schulte, P.A., Jacklitsch, B.L., Bhattacharya, A., Chun, H., Edwards, N., Elliott, K.C., Flynn, M.A., Guerin, R.J., Hodson, L., Lincoln, J.M., MacMahon, K., Pendergrass, S.M., Siven, J. and Vietas, J. (2023). Updated Assessment of Occupational Safety and Health Hazards of Climate Change. *Journal of Occupational and Environmental Hygiene*. 20(5-6), pp. 183–206. Available at: https://doi.org/10.1080/15459624.2023.2205468.

[142] Eurostat (2024). *EU relies on over 360,000 professional firefighters.* Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240823-1.

[143] Eurostat (2025) *Police, court and prison personnel statistics.* Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Police,_court_and_prison_personnel_statistics.

[144] European Public Service Union (EPSU) (2022). *Adaptation to climate change: Has the European Union forgotten about firefighters and emergency services?* Available at: https://www.epsu.org/sites/default/files/article/files/EPSU%20firefighters%20and%20emergency%20services%20workers%20-%20Adaptation%20to%20climate%20change_0.pdf.

avoid them[145] . They cannot easily curtail or reschedule work to avoid heat, fire, or storm danger – rather, they experience the brunt of it by virtue of their duties. This makes their OSH challenges uniquely acute.

Heatwaves and wildfires are particularly dangerous for firefighters, police, and ambulance personnel, who must work through high temperatures and smoke-filled environments while wearing heavy personal protective equipment (PPE). This combination elevates the risk of heat exhaustion, cardiovascular strain, and burns, and has been linked to on-duty heart attacks[146]. In worst-case scenarios, the consequences are fatal, as demonstrated by the death of 12 firefighters in a single wildfire incident in Croatia in 2007[147]. Meanwhile, floods and storms expose crews to fast-moving or contaminated waters, collapsing buildings, falling trees, and toxic materials. These conditions frequently lead to traumatic injuries (slips, falls, electrocution), particularly during search and rescue operations or post-disaster clean-up in structurally unstable environments[148].

In addition to environmental risks, emergency responders endure intense physical and psychological pressure. Prolonged shifts with minimal rest (often while carrying heavy equipment or extracting victims) can result in fatigue-related accidents such as vehicle crashes or manual handling injuries[149]. These risks are amplified during heatwaves or when navigating obstructed terrain after storms. Over time, the cumulative toll of responding to increasingly frequent and severe weather events is expected to raise rates of work-related sickness and injury. Moreover, emergency responders regularly face mental health challenges, including chronic stress, anxiety, burnout, and post-traumatic stress disorder, as they operate under life-or-death pressure and are frequently exposed to death, suffering, and in some cases violence or civil unrest. Without adequate recovery time between crises, these psychosocial risks are likely to intensify alongside climate change[150].

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[145] Interviews with representatives from Eurofound [6 August 2025], ETUC [27 June 2025], an EU institution [21 August 2025], and EU-OSHA [16 July 2025].

[146] European Climate and Health Observatory (2021). *Effects on occupational health and safety.* Climate ADAPT. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/occupational-health-safety.

[147] Ibid.

[148] International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate. See also: European Agency for Safety and Health at Work, (2011). *Emergency services: A literature review on occupational safety and health risks. Effects on occupational health and safety*. European Risk Observatory Report. Available at: https://osha.europa.eu/en/publications/emergency-services-occupational-safety-and-health-risks.

[149] Ibid.

[150] Schulte, P.A., Jacklitsch, B.L., Bhattacharya, A., Chun, H., Edwards, N., Elliott, K.C., Flynn, M.A., Guerin, R.J., Hodson, L., Lincoln, J.M., MacMahon, K., Pendergrass, S.M., Siven, J. and Vietas, J. (2023). Updated Assessment of Occupational Safety and Health Hazards of Climate Change. *Journal of Occupational and Environmental Hygiene.* 20(5-6), pp. 183–206. Available at: https://doi.org/10.1080/15459624.2023.2205468.

3.3.2. Underrepresented yet highly affected sectors

Public utilities: Energy, water and waste management

Public utilities (including electricity, gas, steam, water supply, sewerage, and waste management) employ a relatively small share of the EU workforce[151], yet play an outsized role in maintaining critical infrastructure during extreme weather events. Their importance is further underscored by the high and often under-acknowledged OSH risks faced by utility workers in the context of climate change.

Energy utility workers are frequently exposed to hazardous conditions during storms, heatwaves, and droughts. Windstorms and snow/ice events can damage power lines and pipelines, forcing repair crews into emergency outdoor work under dangerous conditions, particularly in places such as offshore wind farms[152]. Similarly, heatwaves stress the generation and transmission infrastructure, requiring high-temperature maintenance operations that increase the risk of heat exhaustion, particularly for workers wearing heavy protective equipment. Droughts compound the problem: reduced water availability limits hydroelectric output and power plant cooling capacity, contributing to system strain. These conditions create both physical and psychosocial risks, especially when long shifts are required to restore essential services.

Water supply and waste management workers face similarly complex hazards. Droughts increase the workload of water utility personnel tasked with managing scarce resources, often under significant public pressure. Floods and heavy rain, on the other hand, overwhelm sewerage systems and treatment plants, exposing workers to contaminated water and debris. Waste management crews are commonly deployed for clean-up following extreme weather events (e.g. storms, wildfires), facing chemical, biological, and mechanical hazards in unstable environments. Heat stress is a major concern for outdoor waste workers, especially during summer months when decomposition accelerates exposure to hazardous substances. Cold weather also presents risks, from icy surfaces to frozen equipment.

According to Eurostat ESAW data (*Figure 17* at the beginning of the section), water and waste management report among the highest accident incidence rates from physical phenomena, indicating high real-world exposure. While ESENER data (*Figure 19* in the construction sub-section) also reflect a strong presence of thermal discomfort risks, these sectors remain underrepresented in OSH policy discussions, particularly when compared to larger sectors such as construction or manufacturing.

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[151] Eurostat (2023) *Employment by sex, age, occupation and economic activity (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eisn2/default/table?lang=en; Water supply; sewerage, waste management and remediation activities (0.8%); Electricity, gas, steam and air conditioning supply (0.8%).

[152] Parent-Thirion, A., Weber, T. and Cabrita, J., 2024. *Job quality side of climate change*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/job-quality-side-climate-change.

Administrative and support service activities

The administrative and support services sector (about 4.1% of EU employment and part of a combined services segment contributing ~11.9% of EU GVA)[153] encompasses a broad range of activities – from office administration to services like building maintenance, landscaping, and security – some of which involve notable weather exposure. Sectoral exposure to extreme weather is very heterogeneous: a portion of this workforce is office-based, while another portion works in the field. Notably, "services to buildings and landscape" (e.g. gardeners, landscapers, outdoor cleaners) and security or support staff at facilities often work outside or in semi-outdoor environments. These workers can face heat stress in summer and cold stress in winter, similar to construction but on a smaller scale. High temperatures also increase indoor CO levels that can reduce cognitive capacities[154]. High temperatures in combination with indoor air pollutants can also worsen the so-called "sick building syndrome"[155].

Many interviewees[156] noted that office-based work is also increasingly exposed to heat in light of increasing temperatures, since many buildings are not properly ventilated or have air conditioning (AC). They also highlighted that many buildings, particularly in city centres, are old and protected (thus cannot be easily modified to include AC), meaning that together with the urban heat island effect, the temperatures inside can get extreme.

Manufacturing

Manufacturing, the EU's largest sector by size (15.3% of employment, 15.7% of GVA)[157], is generally less directly exposed to weather extremes compared to the above sectors – most manufacturing work occurs indoors. However, even within factories and plants, climate hazards can significantly impact OSH in certain contexts. High heat is a prime example: many manufacturing facilities (e.g. metalworking, glass, or food processing plants) experience elevated indoor temperatures during summer heatwaves, especially if they lack adequate cooling[158]. It also has insidious effects on chemical exposures – research notes that heat can increase the absorption of toxic substances by the body, meaning workers simultaneously

[153] Eurostat (2025) Gross value added and income by main industry. (NACE Rev. 2). *Eurostat*. Available at: https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10/default/table?lang=en; Eurostat (2023) *Employment by sex, age, occupation and economic activity (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eisn2/default/table?lang=en.

[154] Kapalo, P., Vilčeková, S., Mečiarová, Ľ., Domnita, F. and Adamski, M. (2020). Influence of indoor climate on employees in office buildings—A case study. *Sustainability*, 12(14), 5569. https://doi.org/10.3390/su12145569.

[155] Nazaroff, W.W. (2013). Exploring the consequences of climate change for indoor air quality. *Environmental Research Letters*, 8(1), 015022. http://dx.doi.org/10.1088/1748-9326/8/1/015022.

[156] Interview with a representative from European trade union [23 July 2025] and an expert [2 July 2025].

[157] Eurostat (2025) Gross value added and income by main industry. (NACE Rev. 2). *Eurostat*. Available at: https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10/default/table?lang=en; Eurostat (2023) *Employment by sex, age, occupation and economic activity (NACE Rev. 2).* Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eisn2/default/table?lang=en.

[158] Interview with EU-OSHA representatives [16 July 2025].

exposed to high temperatures and chemicals (such as in metal manufacturing or plastics processing) face heightened health risks[159].

The sector's demographic structure further amplifies its vulnerability. As shown in *Table 7,* manufacturing employs a predominantly male workforce (69.5%), with a relatively high share of older workers (35.3% aged over 50) and limited part-time or temporary employment. This profile suggests that many employees are exposed to physically demanding and repetitive tasks, with age-related sensitivity to heat or poor air quality likely compounding OSH risks during extreme weather events. While many European indoor workplaces are assumed to have air conditioning, smaller-scale manufacturing enterprises may still be affected[160], leaving workers more exposed.

Table 7: Demographic and employment structure in manufacturing (EU27, 2024)

Indicator	Value
Share of 50+ years old employees (%)	35.30%
Share of male employees (%)	69.50%
Share of part-time employees (%)	7.50%
Share of self-employed (%)	5.80%
Share of temporary employees (%)	8.00%
Overqualification rate (%)	26.20%

Source: Author's own elaboration based on data from Eurostat (online data code: lfsq_eegan2 (1), lfsa_eisn2 (2), lfsa_epgan2 (3), lfsa_esgan2 (4), lfsa_etgan2 (5), lfsa_eoqgan2 (6). *Note*: Overqualification rate refers to the percentage of employees with tertiary education (i.e. ISCED levels 5–8) who are working in occupations that do not require tertiary education.

Moreover, severe storms or floods, while rare, can damage manufacturing sites (flooded factory floors, power cuts) and create safety issues during emergency shutdowns or repairs[161]. Drought can also directly impact chemical and plastic manufacturing by affecting production processes and resource availability[162]. Overall, although manufacturing's controlled environments provide

[159] Schulte, P. and Davis, C. (2025). *The heat is on: Protecting worker health and safety from the impacts of climate change.* IOSH. Available at: https://iosh.com/media/hqvhtv30/climate-change-white-paper.pdf.

[160] Orlov, A., Sillmann, J., Aaheim, A., Aunan, K. and de Bruin, K. (2019) Economic losses of heat-induced reductions in outdoor worker productivity: A case study of Europe. *Economics of Disasters and Climate Change*, 3(3), pp. 191–211. Available at: https://doi.org/10.1007/s41885-019-00044-0.

[161] European Environment Agency (EEA) (2024). *Responding to climate change impact on human health in Europe: Focus on floods, droughts and water quality.* Copenhagen: European Environment Agency. Available at: https://www.eea.europa.eu/en/analysis/publications/responding-to-climate-change-impacts.

[162] Ibid.

a degree of insulation from climate extremes, its large workforce, ageing demographics, and dependence on stable environmental conditions mean that even modest weather-related disruptions can have wide-ranging health, safety, and productivity impacts – risks that remain under-recognised in OSH policy discussions. In this context, it is important to note that preventative measures like thermal insulation, cooling systems, and appropriate PPE are the most adopted in the manufacturing sector in the EU (61% of workers reported these measures are being implemented), showcasing that employers are adapting to the specific risks the workers face in this sector[163].

3.4. Effects on different worker groups

This section examines, under a pan-European lens, what types of workers are the most vulnerable to weather events. In addition to the factors considered in the other sections (i.e., geographical location, hazards related to specific weather events, and economic sector of belonging), other horizontal factors come into play: demographic aspects, the type of work conducted (whether indoors or outdoors, manual or intellectual), the socioeconomic status of workers, and the contractual conditions that apply. Below, we analyse how each factor contributes to vulnerability, and we note that there is a difference between more vulnerable and more exposed groups.

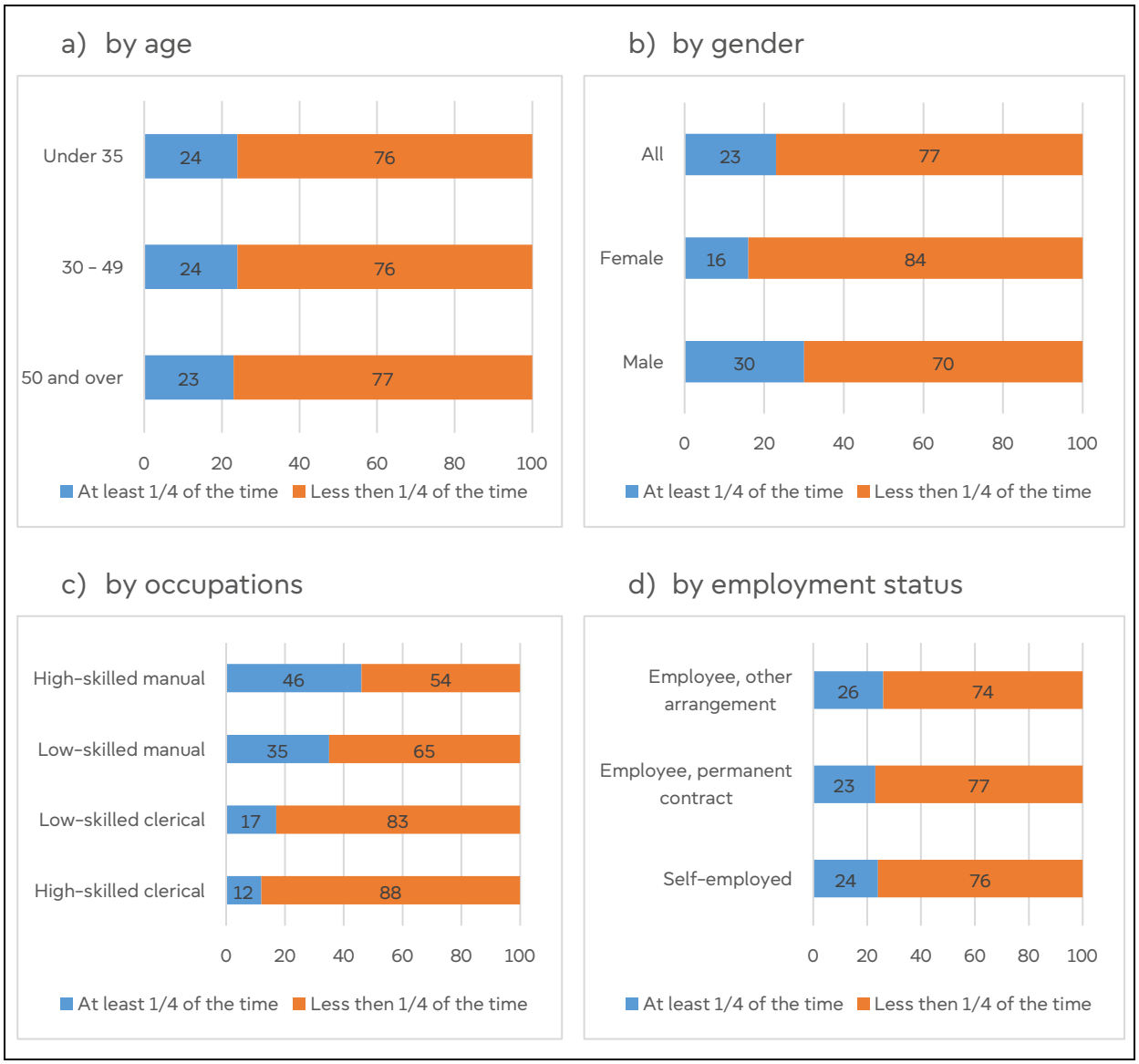
Eurofound EWCS data indicate systematic differences in reported exposure to temperature extremes by age, gender, occupation and employment status. *Figures 20-21* below show higher self-reported exposure to both high and low temperatures among workers in manual, outdoor, and lower-autonomy roles, with clear gradients by occupation and contract type; men report higher exposure, consistent with their concentration in construction, agriculture and similar jobs. In Europe, at least half of agricultural workers and nearly half of construction workers (51% and 45%, respectively) report exposure to high temperatures for at least a quarter of working time[164]. This data is further evidenced by the OSH Pulse 2025, which found that 55% of workers reporting exposure to climate change-related risk factors were in manual occupations — that is skilled, semi-skilled or unskilled workers (incl. farm workers)[165]. Together, these patterns point to outdoor manual occupations, men, and those in non-standard arrangements as the groups most affected.

[163] EU-OSHA (2025) *OSH Pulse 2025: Climate change at work*. Available at: https://osha.europa.eu/en/tools-and-publications/infographics/osh-pulse-2025-climate-change-work.

[164] Eurofound (2023) *Rising temperatures pose serious risks to workers' health.* Available at: https://www.mynewsdesk.com/eurofound/news/rising-temperatures-pose-serious-risks-to-workers-health-470183.

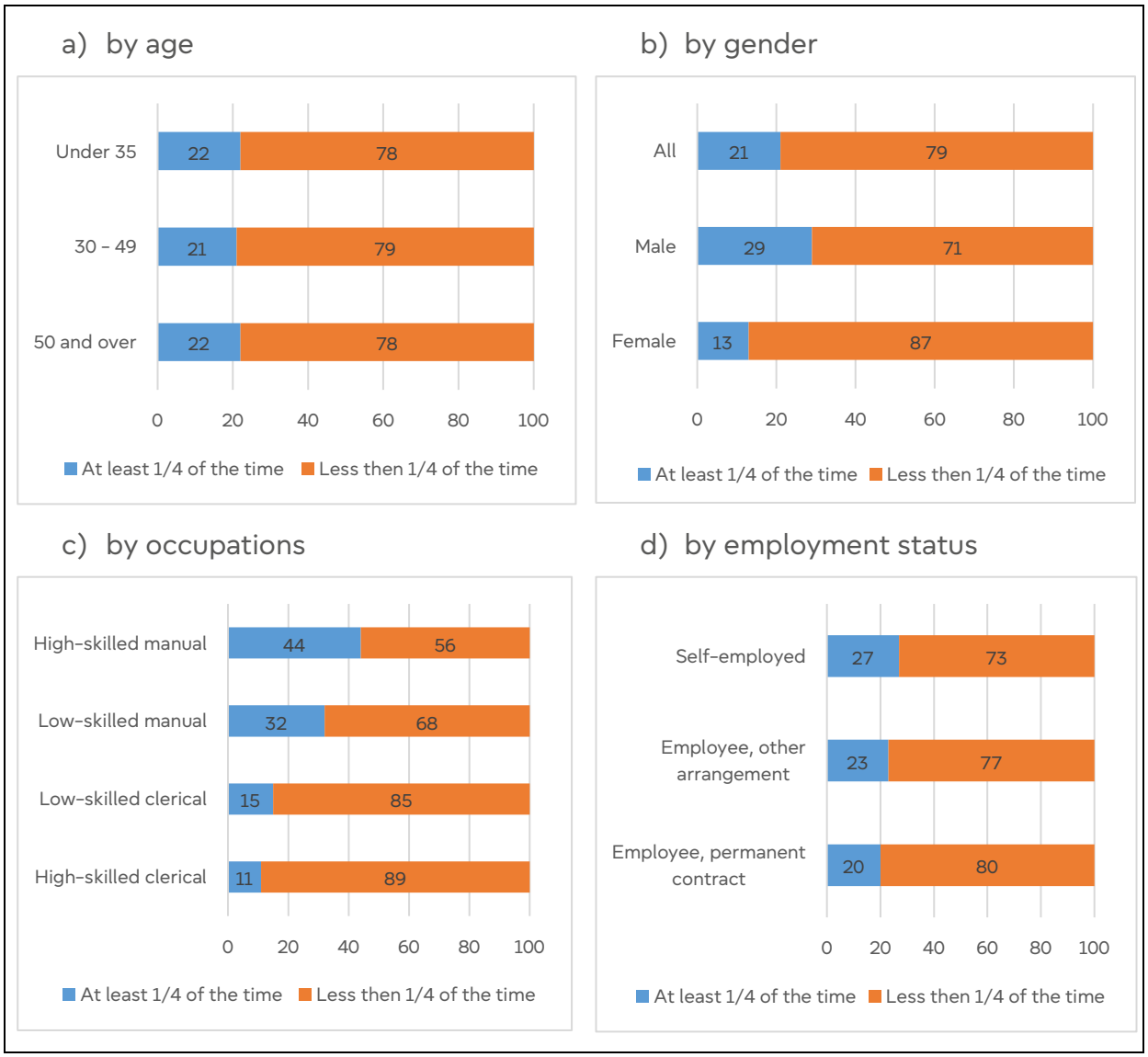
[165] EU-OSHA (2025) *OSH Pulse 2025: Climate change at work*. Available at: https://osha.europa.eu/en/tools-and-publications/infographics/osh-pulse-2025-climate-change-work.

Figure 20: Exposure to high temperatures (EU27, 2015)



Source: Author's own elaboration based on data from Eurofound (EWCS 2015, Physical environment "Are you exposed to high temperatures?").

Figure 21: Exposure to low temperatures (EU27, 2015)



Source: Author's own elaboration based on data from Eurofound (EWCS 2015, Physical environment "Are you exposed to low temperatures?").

Similarly, the research base consistently identifies outdoor manual workers as the most vulnerable to heat, cold, storms and floods, with added risks from UV exposure and vector-borne disease[166]. Yet, research also shows that vulnerability is heightened for older

[166] Chirico, F. and Taino, G. (2018) Climate change and occupational health of outdoor workers: An urgent call to action for European policymakers, *Environmental Disease*, 3(2), pp. 1–6. Available at: https://journals.lww.com/endi/fulltext/2018/03040/climate_change_and_occupational_health_of_outdoor.1.aspx.

workers (thermoregulatory decline, chronic conditions)[167], pregnant workers[168], people with disabilities or long-term conditions[169], and younger/inexperienced workers (acclimatisation and training gaps)[170] – they are also commonly protected by specialised regulation, or their vulnerability is noted explicitly in the main legislation. Migrant, seasonal, temporary, posted and undocumented workers are repeatedly flagged due to concentration in high-exposure jobs, language barriers, ill-fitting PPE, weak enforcement coverage and poorer recovery conditions at home[171]. Low socio-economic status workers and those in non-standard work settings face financial pressure to work through dangerous conditions, while self-employed workers may lack institutional protections[172].

Stakeholder interviews mirror these findings, highlighting older workers' slower recovery and greater severity of outcomes[173]; pregnant or menopausal women's heat sensitivity[174]; migrants and posted workers pushed into peak-heat shifts (e.g., delivery) and excluded by language/contracting practices[175]; gig and informal workers operating outside standard OSH frameworks[176]; and SMEs' limited capacity to assess and mitigate climate risks[177].

A frequent apparent mismatch arises: literature highlights older, pregnant, medically vulnerable, migrant and precarious workers as "most vulnerable," yet survey statistics often show higher reported *exposure* among men, younger workers and specific outdoor manual occupations. There are several reasons:

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[167] Bonafede, M., Marinaccio, A., Asta, F., Schifano, P., Michelozzi, P. and Vecchi, S. (2016) The association between extreme weather conditions and work-related injuries and diseases: A systematic review of epidemiological studies. *Annali dell'Istituto Superiore di Sanità,* 52(3), pp. 357–367. https://doi.org/10.4415/ann_16_03_07 and International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate.

[168] International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate. See also: Moulds, C. (2025). *The climate change gender gap*. IOSH Magazine. Available at: https://www.ioshmagazine.com/2025/03/03/climate-change-gender-gap.

[169] Ribes Moreno, M.I. (2023) Climate change and working time: a complex challenge, in Gstrein, O.J., Fröhlich, M., van den Berg, C. and Giegerich, T. (eds.) *Modernising European Legal Education (MELE). European Union and its Neighbours in a Globalized World* (pp. 183-193), vol. 10. Springer Nature. https://doi.org/10.1007/978-3-031-40801-4_11.

[170] Mattila-Wiro, P., Samant, Y., Husberg, W., Falk, M., Knudsen, A. and Sæmundsson, E. (2020). Work today and in the future: Perspectives on occupational safety and health challenges and opportunities for the Nordic labour inspectorates. Finnish Ministry of Social Affairs and Health. Available at: https://urn.fi/URN:ISBN:978-952-00-7172-1.

[171] Arici, C., Ronda-Pérez, E., Tamhid, T., Absekava, K. and Porru, S. (2019) Occupational health and safety of immigrant workers in Italy and Spain: a scoping review. *International Journal of Environmental Research and Public Health,* 16(22), 4416. https://doi.org/10.3390/ijerph16224416.

[172] Park, J., Han, B., Park, J.S., Park, E.J. and Kim, Y. (2019) Nonstandard workers and differential occupational safety and health vulnerabilities, *American Journal of Industrial Medicine,* 62(8), pp. 701–715. https://doi.org/10.1002/ajim.22997.

[173] Interview with EFBWW representative [8 July 2025].

[174] Interviews with representatives from EU-OSHA [16 July 2025] and ETUC [27 June 2025].

[175] Interviews with representatives from EFBWW [8 July 2025] and a European employers' organisation [19 August 2025].

[176] Interview with Marouane Laabbas el Guennouni [17 July 2025].

[177] Interviews with an EU-level SME organisation representative [2 July 2025].

- Composition effects: exposure metrics reflect who is in the hottest/coldest jobs (disproportionately men and younger workers), whereas vulnerability includes physiological and social susceptibility irrespective of job;
- Measurement limits: statistical data capture environmental exposure at work, not severity of health outcomes, recovery conditions at home, cumulative 24-hour heat load, or under-reported incidents in informal/gig work;
- Under-coverage and under-reporting: undocumented, agency and platform workers can fall outside enforcement and surveys, depressing their statistical visibility;
- Healthy-worker selection: those most fragile may exit high-exposure jobs, leaving a hardier observed workforce that still reports high exposure but not the full burden of adverse outcomes.

Last key point to highlight is that for many groups, the relevant dose of, for example, heat exposure, is not their shift alone but the full day: hot or poorly insulated housing, shared rooms with limited cooling, and a lack of night-time respite trap workers in a continuous heat-stress cycle. Migrant, seasonal and low-income workers are disproportionately affected; posted and temporary workers often lack control over accommodation. Commuting during alerts and additional care duties (e.g. for children or older relatives) further compresses recovery windows, explaining why similar measured exposures can yield worse outcomes for some groups. Stakeholders[178] repeatedly point to these recovery deficits for migrants, older women and low-income workers, thus further increasing their vulnerability.

3.5. Economic impacts

Extreme weather at work (particularly heatwaves, cold spells, floods, storms and wildfires) is already translating into tangible economic burdens in Europe (see *Figure 22*). In 2020 alone, some estimates claim that 80,800 workplace injuries and 67 deaths were attributed to heat exposure across the EU, a 42% increase in heat-related workplace fatalities since 2000[179]; yet, it is crucial to note that these estimates do not portray the full picture as most Member States do not collect concrete data relating heat exposure to workplace injuries and mortality (see section 4.2.4.). Notably, work-related accidents and illnesses (of all causes) already cost the EU economy about EUR 476 billion per year[180]; as climate change amplifies risks stemming from climate change, a growing share of this burden will stem from extreme weather. Using the EU-OSHA cost of accidents and ill health at work typology framework[181], these costs can be

[178] Interviews with Dr Ivan Williams Jimenez [26 June 2025] and another expert [2 July 2025].

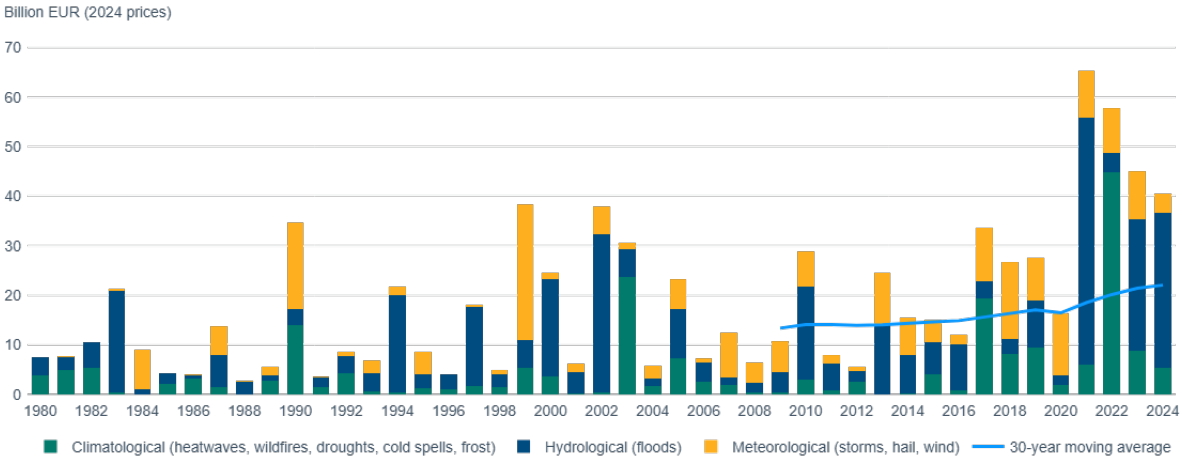
[179] ETUC (2024). *Heat deaths at work up by 40% in the EU* [press release]. Available at: https://www.etuc.org/en/pressrelease/heat-deaths-work-40-eu.

[180] Drescher, K. and Janzen, B. (2025) When weather wounds workers: The impact of temperature on workplace accidents. *Journal of Public Economics*, 241, 105258. https://doi.org/10.1016/j.jpubeco.2024.105258.

[181] de Weerd, M., Tierney, R., van Duuren-Stuurman, B., and Bertranou, E. (2013). *Estimating the Cost of Accidents and Ill Health at Work*. European Agency for Safety and Health at Work. Luxembourg: Publications Office of the European Union Available at: https://publications.europa.eu/resource/cellar/1494caf6-6dd9-441a-8cf8-248826156bd2.0004.02/DOC_1.

classified into **productivity losses, healthcare expenses, quality-of-life losses, administrative costs, and insurance/compensation costs**, accruing to different stakeholders (workers, employers, governments and society at large). This section quantifies and estimates the specific OSH costs attributable to extreme weather[182] in the EU27, drawing on recent research and case examples, and highlights gaps where data remain limited.

Figure 22: Annual economic losses caused by weather-and climate-related extreme events in the EU Member States



Source: EEA (2025) *Economic losses from weather- and climate-related extremes in Europe*. Available at: https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related.

Note: these are economy-wide.

3.5.1. Productivity costs (lost output and workdays)

Extreme weather-related injuries and illnesses reduce productivity through lost working time, lower work capacity, and disruption of operations. As seen in section 3.1.1, heat stress significantly reduces workers' performance, concentration, decision-making ability, and physical work capacity, leading to reduced intensity, longer breaks, and thus decreased productivity. Research shows that work time loss due to workplace temperature follows a U-shaped relationship, where the least work time loss is observed at 18°C[183]. This finding suggests that work time loss due to temperature is more widespread than previously thought, extending to thermal conditions previously considered not so extreme. Another study showed that for every 1°C rise in daily high temperature within the 20–32°C range, labour productivity can drop by about 6.5% for physically demanding jobs; in extreme heat (e.g. ~40°C), work capacity for heavy outdoor work can virtually collapse, with over 80% productivity loss observed in Italian

[182] Due to data limitations, most estimations regard heatwaves with some data also quantifying the impact of other extreme weather events.

[183] Ioannou, L.G., Tsoutsoubi, L., Mantzios, K., Gkikas, G., Agaliotis, G., Koutedakis, Y., García-León, D., Havenith, G., Liang, J., Arkolakis, C., Glaser, J., Kenny, G.P., Mekjavic, I.B., Nybo, L. and Flouris, A.D. (2025) The impact of workplace heat and cold on work time loss. *Journal of Occupational and Environmental Medicine,* 67(6), pp. 393–399. Available at: https://doi.org/10.1097/JOM.0000000000003332.

case studies[184]. Recent meta-analytic evidence shows that labour productivity begins to decline at even lower levels of workplace heat stress than previously assumed. The optimal working environment appears to be around 15° Wet Bulb Globe Temperature (WBGT), with productivity decreasing by an average of 2.4% for each degree above this threshold[185].

By 2030 globally, an estimated 2.2% of total working hours worldwide may be lost to heat stress – equivalent to around 80 million full-time jobs and USD 2.4 trillion in lost output – with Europe's losses amounting to about 0.1% of working hours[186]. Using the most recent figures for the EU27, with approximately 217 million employed persons[187] and an average working time of 1,872 hours per year[188], total annual working hours amount to roughly 406.2 billion hours. Based on the International Labour Organisation's (ILO) projection that 0.1% of working hours in Europe may be lost annually due to heat stress by 2030, this implies an estimated loss of 406 million hours per year. Assuming average hourly productivity derived from EU27 GDP (around EUR 17 trillion[189]), this translates to a lost output of approximately EUR 17 billion per year. This estimate assumes a direct proportional relationship between hours worked and economic output and serves as an indicative measure of the scale of productivity loss due to rising temperatures in the workplace. However, during the major heatwaves of 2003, 2010, and 2015, Europe already experienced economic output losses equivalent to roughly EUR 50–80 billion (in 2025 euros) — or about 0.3–0.5 % of EU GDP — due to reduced labour productivity[190], showcasing that the impacts can be even more substantial.

Southern Europe, as one of the most hit regions, is already experiencing significant productivity impacts: one analysis found that in 2020, GDP per capita growth in Southern EU countries was nearly 1% lower due to above-average temperatures, whereas no such effect was seen in Northern Europe[191] (*Figure 23*). Over the long term, climate projections warn of escalating losses. Another study showed that average labour productivity in Europe could decline 0.7% by

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184 Climate ADAPT (2025) *Occupational heat stress, adaptation and prevention policies (Worklimate 2.0)*. Available at: https://climate-adapt.eea.europa.eu/en/metadata/projects/worklimate-2-0-occupational-heat-stress-adaptation-and-prevention-policies.

185 Ioannou, L. G., Foster, J., Morris, N. B., Piil, J. F., Havenith, G., Mekjavic, I. B., Kenny, G. P., Nybo, L., and Flouris, A. D. (2022) Occupational heat strain in outdoor workers: A comprehensive review and meta-analysis, *Temperature*, 9(1), pp. 67–102. Available at: https://doi.org/10.1080/23328940.2022.2030634.

186 International Labour Organisation (2019) *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_711919.pdf.

187 Eurostat (2024) *GDP stable and employment up by 0.3% in the euro area*. Available at: https://ec.europa.eu/eurostat/web/products-euro-indicators/-/2-08032024-ap.

188 Eurostat (2025) *People in the EU worked on average 36 hours per week*. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250514-1.

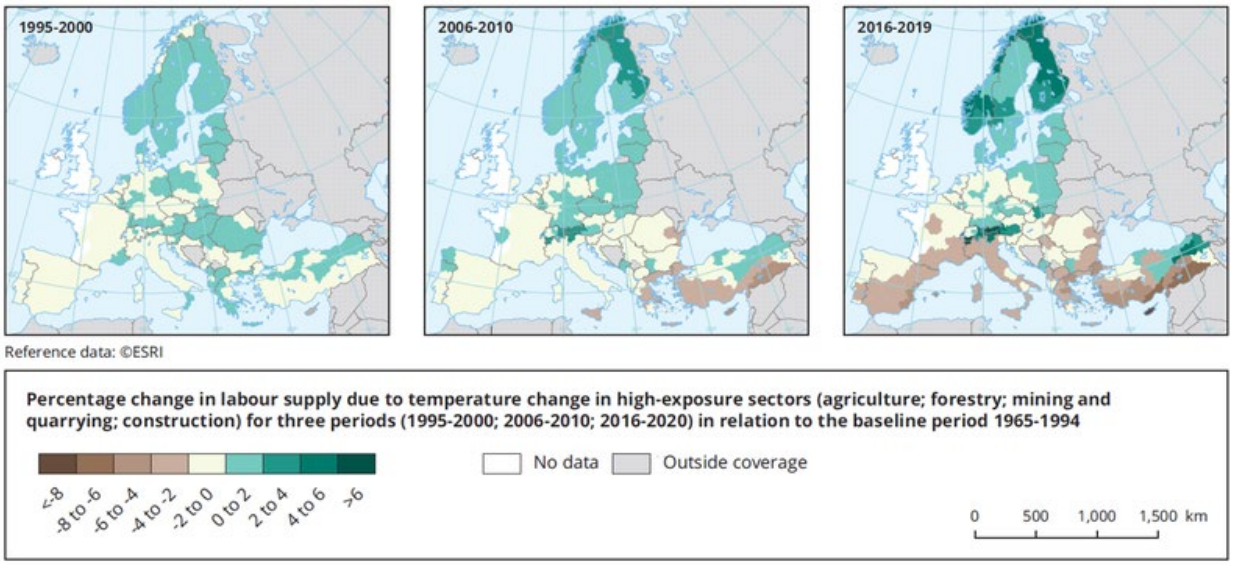
189 *Facts and figures on the European Union* (n.d.). Available at: https://european-union.europa.eu/principles-countries-history/facts-and-figures-european-union_en.

190 García-León, D., Casanueva, A., Standardi, G., Burgstall, A., Flouris, A. D., and Nybo, L. (2021) Current and projected regional economic impacts of heatwaves in Europe. *Nature Communications*, 12, 5807. Available at: https://doi.org/10.1038/s41467-021-26050-z.

191 Ibid.

the 2080s, with annual economic losses reaching EUR 563 billion (about 1.15% of GDP) under worst-case warming. Regional variation was also noted: Spain, Italy, Greece, Cyprus and Romania were said to lose around 2% of their GDP by 2080s, or 3%–5% under the worst-case scenario; Central European MS could lose 0.6% of their GDP (1.1% in the worst-case scenario) by the 2080s; the northern European losses would not exceed 0.23% GDP even in the worst-case outlook[192].

Figure 23: Percentage change in labour supply due to temperature change in high-exposure sectors (agriculture; forestry; mining and quarrying; construction) relative to the baseline period 1965–1994



Source: European Climate and Health Observatory (2023) *Labour productivity effects*. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/occupational-health-safety/labour-productivity-effects.

While heat is the most studied risk, other extremes also cause productivity losses – cold stress on "ice days" has been shown to increase accident rates and sick leave as well[193], while storms and floods can halt operations entirely in affected workplaces. In Finland, for example, over 500,000 people have experienced cold negatively affecting their work environment, thus consequently reducing their productivity and increasing the risk of injuries[194]. For instance, a study analysing the impact of floods on European manufacturing firms found that water damages significantly and persistently worsen firm performance, potentially endangering their

[192] Szewczyk, W., Mongelli, I. and Ciscar, J.-C. (2021). Heat stress, labour productivity and adaptation in Europe—A regional and occupational analysis. *Environmental Research Letters*, 16(10), 105002. Available at: https://doi.org/10.1088/1748-9326/ac24cf.

[193] Drescher, K. and Janzen, B. (2025). When weather wounds workers: The impact of temperature on workplace accidents. *Journal of Public Economics*, 241, 105258. Available at: https://doi.org/10.1016/j.jpubeco.2024.105258.

[194] Anttonen, H., Pekkarinen, A. and Niskanen, J. (2009) Safety at work in cold environments and prevention of cold stress. *Industrial Health,* 47(3), pp. 254–261. Available at: https://doi.org/10.2486/indhealth.47.254.

survival[195]. Notably, EU-wide working-hour and productivity losses from these events have not been well quantified. Overall, evidence thus points to growing productivity costs for employers and society, running into hundreds of millions of euros annually, as extreme weather events become more frequent.

3.5.2. Healthcare and medical costs

When workers are injured or fall ill due to extreme weather conditions, substantial healthcare costs are incurred for emergency response, treatment and rehabilitation. These costs may be borne by public health services, employers (in the form of workplace medical aid) and insurance systems. In the EU27, data on aggregate healthcare expenditures specifically attributable to extreme weather-related OSH cases remain scarce. Nevertheless, country-level studies provide insight. In Spain, heat-related workplace injuries are estimated to generate around EUR 28 million per year in direct healthcare costs (hospital care, medications, etc.), while the number for cold-related healthcare costs amounts to EUR 4.38 million[196]. Similarly, a study in South Australia (with a much smaller population than any EU MS) found over AUD 6 million in annual medical costs from occupational heat stress cases[197], underscoring that the medical burden scales with population and climate.

In the record-hot European summer in the last few years, hospitals in EU MS like France (over 22,000 heat-related instances in the summer of 2022 alone)[198], Italy[199] and Greece[200] treated numerous people (both workers and general population) for heat exhaustion and heat stroke, sometimes overwhelming local health services (although comprehensive cost tallies are not yet reported). Research also shows that hospital overcrowding during heatwaves can be a major driver of excess mortality, including among patients whose conditions are unrelated to heat

[195] Fatica, S., Katay, G., and Rancan, M. (2022) *Floods and firms: Vulnerabilities and resilience to natural disasters in Europe*. JRC Working Papers in Economics and Finance, 2022/13. Available at: https://civil-protection-knowledge-network.europa.eu/system/files/2024-04/JRC132125_01.pdf.

[196] Martínez-Solanas, È., López-Ruiz, M., Wellenius, G.A., Gasparrini, A., Sunyer, J., Benavides, F.G. and Basagaña, X. (2018) Evaluation of the impact of ambient temperatures on occupational injuries in Spain. *Environmental Health Perspectives*, 126(6), 067002. Available at: https://doi.org/10.1289/EHP2590.

[197] Fulcher, J. (2022) The cost of Inaction — The failure of employers to mitigate the effects of heat stress on workers causes preventable heat-related illness, injury and fatalities and costs the U.S. economy nearly $100 billion each year. Key findings. *Public Citizen*. Available at: https://www.citizen.org/wp-content/uploads/The-Cost-of-Inaction-report-Oct-2022.pdf.

[198] Santé publique France (2022) *Heatwaves and health: A summer marked by multiple weather phenomena and a significant health impact*. Available at: https://www.santepubliquefrance.fr/en/heatwaves-and-health-a-summer-marked-by-multiple-weather-phenomena-and-a-significant-health-impact.

[199] Alfano, V., Serini, F. and Scaletti, A. (2024). Addressing heatwave impacts on hospital admissions in an Italian region. *Scientific Reports*, 14(1), 27994. Available at: https://doi.org/10.1038/s41598-024-79652-0.

[200] Ballester, J., Quijal-Zamorano, M., Méndez Turrubiates, R. F., Pegenaute, F., Herrmann, F. R., Robine, J. M., Basagaña, X., Tonne, C., Antó, J. M., and Achebak, H. (2023). Heat-related mortality in Europe during the summer of 2022. *Nature Medicine,* 29(29), pp. 1–10. Available at: https://doi.org/10.1038/s41591-023-02419-z.

exposure[201]. This all points towards higher healthcare and medical costs, deriving from higher admission or mortality rates.

Beyond heat, other extremes also drive healthcare spending: flood events can cause injuries (drownings, fractures, electrocutions) requiring acute care, and wildfire smoke inhalation or burns among firefighters lead to significant treatment and recovery costs. Yet, there is no concrete research done in estimating these costs at either the national or EU levels. In addition, chronic conditions linked to extreme weather exposures further add to healthcare costs over the long term, both for the individual worker and the healthcare system overall. For example, firefighters exposed to wildfires may suffer chronic respiratory illnesses or post-traumatic stress disorder requiring treatment. These prolonged health impacts attributable to extreme weather at work are not yet quantified in monetary terms for the EU, representing a notable data gap.

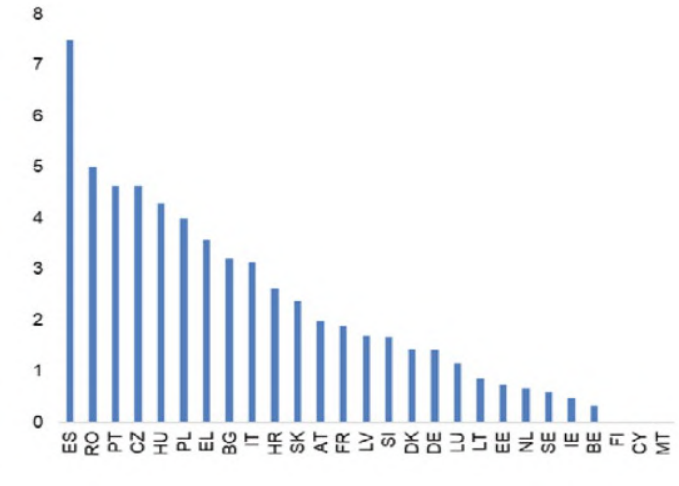
3.5.3. Insurance and compensation costs

The financial burden of extreme weather on occupational safety and health is also mediated through insurance and compensation systems. Insurance is a critical mechanism for spreading risk and cushioning economic shocks. However, most climate-related losses in Europe remain uninsured (only about one-quarter of catastrophe losses are insured): in 2022, for example, EUR 8.2 billion of weather-related losses (44.2%) were uninsured[202], creating a large "climate protection gap". Country-level variation is sharp, with the most exposed Member States mainly located in Southern and Eastern Europe (see *Figure 24*). Notably, these estimates do not differentiate specifically OSH-related losses, yet these figures remain important to consider.

[201] Aguilar-Gomez, S., Zivin, J. G. and Neidell, M. (2025). Extreme heat, hospital crowding, and the hidden health costs of climate change. *CEPR.* Available at: https://cepr.org/voxeu/columns/extreme-heat-hospital-crowding-and-hidden-health-costs-climate-change.

[202] van Daalen, K.R., et al. (2024) The 2024 Europe report of the lancet countdown on health and climate change: unprecedented warming demands unprecedented action', *The Lancet Public Health*, 9(6), e315–e325. Available at: https://doi.org/10.1016/S2468-2667(24)00055-0.

Figure 24: Uninsured economic losses from extreme events (% of country GDP), by country, 1980–2020



Source: Gagliardi, N. et al. (2022) The fiscal impact of extreme weather and climate events: Evidence for EU countries, *European Economy*. Available at: https://doi.org/10.2765/867213; based on The Emergency Events Database (EMDAT; CRED, UCLouvain). *Note: data for Malta, Cyprus, and Finland are missing.*

In Europe, many of the OSH costs are absorbed by national accident insurance funds or social insurance, which ultimately spreads the cost across employers (via premiums) and society. Available evidence indicates a rising financial toll on these systems due to climate-related incidents. In Italy, for example, the National Institute for Insurance against Accidents at Work (INAIL) data revealed that extreme heat exposure was responsible for over EUR 292 million in injury compensation payouts between 2014 and 2019 – roughly EUR 49 million per year in insurance costs directly attributable to workplace heat stress[203]. This covers benefits paid to workers for lost wages, treatment, and disability due to heat-related injuries. In Spain, portions of the EUR 366 million annual total cost were also essentially insurance costs: the "worker income loss" (EUR 56 million) and health care (EUR 32 million) components are often covered by Spain's employer liability insurance and public insurance, meaning insurers and the state bear those financial burdens on behalf of workers[204].

Private insurers are beginning to factor in climate extremes as a driver of higher occupational risk. For instance, major reinsurance firms have flagged extreme heat as an emerging top risk that could increase workers' compensation claims and premiums in certain sectors (e.g. construction, agriculture)[205]. However, Europe's current insurance gap means that a large share

[203] Marinaccio, A., Gariazzo, C., Taiano, L., Bonafede, M., Martini, D., D'Amario S., de'Donato, F., and Morabito, M. (2025) Climate change and occupational health and safety. Risk of injuries, productivity loss and the co-benefits perspective, *Environmental Research*, 269, 120844. Available at: https://doi.org/10.1016/j.envres.2025.120844.

[204] Martínez-Solanas, È., López-Ruiz, M., Wellenius, G.A., Gasparrini, A., Sunyer, J., Benavides, F.G. and Basagaña, X. (2018) Evaluation of the impact of ambient temperatures on occupational injuries in Spain. *Environmental Health Perspectives,* 126(6), 067002. Available at: https://doi.org/10.1289/EHP2590.

[205] Goh, W. (2024) Time for a global reckoning on extreme heat risk. *Swiss Re*. Available at: https://www.swissre.com/risk-knowledge/mitigating-climate-risk/time-for-a-global-reckoning-on-extreme-heat-risk.html.

of OSH-related costs from storms, floods, heatwaves and other extremes is ultimately borne by employers (through uninsured damages and compensation payouts) and by society at large.

3.5.4. Administration costs

Extreme weather events also drive up the various administrative and organisational costs related to occupational safety and health. When weather-related accidents or illnesses occur, businesses and public agencies incur expenses in accident investigations, reporting, and regulatory compliance. Employers must manage work disruptions and reallocate staff – often at additional cost. For example, companies may need to pay overtime or train temporary replacements to maintain production while an injured worker recovers, an indirect cost estimated at about EUR 68 million per year in Spain (around EUR 88.7 million adjusted to inflation in 2025)[206]. At the government level, severe events necessitate disaster response coordination, workplace inspections, and sometimes military or civil protection mobilisation – all incurring public administration costs. Social welfare systems face increased workloads handling sick leave certifications, disability benefit claims, and early retirements resulting from climate-related health issues. Overall, while harder to quantify, the administrative and organisational efforts required to cope with extreme weather's impacts on OSH represent a notable cost for employers and authorities.

3.5.5. Quality-of-life losses (intangible costs)

Quality-of-life costs represent the intangible human toll of work-related injuries and illnesses from extreme weather – the pain, suffering, reduced functional capacity and loss of life that workers and their families experience. These costs are estimated through metrics like the value of a statistical life (VSL) or disability-adjusted life years. Research finds that these intangible costs are the largest single component of total OSH costs[207]. Some estimates of injuries and deaths related to extreme weather exposure include (both in working and general populations):

- Globally, almost 23 million occupational injuries, nearly 19,000 fatalities, and over 2 million disability-adjusted life years (DALYs) are directly linked to exposure to excessive heat at work[208];

[206] Martínez-Solanas, È., López-Ruiz, M., Wellenius, G.A., Gasparrini, A., Sunyer, J., Benavides, F.G. and Basagaña, X. (2018) Evaluation of the impact of ambient temperatures on occupational injuries in Spain. *Environmental Health Perspectives,* 126(6), 067002. Available at: https://doi.org/10.1289/EHP2590.

[207] Martínez-Solanas, È., López-Ruiz, M., Wellenius, G.A., Gasparrini, A., Sunyer, J., Benavides, F.G. and Basagaña, X. (2018) Evaluation of the impact of ambient temperatures on occupational injuries in Spain', *Environmental Health Perspectives,* 126(6), pp. 067002. Available at: https://doi.org/10.1289/EHP2590.

[208] ADAPTHEAT (2024). *Collective bargaining and social dialogue to protect workers' health and safety at work against heat and heat waves*. Available at: https://istas.net/sites/default/files/2024-09/Folleto_ADAPTHEAT_ENG-corregido_compressed.pdf.

- In Italy, over 4,000 workplace injuries annually are directly due to heat exposure[209];
- Just in summer 2025, the study looking into 854 European cities found that climate change-driven changes in temperatures have caused over 16,000 additional excess deaths[210].

Each fatality or serious illness represents not only a personal tragedy but also an economic valuation of life lost (often on the order of EUR 1–2 million per life in EU cost assessments, though such figures are inherently approximate). For non-fatal cases, workers who may suffer permanent impairments (for example, kidney failure or chronic lung disease after extreme heat or smoke exposure) endure lifelong reductions in quality of life. While the financial costs can reach hundreds of millions, the immeasurable loss of health, well-being and life remains the highest price paid that cannot be fully quantified. In Spain alone, the estimated costs of pain and suffering due to extreme weather exposure (both heat and cold) reached EUR 210 million (around EUR 273 million adjusted to inflation in 2025)[211]. Overall, more research is warranted, focusing on different types of costs, weather events, the impact of demographic factors in relation to potential adaptation and mitigation strategies[212].

[209] European Environment Agency (2025) Occupational heat stress, adaptation and prevention policies (Worklimate 2.0). *Climate-ADAPT*. Available at: https://climate-adapt.eea.europa.eu/en/metadata/projects/worklimate-2-0-occupational-heat-stress-adaptation-and-prevention-policies.

[210] Barnes, C., et al. (2025) Summer heat deaths in 854 European cities more than tripled due to climate change, *Imperial Grantham Institute.* Available at: https://doi.org/10.25560/123873.

[211] Martínez-Solanas, È., López-Ruiz, M., Wellenius, G.A., Gasparrini, A., Sunyer, J., Benavides, F.G. and Basagaña, X. (2018) Evaluation of the impact of ambient temperatures on occupational injuries in Spain', *Environmental Health Perspectives,* 126(6), pp. 067002. Available at: https://doi.org/10.1289/EHP2590.

[212] Borg, M.A., Xiang, J., Anikeeva, O., Pisaniello, D., Hansen, A., Zander, K., Dear, K., Sim, M.R., and Bi, P. (2021) Occupational heat stress and economic burden: A review of global evidence, *Environmental Research*, 195, 110781. Available at: https://doi.org/10.1016/j.envres.2021.110781.

4. RELEVANT LEGISLATION AND POLICIES ACROSS THE EU

This Chapter examines how the European Union and national policy frameworks address the growing OSH risks posed by extreme weather events, and where significant shortcomings remain. It begins by reviewing the EU's legislative foundations and non-legislative initiatives, assessing how far existing directives, strategies and guidance capture climate-related risks such as heat, cold, storms and flooding. The Chapter then compares approaches across Member States, highlighting the divergence between countries that have introduced specific legal standards and operational protocols, and those that continue to rely largely on general OSH duties and voluntary measures. Case studies (see *ANNEX 3*) provide more granular insight into recent reforms, inspectorate practices, data collection systems and the role of social partners in negotiating workplace protections. By mapping these developments and gaps, the Chapter aims to clarify where EU-level action could add most value, and to identify forward-looking measures that can strengthen the resilience of workplaces and safeguard workers' health and well-being in a changing climate.

4.1. European Union competencies, policies and legislation, as well as remaining gaps and challenges

EU legislative instruments

Ensuring the health and safety of workers is a fundamental obligation embedded in the EU Treaties (article 153 of the Treaty on the Functioning of the European Union (TFEU)) and reaffirmed in the Charter of Fundamental Rights of the European Union. This right is further reinforced in Principle 10 of the European Pillar of Social Rights, which recognises every worker's entitlement to a healthy, safe, and well-adapted work environment. Moreover, safeguarding occupational health and safety is an essential component of the broader vision for a European Health Union under construction, which aims to strengthen the EU's collective capacity to prevent and respond to cross-border health threats, including those exacerbated by climate change and environmental pressures[213].

In recent years, climate change has also become an increasingly recognised driver of occupational health and safety risks in the European Union. The policy discussion on how to protect workers from the adverse effects of extreme weather has encompassed EU legislation, guidance, high-level political support, and other recent policy developments considering the climate-related OSH risks. While the EU currently lacks binding or more targeted OSH measures linked specifically to heat, UV radiation, flooding, or air quality, the protection of workers in extreme weather conditions falls within the broader EU legal framework that ensures a safe and healthy working environment.

[213] *Health crisis preparedness* (no date). European Commission. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/promoting-our-european-way-life/european-health-union/health-crisis-preparedness_en.

The **Framework Directive 89/391/EEC** on the introduction of measures to encourage improvements in the safety and health of workers at work[214] underpins this system. It obliges employers to evaluate all workplace risks and implement preventive measures according to a hierarchy of controls. The Framework Directive guarantees minimum safety and health requirements throughout Europe, while Member States are allowed to maintain or establish more stringent measures. Extreme temperatures or weather conditions are covered under this general duty, even though not singled out by name. In principle, employers must assess hazards like excessive heat, severe cold, or dangerous weather and take appropriate collective and individual protection measures. The Framework Directive thus provides a legal basis to address climate-related OSH risks (such as heat stress) as part of the employer's overall risk assessment responsibilities[215].

Complementing it, **24 individual directives** address particular risks, groups and settings as well as oblige employers to ensure that working environments, including thermal conditions, are appropriate to the nature of the work being performed. More specific connections and their coverage of extreme weather conditions are explained in *Table 8*.

Table 8: OSH Framework Directive "daughter" directives' coverage of extreme weather conditions and their impact on OSH

Directive	Extreme weather coverage and remaining gaps
Directive 92/57/EEC on temporary or mobile construction sites and the accompanying non-binding guide for its implementation[216]	Explicitly requires protection against adverse atmospheric conditions (rain, wind, temperature extremes). After extreme events (storms, floods, seismic activity), scaffolding and structures must be re-inspected.
Directive 89/654/EEC on workplace requirements[217]	Requires indoor workplaces to have temperature and ventilation adequate for human beings. Relevant for maintaining safe thermal environments during heatwaves and cold spells; ensuring building safety during storms/floods (though no specific temperature limit is given in the EU text).

[214] EU-OSHA (2021) *Directive 89/391/EEC – OSH "Framework Directive"*. Available at: https://osha.europa.eu/en/legislation/directives/the-osh-framework-directive/1.

[215] Cefaliello, A. (2024) Heat stress at work, *World Commerce Review*. Available at: https://worldcommercereview.com/heat-stress-at-work.

[216] EU-OSHA (2024) *Directive 92/57/EEC - temporary or mobile construction sites*. Available at: https://osha.europa.eu/en/legislation/directives/15.

[217] EU-OSHA (2021) *Directive 89/654/EEC - workplace requirements*. Available at: https://osha.europa.eu/lt/legislation/directives/2.

Directive	Extreme weather coverage and remaining gaps
Directive 89/656/EEC on the use of personal protective equipment (PPE)[218]	Employers must provide PPE if risks cannot be otherwise prevented. Relevant for protecting against weather exposure (e.g. insulated clothing for cold, breathable reflective clothing for heat, waterproof gear for storms, UV protection outdoors). Does not list "heat" or "cold" specifically. Natural UV radiation from the sun is also not explicitly regulated by the EU's Artificial Optical Radiation Directive, so sun protection relies on this general PPE duty and national initiatives.
Biological Agents Directive 2000/54/EC[219]	Requires assessment and prevention of risks from biological agents. Relevant because climate change and extreme weather increase exposure to pathogens (e.g. vector-borne diseases like West Nile virus).
Directives 92/91/EEC and 92/104/EEC on Mineral-extracting industries (drilling and underground/surface mines)[220]	Requires safety measures in oil and gas drilling facilities as well as mines. Extreme weather offshore (storms, flooding, heat) can compromise rig safety; operators must account for these risks in prevention measures. Heat accumulation underground is a concern, as are floods and stormwater infiltration; the directive obliges preventive ventilation, drainage, and monitoring.

Source: Author's own elaboration.

In addition to the OSH Framework, the Seveso III Directive (2012/18/EU) on industrial accident prevention obliges high-risk sites to consider natural hazard triggers in their safety plans – this is more an environmental safety law, but it means facilities must account for floods or lightning that could cause chemical accidents, protecting workers and communities. Overall, while the EU OSH legislative framework provides a broad mandate to manage extreme weather risks, it does so mostly through general clauses (duty of care, risk assessment) rather than specific standards for heat, cold, or weather extremes.

[218] EU-OSHA (2021) *Directive 89/656/EEC - use of personal protective equipment.* Available at: https://osha.europa.eu/lt/legislation/directives/4.

[219] EU-OSHA (2025) *Directive 2000/54/EC – biological agents at work*. Available at: https://osha.europa.eu/en/legislation/directives/exposure-to-biological-agents/77.

[220] EU-OSHA (2024) *Directive 92/91/EC – mineral-extracting industries – drilling.* Available at: https://osha.europa.eu/lt/legislation/directives/11;
EU-OSHA (2024) *Directive 92/104/EEC – mineral-extracting industries.* Available at: https://osha.europa.eu/lt/legislation/directives/12.

EU non-legislative instruments and initiatives

The strategic framework for OSH at the EU level is underpinned by the **2021-2027 EU Strategic Framework on Health and Safety at Work**[221], announced in the European Pillar of Social Rights action plan. This strategic document acknowledges climate change and extreme weather as emerging OSH risks and prioritises anticipating and managing change in the evolving world of work. While non-binding, it sets OSH policy priorities and encourages Member States, social partners and companies to develop measures for climate-linked risks, including extreme weather events (e.g. heatwaves). It also guides EU funding for research and awareness (see EU-funded project examples in the Box below).

Box 1: Horizon 2020 / Horizon Europe project examples

- **HEAT-SHIELD** (funded by Horizon 2020, 2016-2021): this project aimed to address the negative effects of climate change – notably rising workplace temperatures – on workers' health and productivity. HEAT-SHIELD developed adaptation strategies for five major industries of the EU (manufacturing, construction, transportation, tourism, and agriculture) to project workers from heat stress and prevent productivity loss.
- **CATALYSE** (part of the European Climate Change and Health Cluster, funded by Horizon Europe, 2022-2027): part of it involves developing frameworks, evidence, guidelines, and training to reduce vulnerability to climate change among migrant and outdoor workers. It also creates training materials for health professionals to support adaptation and mitigation, with the overall aim of safeguarding occupational health under increasing extreme heat while also reducing greenhouse emissions.
- **INTERCAMBIO** (Horizon Europe, 2024-2029): in response to growing concerns about the impact of climate change and occupational health, this research project aims to understand and address mental and physical health challenges among workers. The overall objective is to promote awareness, new working practices, and other evidence-based interventions.

Source: Author's own elaboration.

Other research initiatives include the **European Climate and Health Observatory (Climate-ADAPT),** a joint initiative by the European Commission, EEA and several other research organisations, that disseminates information on how climate change impacts health and safety – including a section on occupational health and extreme weather. It compiles evidence and case studies, such as how heatwaves reduce labour productivity and how floods or wildfires

[221] EU-OSHA (n.d.) *EU Strategic Framework on Health and Safety at Work 2021-2027*. Available at: https://osha.europa.eu/en/safety-and-health-legislation/eu-strategic-framework-health-and-safety-work-2021-2027.

endanger emergency responders[222]. While not dedicated specifically to OSH**, the EU4Health programme** 2021-2027[223] also supports projects on health resilience (e.g. heat-health action plans, crisis preparedness), which can indirectly benefit workers' safety during extreme weather events. Similarly, **Programme for the Environment and Climate Action (LIFE)** 2021-2027[224] funds pilot and demonstration projects on climate change adaptation that could indirectly support work environment adaptation and preparedness against climate-change-induced challenges.

More recently, in March 2024, the European Commission released a **Communication** titled "**Managing climate risks - protecting people and prosperity**"[225], responding to the first-ever **European Climate Risk Assessment (EUCRA)** conducted by EEA[226]. The EUCRA identifies 36 climate-related risks across sectors such as health, infrastructure, and the economy, emphasising the urgency for immediate action. The Commission's Communication underscores the necessity for enhanced resilience and preparedness to address escalating climate threats, including extreme weather events like heatwaves and floods, which pose significant challenges to occupational health and safety. It advocates for systemic, cross-sectoral strategies that empower stakeholders at all levels to implement effective climate risk management practices.

Further reinforcing this approach, on 27 November 2024, **the Advisory Committee for Safety and Health at Work** adopted an **Opinion focusing on climate change and extreme weather conditions**[227]. This Opinion highlights the imperative to incorporate climate-related risks into OSH policies, ensuring that workers, especially those in vulnerable sectors, are protected against the adverse effects of climate change. The Committee's recommendations aim to guide the European Commission in developing comprehensive strategies that address the intersection of climate change and workplace safety.

High-level political support and a call for action to tackle climate-related OSH risks have been expressed by the **European Parliament** (EP) on multiple occasions as well. For instance, the Parliament Resolution of 23 October 2024 on the Guidelines for Employment Policies of the Member States called for 'a "vision zero" approach aiming to prevent work-related deaths, including the prevention of hazards to workers from extreme weather caused by climate change

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[222] European Climate and Health Observatory (2021) *Effects on occupational health and safety*. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/occupational-health-safety.

[223] European Commission (n.d.) *EU4Health programme 2021-2027 – a vision for a healthier European Union*. Available at: https://health.ec.europa.eu/funding/eu4health-programme-2021-2027-vision-healthier-european-union_en.

[224] European Commission (n.d.) *Programme for the Environment and Climate Action (LIFE)*. Available at: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/programme-environment-and-climate-action-life_en.

[225] European Commission (2024) *Commission sets out key steps for managing climate risks to protect people and prosperity* [press release]. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_24_1385.

[226] EEA (2024) *European Climate Risk Assessment*. Available at: https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment.

[227] Advisory Committee for Safety and Health at Work (2024) *Opinion Climate Change – extreme weather conditions*. Doc. 016-24. Available at: https://circabc.europa.eu/ui/group/cb9293be-4563-4f19-89cf-4c4588bd6541/library/f1cb742e-1c05-482c-be79-f2065cd3c054/details.

and psychosocial risks at the workplace'[228]. Previously, in its resolution of 23 November 2023 on job creation and the just transition[229], the EP emphasised the urgent need to mitigate climate change impacts on the environment, economy, employment, well-being, and workplace health across all sectors, highlighting the necessity for comprehensive strategies to address these challenges. Crucially, in its resolution of 15 September 2022[230], the Parliament also acknowledged the gender dimension to climate change, noting that gender-differentiated roles lead to varying vulnerabilities among women and men to climate change effects, thereby intensifying gender disparities. This is an important perspective to uphold when pursuing further analysis and action in relation to OSH and climate change.

In addition, **the European Agency for Safety and Health at Work (EU-OSHA)** plays a crucial role in developing guidance, raising awareness, and providing practical resources for workplaces on how to manage the risks associated with health issues caused by extreme weather events. Their contributions include **articles**[231] on the topic, **guidelines** (e.g., to help workplaces manage heat-related issues[232]), and **tools** like the Online interactive Risk Assessment (OiRA) platform. These materials and tools are voluntary and intended to spread best practices across Europe. Particularly, national stakeholders view these materials as a positive addition to their work: for example, national OSH institutions, such as the Finnish Institute of Occupational Health (FIOH), incorporate guidance from EU-OSHA into their national recommendations[233]. Other stakeholders highlighted that common EU-level guidance is helpful because many employers operate across multiple MS and often compare national requirements. They also said that guidance coming from Europe carries more weight and is more convincing than if it were seen as a local initiative[234].

Lastly, **the Senior Labour Inspectors' Committee (SLIC)** – an EU-level network of national labour inspectors – has worked on the exchange of good practices, for instance, developing non-binding guidance for outdoor work (which covers precautions for heat, cold and storms on construction sites and in agriculture). National stakeholders have reiterated that SLIC materials are valuable for coordinating approaches across Member States and sharing best practices,

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[228] European Parliament (2024) *European Parliament legislative resolution of 23 October 2024 on the proposal for a Council decision on guidelines for the employment policies of the Member States (COM(2024)0599 – C10-0084/2024 – 2024/0599(NLE)).* Available at: https://www.europarl.europa.eu/doceo/document/TA-10-2024-0027_EN.pdf.

[229] European Parliament (2023) *European Parliament resolution of 23 November 2023 on job creation – the just transition and impact investments (2022/2170(INI)).* Available at: https://www.europarl.europa.eu/doceo/document/TA-9-2023-0438_EN.html.

[230] European Parliament (2022) *European Parliament resolution of 15 September 2022 on the consequences of drought, fire, and other extreme weather phenomena: increasing the EU's efforts to fight climate change (2022/2829(RSP)).* Available at: https://www.europarl.europa.eu/doceo/document/TA-9-2022-0330_EN.html.

[231] For example, see: EU-OSHA (2023) *Climate Change: Impact on Occupational Safety and Health (OSH).* Available at: https://oshwiki.osha.europa.eu/en/themes/climate-change-impact-occupational-safety-and-health-osh.

[232] EU-OSHA (2023*) Heat at work – Guidance for workplaces*. Available at: https://osha.europa.eu/en/publications/heat-work-guidance-workplaces.

[233] Interview with representatives from FIOH [14 August 2025].

[234] Interviews with representatives from HSA [19 August 2025] and ITSS [26 August 2025].

especially the planned outputs from the new working group "Physics" that started work in 2024 and has a 3-year mandate, particularly focusing on OSH risks from climate change[235].

Gaps and challenges

The current legal framework provides only general coverage of climate-related risks, and no specific EU-wide standards or limits exist for hazards like heat, cold, or other weather extremes. In practice, this has led to a patchwork of protections across Member States, with uneven safeguards for workers (see more in section 4.2 below).

As heat-related illnesses (heat stroke, dehydration, etc.) are emerging as a top OSH concern in Europe's warming climate, the main gap points to a lack of a directive focusing on protection from heat. Similarly, extreme cold exposure (risk of hypothermia, frostbite) is not specifically regulated at the EU level. The lack of binding limits or procedures related to temperature means that, unless national law steps in, it is up to individual employers to decide what is "safe enough". This is problematic in sectors with vulnerable or precarious workers (agriculture, construction, delivery services), where economic pressure might outweigh voluntary safety measures.

Another related gap is the lack of EU rules on natural UV radiation (sunlight) exposure at work. Although skin cancer is a risk for outdoor workers under intense sun (exacerbated by heat and clear skies), the EU's Optical Radiation Directive deliberately excluded sunlight, leaving it to national decision[236]. Similarly, there is no dedicated EU directive on emergency preparedness for natural disasters in workplaces, aside from the major hazards industries (Seveso III Directive for chemical sites). The gap is usually managed by national disaster-response regulations and company-level emergency planning. While the EU's Civil Protection Mechanism coordinates disaster response, worker safety standards in response operations or the preventative measures at the workplace are not harmonised at the EU level.

Overall, while the EU's non-legislative instruments are valuable, the challenge remains in practical adoption and implementation, as they are not enforceable. Without binding EU requirements, proactive companies may implement heat and flood safety plans, whereas less resourceful ones might not, creating inequality in worker protection[237]. In addition, while guidance produced by EU agencies like EU-OSHA and by SLIC is generally viewed positively by various stakeholders, primarily as useful supplementary tools for knowledge sharing, guidance, and awareness-raising, their perceived effectiveness often stops short of influencing binding practice, leading to a divide in how social partners view their ultimate value compared to binding legislation.

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[235] Interview with representatives from ITSS [26 August 2025].

[236] Euractiv (2006). *No EU regulation on sunlight*. Available at: https://www.euractiv.com/news/no-eu-regulation-on-sunlight.

[237] Interview with Marouanne Laabbas el Guennouni [17 July 2025].

4.2. Mapping and comparative analysis of Member States' approaches

This section examines how national OSH policy frameworks across the EU address the risks posed by extreme weather, comparing the extent to which Member States have translated the general EU-level obligations into explicit, enforceable, and operational measures. It reviews legislative, strategic, and practical approaches to prevention and adaptation—highlighting the diversity of national systems and identifying emerging patterns of convergence. The comparative analysis draws on the findings of national policy mapping and seven in-depth case studies (Poland, Lithuania, Spain, Italy, the Netherlands, Finland, and Ireland, see *ANNEX 3*). Together, these insights provide a comparative picture of how national frameworks are evolving to integrate climate-related OSH risks and strengthen resilience against extreme weather across Europe.

4.2.1. OSH policy framework, its coverage of extreme weather events, operational tools and financial support

All EU Member States ensure that extreme weather risks (heat, cold, storms, etc.) are at least implicitly covered under their occupational safety and health frameworks. In every Member State, the foundational OSH legislation with the EU OSH Framework Directive at the core imposes a general duty on employers to safeguard workers from all hazards, which, by interpretation, includes weather-related risks. In this sense, no Member State entirely ignores extreme weather – the baseline employer obligation to ensure safe working conditions applies everywhere as enshrined in the EU-level framework. All countries also encourage risk assessment processes to account for climatic conditions (e.g. including heat/cold in mandatory workplace risk assessments).

Box 2: Recent national regulatory initiatives tightening OSH protections against extreme weather events

- **Spain**: Royal Decree-Law 4/2023 (May 2023) obliges employers to adapt or halt outdoor work when the national meteorological agency (AEMET) issues orange/red heat alerts. This replaced vague "inclement weather" provisions with clear, enforceable obligations linked to official alert levels. For more details on the Spanish initiatives, see *ANNEX 3 – Spain.*
- **Belgium**: *Code du bien-être au travail – Livre V, Titre 1* fixes WBGT-based action limits (29°C light, 26°C moderate, 22°C heavy, 18°C very heavy; introduced in 2012). Exceedance triggers mandatory measures: ventilation, provision of cool drinks, extra breaks, and rest facilities, applicable to both indoor and outdoor work.
- **Malta**: Occupational Health and Safety Authority (OHSA) binding rules for construction (July 2025) introduced sector-specific heat protections: free drinking water, shaded rest areas, high-SPF sunscreen, regular cooling breaks, and prohibition of shirtless work. A 40°C action threshold obliges supervisors to reassess and adapt working conditions.
- **Italy**: In 2025, several regions introduced binding bans on outdoor work during peak heat hours (e.g. 12:30–16:00); see more in *ANNEX 3 – Italy*.
- **Greece**: Ministerial decisions (2023 and 2025) mandated midday outdoor work stoppages (12:00–17:00) when WBGT > 32.2°C or air temperature ≥ 40 °C. Non-compliance carried fines. These emergency measures, based on OSH Law 3850/2010, have been repeatedly enacted during summer heatwaves.

Source: Author's own elaboration based on policy mapping sources (see *REFERENCES* and *ANNEX 3*).

In addition, all MS have introduced some forms of non-binding measures (e.g., labour inspectorates' guidance, awareness-raising campaigns) to complement existing legislation on working safely in extreme weather. These measures may differ in scope and degree of formalisation, but it is evident that no MS relies exclusively on binding legal provisions.

Since around 2023, a few Member States have started issuing binding legal measures specifically targeting extreme-weather-related risks and outdoor working environments. These initiatives are diverse in their approaches: some trigger particular rules with meteorological alerts (Spain) or Wet-bulb Globe Temperature (WBGT) values (Cyprus and Belgium), while other countries rely on sectoral (Malta) or regional (Italy) rules or temporary ministerial orders (Greece) rather than permanent, cross-sector norms.

Dimensions of national approaches

Taking into consideration the newest initiatives or updates, the divergence in how explicit or prescriptive the policy frameworks are in addressing extreme weather impact on OSH has

significantly grown. Below, we discuss different dimensions and aspects of divergence identified through comparative analysis of EU27 policies.

Legislation and standards

A subset of MS has specific legal provisions or standards addressing extreme temperatures. For instance, Belgium's Code of Well-being at Work sets concrete action limits based on WBGT heat index (e.g. WBGT 29°C for light work, 22°C for heavy work) and requires ventilation, breaks, and cool drinks when those thresholds are exceeded. Romania's regulations mandate certain measures once temperatures rise above 37°C (or fall below –20°C), such as providing 2–4 litres of water per worker, shading, reduced work pace, etc., triggered by official heat/cold warnings. Several others (e.g. Austria, Czechia, Slovakia, Cyprus) set numeric temperature guidelines or limits only for indoors or in other legally-binding documents (like collective bargaining agreements). Poland is moving toward statutory maximum temperature limits – a forthcoming regulation (still in draft stage; should enter into force by 2027) will prohibit work above 35°C indoors (32°C for heavy outdoor work) except with special measures. For more details on the different countries' limits and related measures, see *ANNEX 2*.

In contrast, many MS have no fixed temperature cut-offs in legislation, instead relying on the general duty. For example, Sweden and Denmark have broadly worded rules that workplaces must have a "suitable" thermal environment and specify exact temperature limits only in guidelines as recommended thresholds.

Policy reactions to extreme weather events

Policy responses tend to closely track climatic exposure and the recent intensity of extreme weather events. Member States in the Mediterranean region have consistently experienced severe heatwaves and other events that have prompted the governments to introduce stronger and more specific rules and operational protocols. For example, Greece reacted to unprecedented heat in 2023–2025 by issuing emergency ministerial decisions mandating midday work stoppages and breaks during heatwaves. Spain, after record heat and floods, updated its laws in 2023 and 2024 to explicitly require adjusting or halting outdoor work when the national meteorological agency issues orange/red weather alerts and included a paid climate leave allowing workers to stay home during life-threatening weather emergencies.

On the other hand, countries in the rest of Europe tend to rely on existing OSH rules and voluntary measures rather than new laws. While some more recent responses are observed (e.g., Sweden's authority gave extra recommendations during the 2018 heatwave), they are limited to non-binding measures such as guidance, awareness-raising campaigns or other support measures (e.g., the heat hotline established in Austria in 2025 summer). Overall, reactive approaches also differ substantially in specificity, ranging from detailed temperature-based mandates and guidance in some nations to purely general duties supplemented by advice in others, correlating with the geographical location and exposure of the country.

Guidance and enforcement

While all MS provide non-legislative guidance to supplement their laws, the breadth, content, and formality vary significantly. Commonly, national labour inspectorates or OSH institutes issue seasonal guidance (e.g. summer heat advisories, winter weather bulletins) to translate obligations into practical steps. For example, Bulgaria's Labour Inspectorate in 2025 circulated a summer notice reminding employers to shift work schedules, offer shaded breaks, and heed heat alerts, while Poland's State Inspectorate published a guide *Praca w wysokich i niskich temperaturach* (*Work in High and Low Temperatures*)[238] in 2023, and runs annual awareness-raising campaigns to spur preventive action. Many MS, therefore, share similar recommended measures (hydration, rest breaks, adjusting work hours, cooling or heating provisions, PPE for weather, etc.), communicated via guidelines rather than statutes. Some countries, instead of developing their own guidelines, rely on EU-OSHA materials (e.g., quite a few distributed the translated versions of the *Heat at work – Guidance for workplaces* publication in 2023).

The difference lies in intensity and innovation: some authorities have highly proactive programs (e.g. Spain's National Institute for Safety and Health at Work (INSST) mounts multimedia campaigns each summer and the labour inspectorate conducts special inspections for heat; France and Italy develop extensive technical guidance and toolkits), whereas others provide more basic guidance or primarily point employers to EU-OSHA materials. Nevertheless, a baseline similarity is that no MS relies solely on the law – all complement legal duties with some form of guidance, checklists or training on extreme weather risks.

Financial and support measures

MS diverge quite starkly when it comes to financial and support measures. Most MS do not have dedicated public funding or compensation for weather-related OSH measures, treating the costs of heat/cold protection as a normal employer responsibility. In a majority of countries, employers are expected to bear expenses for mitigation (e.g. providing water, shade, ventilation, protective gear, schedule adjustments) as part of their OSH duty. For instance, neither Romania nor Lithuania offers any special subsidy for weather adaptations – compliance costs are simply part of doing business safely. However, seven MS (Austria, Finland, France, Germany, Luxembourg, Italy, the Netherlands) have established financial support mechanisms,

[238] PIP (2023) *Praca w wysokich i niskich temperaturach*. Available at: https://www.pip.gov.pl/publikacje/publikacje-dla-pracodawcow/praca-w-wysokich-i-niskich-temperaturach.

especially for weather-induced work stoppages in certain sectors. Other countries also use European Social Fund (ESF), particularly in Eastern Europe (see more details in *Box 3*).

Box 3: Financial support mechanisms for weather-related OSH risks

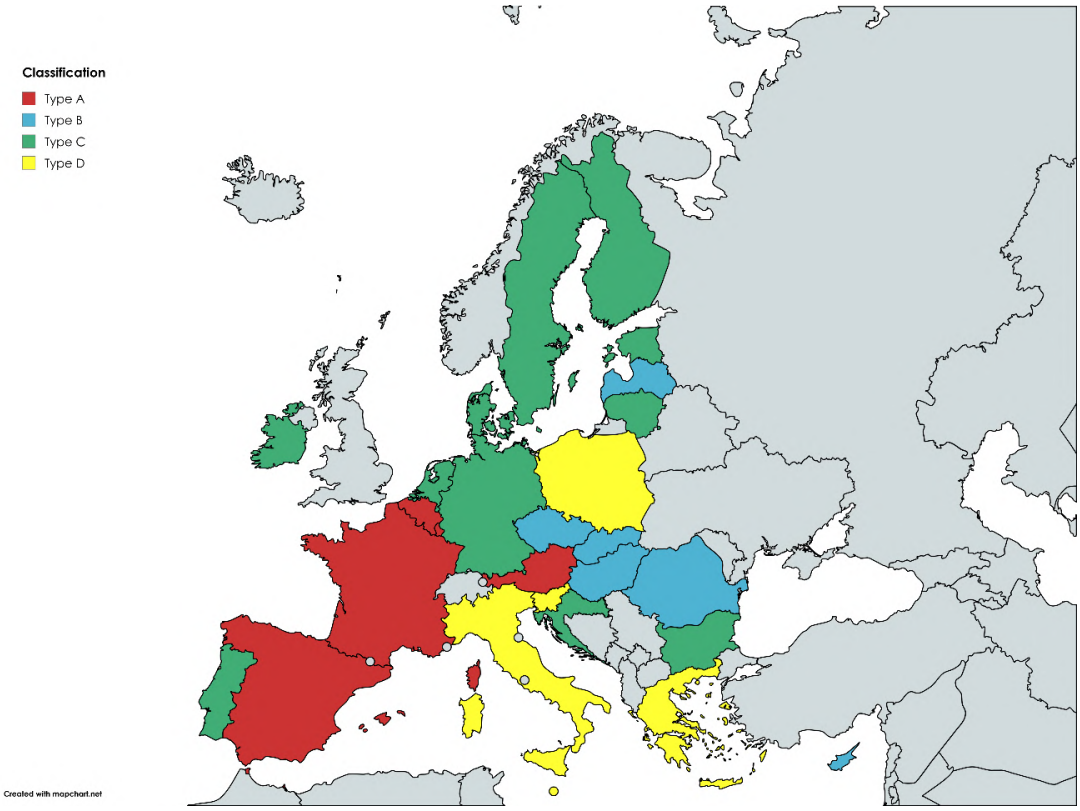
- **Bad-weather compensation schemes**: Austria's Construction Workers' Leave and Severence Pay Fund (BUAK) reimburses 60% of wages lost to heat, rain, frost or storms under the Bad Weather Compensation Act. Belgium and Luxembourg allow employers to invoke *intempéries* unemployment, with public or sectoral funds covering 60–80% of lost pay. The Netherlands' "*onwerkbaar weer*" scheme extends beyond construction, enabling firms to claim unemployment benefits during weather stoppages, typically covering 75% of wages.
- **Public funding for adaptation**: A handful of Member States channel resources into workplace climate resilience. Spain earmarked over EUR 40 million in 2023 to support heat-stress prevention and other climate-related OSH measures. Italy leverages INAIL to fund research (e.g. the Worklimate project) and reward firms with lower premiums for preventive action. Bulgaria's European Social Fund (ESF) backed Adapted Working Environment programme subsidises up to 100% of SMEs' costs for cooling and protective equipment, while Latvia uses ESF+ (2021–27) to co-finance workplace improvements and inspectorate capacity-building.

Source: Author's own elaboration based on policy mapping sources (see *REFERENCES* and *ANNEX 3*).

Classification of approaches

Considering legislation, practical measures, and support together (see *ANNEX 1* for separate classifications of legislative and non-legislative measures), we categorise overall Member States' national frameworks into a few integrated approach types. It is important to note that while we see these types often aligning with geography and extreme weather exposure intensity, historical regulatory styles and socioeconomic factors play a role as well.

Figure 25: Integrated classification by Member State



Source: Author's own elaboration using MapChart.

Type A: "Advanced integrated approach"

These Member States combine explicit legal requirements, active guidance, and some financial support. They tend to acknowledge extreme weather as a distinct OSH issue and marshal multiple policy instruments to tackle it. For example, Belgium has clear heat/cold standards in its code, robust guidance through its FPS Employment and BeSWIC portal, and a functional compensation system for weather stoppages. Austria likewise blends strict rules (comfort temperature limits, upcoming heat regulation) with practical tools (heat checklists, hotlines) and a construction sector fund for weather downtime. Spain, especially after the 2023 reforms, falls here too: it introduced new legal mandates tied to heat alerts, runs high-profile seasonal campaigns, and allocated government funding for heat risk prevention. In Luxembourg, while general duty laws apply, there is both detailed guidance (heatwave recommendations) and a generous state-backed *intempéries* unemployment scheme covering 80% of weather-lost wages. These Type A approaches can be seen as comprehensive – they leverage law, guidance, and financial mechanisms in concert. They are more common in MS that have strong social safety nets or a recent impetus to address climate risks systematically.

Type B: "Legislation-focused, support-light approach"

Member States in this group have strict regulatory provisions on paper, but relatively limited complementary programs or funding. Many Eastern European states fit here. Romania, for instance, mandates specific employer actions during extreme temperatures by law, yet

essentially leaves it to employers to fund and implement those measures, with the government's role comprising largely just enforcement and basic guidance. Slovakia and Czechia have detailed indoor climate rules, but no special financial relief for stopping work; employers must absorb the costs (though general labour inspection and public health guidelines help with compliance). These approaches ensure a baseline level of protection through law but rely on the general OSH budget, EU funds, and employer resources for execution. Non-legislative efforts tend to be moderate – e.g. periodic advisories and use of EU materials, rather than large-scale national campaigns. Type B can be thought of as "regulate and enforce" – the state sets the rules clearly and oversees compliance, but does not heavily subsidise or actively facilitate beyond that. This is often the case in countries where the government expects companies to shoulder OSH responsibilities fully, or where budget constraints limit public initiatives.

Type C: "Guidance-centric flexible approach"

These are the Member States with minimal prescriptive law but strong emphasis on guidance, consultation, and voluntary adaptation, usually coupled with general social welfare provisions. The Nordic countries and some Western European states exemplify this. Sweden and Denmark, for example, have no specific heat laws; instead, their labour inspectorates provide detailed guidelines and checklists and rely on employers' systematic risk management (backed by a culture of cooperation and strong unions). If work must stop due to weather, there might not be a special "weather fund," but workers are often protected by collective agreements (discussed in more detail in section 4.2.5) or general sick leave/unemployment benefits. Lithuania similarly emphasises public awareness and case-by-case consultation (Lithuanian State Labour Inspectorate (VDI) disseminates advisory information through media channels and provides individual advice to employers, employees and their representatives, and social partners – see *ANNEX 3*: *Lithuania*) over hard law (hygienic norms are binding but do not lead to concrete sanctions, and their enforcement depends on the inspector). In these Type C approaches, employers have leeway to determine how to meet the general duty, and regulators focus on educating and nudging them to do so. There is typically no dedicated funding aside from possibly using existing accident insurance or social security for any fallout. We classify them as guidance-centric because non-legislative measures (training, advice, campaigns) are the primary tool for achieving compliance with the broad legal duty.

Type D: "Emerging and adaptive approach"

This category covers MS that are in transition, stepping up their efforts as awareness grows or as climate impacts intensify. They might be introducing new laws or pilot programs, but those are still evolving. Greece could be seen here: historically more of a Type C (general provisions only), it has now started issuing emergency rules and is likely moving toward a more structured heat protection regime – essentially adapting due to increasing exposure to heat. Italy, until recently, had a general-duty approach, but now is bolstering it with advanced guidance (INAIL's 2022 heat guidance) and leveraging existing funds (wage guarantee schemes expanded for heat), while most action remains at the regional level. It could be going towards a Type A, given

the Framework Protocol (see section 4.2.2) signed in July 2025. Slovenia in 2025 amended its rules to add explicit outdoor heat measures (after previously relying on voluntary guidance), showing a shift from implicit to explicit – an adaptation prompted by rising summer temperatures. These emerging approaches are essentially hybrids in flux: they may soon join Type A or B as they solidify.

Crucially, as extreme weather events become more frequent under climate change, there is a **converging trend**: almost all Member States are gradually enhancing their OSH policy frameworks – whether by tightening legislation, expanding guidance, or considering financial incentives – to better protect workers from heatwaves, cold spells, storms and other climate-related extremes. The comparative analysis reveals not only differences to learn from, but also a shared trajectory toward more resilient and climate-adaptive workplaces across Europe.

4.2.2. Relevant broader policy framework

Looking at the broader strategic policy framework, encompassing OSH, climate adaptation or public health strategies, a clear pattern emerges. **MS with the most operationalised legal regimes (Type A) also have the clearest strategic recognition**. Austria, Belgium, Spain, Luxembourg, and France – all have explicit strategic references to extreme weather as an OSH issue, and strategies align tightly with their operational practice (see *Box 4* below).

Box 4: Type A countries strategies

- **Austria**: Heat-health prevention is anchored in federal public-health guidance and the national climate-adaptation strategy, both naming workers as a priority group during heatwaves; a national heat protection plan complements workplace prevention.
- **Belgium**: The Federal Heat & Ozone Plan (2019) sets a three-phase vigilance/warning/alarm system and explicitly urges employers to adapt schedules and protect outdoor staff during official heat alerts.
- **France**: The Occupational Health Plan (PST 4, 2021–2025) and National Adaptation Plan for Climate Change prioritise heat-stress prevention; the *Organisation de la Réponse de Sécurité Civile* (en. Civil Security Response Organisation, ORSEC) plan guides authorities and employers on protection during severe heat episodes.
- **Luxembourg:** The draft national adaptation strategy (first published late 2024, public consultation ongoing in 2025) calls for leveraging OSH laws to establish mandatory measures and robust enforcement to protect outdoor construction workers from extreme heat.
- **Spain:** The Strategy on Safety and Health at Work 2023–2027 explicitly addresses climate change; the National Climate Adaptation Plan emphasises protecting workers (e.g. heat-health action plans) and underpins alert-linked workplace prevention.

Source: Author's own elaboration based on policy mapping sources (see REFERENCES and *ANNEX 3*).

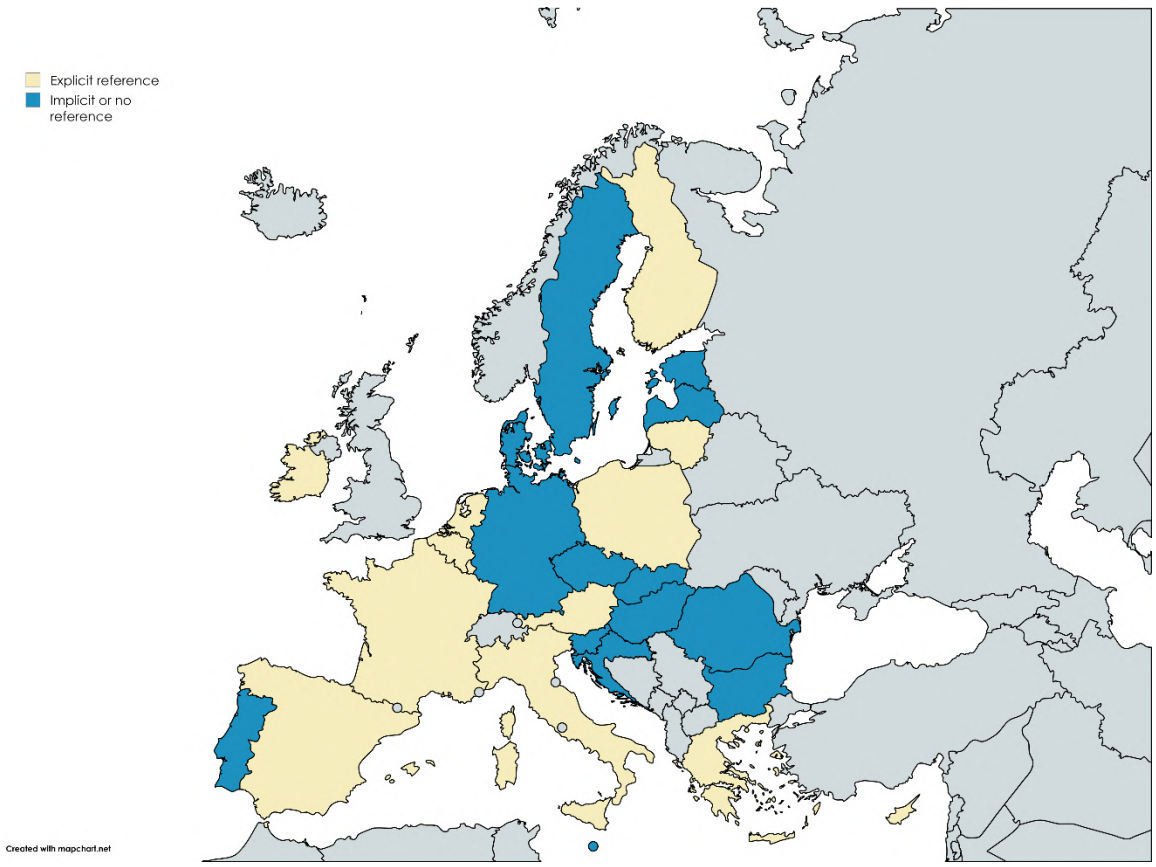
In addition to Type A countries, it is crucial to note the recent progress in **Italy**. In 2025, Italy adopted a high-level framework via a *Protocollo Quadro per l'adozione delle misure di contenimento dei rischi lavorativi legate alle emergenze climatiche negli ambienti di lavoro*[239] to address climate-related occupational risks. This strategic agreement aims to integrate heat and climate risk management into OSH practices nationwide and promotes sector-specific actions (e.g. adjusting work schedules, enhanced training, use of social safety nets) through collective bargaining and institutional support. This Protocol will also aim to create some uniformity among regional responses so far, according to stakeholders[240].

Among other types, there is a **high level of heterogeneity**. Around half of the EU MS (13) have some level of explicit reference to extreme weather as an OSH issue; in many cases, it is in the context of discussing climate change as an overarching issue. The other 14 MS have an implicit reference or no reference at all in any of the strategic documents analysed. In such cases, national systems tend to rely on general OSH duties and guidance, risking uneven uptake and exposure to extreme weather events.

[239] In English: *Framework Protocol for the adoption of measures to contain occupational risks related to climate emergencies in the workplace*, signed on 2 July by government and social partner representatives. Italian version available at: https://www.fiscoetasse.com/files/20484/dm95accordo-clima.pdf?_gl=1*1k51w69*_up*MQ..*_ga*MTQxODA3ODI3Ny4xNzU4ODEyMDk0*_ga_EE64P4Z01K*czE3NTg4MTIwOTQkbzEkZzAkdDE3NTg4MTIwOTQkajYwJGwwJGgw*_ga_9HD1K76044*czE3NTg4MTIwOTUkbzEkZzAkdDE3NTg4MTIwOTUkajYwJGwwJGgw.

[240] See *ANNEX 3 – Italy*; also interview with C.N.A. National Confederation of Crafts and Small and Medium-Sized Enterprises [18 July 2025], Confartigianato Imprese [8 September 2025] and another Italian social partner organisation [30 July 2025].

Figure 26: Strategic framework reference to extreme weather events or climate change as OSH issues



Source: Author's own elaboration using MapChart.

Overall given the OSH policies as well as the more general national strategic frameworks, the trend is that the system is converging (especially driven by recent events in many MS) toward clearer triggers, alert linkages, sector playbooks and inspection campaigns; the remaining gaps point to the value of aligning national strategies with operational legal standards and practical support, so that prevention is both actionable and enforceable across the Union.

4.2.3. Enforcement and role of labour inspectorates

Based on the data collected (see policy mapping sources under *REFERENCES*), all Member States inspect extreme-weather-related risks to some degree, but how systematically they do so and how well they report it varies widely. Most of the Type A countries run proactive, season or alert-triggered inspection campaigns, while others rely mainly on general OSH inspections and complaint handling with limited weather-specific metrics. In general, labour inspectorates and their enforcement can be categorised into the following categories based on similar practices and approaches they employ:

- **Proactive/seasonal or alert-triggered inspection models (strongest coverage):** Inspectorates in Spain (Special Heat Plan since 2021), France (~1,500 checks in summer 2024, plus new powers in 2025 to compel heat-risk plans), Austria (summer spot-checks

with a heat/UV checklist), and Belgium (targeted checks during hot/cold spells using meteorological warnings as benchmarks), Hungary (national heat-stress campaign auditing 255 employers, ~6,500 workers), and Cyprus (heatwave inspections with authority to impose midday outdoor work bans) plan and surge inspections when heat/cold risk is highest. Czechia also conducts targeted inspections in hot/cold spells with sanction powers;

- **General-duty inspection models (baseline coverage)**: Denmark, Germany, Netherlands, Portugal, Malta, Finland, Ireland and others integrate extreme weather into routine OSH inspections and accident investigations. Inspectors verify that employers assessed temperature/weather risks and implemented reasonable controls, and can issue improvement/prohibition notices or stop work if there is imminent danger. These systems often intensify messaging or advice when meteorological alerts are issued, but lack dedicated weather units;
- **Reactive/complaint-triggered models (selective coverage)**: In MS like Croatia, Estonia, Lithuania, and Poland, enforcement or guidance is primarily reactive, with interventions following complaints or incidents. For example, Estonia's hotline recorded 86 heat-related calls in one summer, and inspectors have suspended work where indoor temperatures exceeded ~30°C without mitigation. In Poland, inspectorates provided support to flood-affected employees and employers during the September 2024 floods[241], notably via its Counselling Centre, which operated a temporary helpline for employers and employees and published frequently asked questions online[242]. During heatwaves, central and some regional inspectorates carry out seasonal summer campaigns on social media, which include work adjustment recommendations that reference provisions within the OSH laws and best practices[243]; and
- **Dual-/multi-agency enforcement (shared coverage):** Germany combines state labour inspectorates with accident-insurance inspectors; Italy pairs labour inspectorates with local health authorities; Slovakia shares duties between the Labour Inspectorate and regional public health offices, broadening reach but also distributing responsibility.

[241] In line with the Act on Special Arrangements Related to Flood Recovery Efforts, which was activated until December 2024 for the affected areas. See more: National Labour Inspectorate (PIP) (2024) *State Labour Inspectorate assistance for flood victims* [Państwowa Inspekcja Pracy na pomoc powodzianom]. Available at: https://www.pip.gov.pl/aktualnosci/panstwowa-inspekcja-pracy-na-pomoc-powodzianom.

[242] National Labour Inspectorate (PIP) (2024) *400 pieces of advice for employees and employers from flood-affected areas* [400 porad dla pracowników i pracodawców z terenów objętych powodzią]. Available at: https://www.pip.gov.pl/aktualnosci/400-porad-dla-pracownikow-i-pracodawcow-z-terenow-objetych-powodzia.

[243] National Labour Inspectorate, Olsztyn Branch (PIP Olsztyn) (2024) *Let's protect workers' health during heatwaves* [Chrońmy zdrowie pracowników podczas upałów]. Available at: https://olsztyn.pip.gov.pl/aktualnosci/chronmy-zdrowie-pracownikow-podczas-upalow. National Labour Inspectorate, Rzeszów Branch (PIP Rzeszów) (2024) *Appeal of the District Labour Inspector – attention to heatwaves* [Apel Okręgowego Inspektora Pracy – uwaga na upały]. Available at: https://rzeszow.pip.gov.pl/aktualnosci/apel-okregowego-inspektora-pracy-uwaga-na-upaly.

While not an exact match, these types are mainly in line with the typology identified in section 4.2.1, given that the labour inspectorates are usually bound by existing policy frameworks. However, the inspection typology also illustrates how similar legislative intent can produce different enforcement realities depending on administrative capacity, inter-agency cooperation, and the maturity of national OSH systems.

Taking into account the case studies' findings (see *ANNEX 3*), we have identified a few common gaps:

- **Protocols and trainings**: Finland, Lithuania, and Poland lack dedicated checklists or inspector training on extreme weather conditions and their effects on OSH; Finland's OSH tools mention thermal conditions but do not frame them as extreme-weather risks;
- **Linking public alerts to OSH obligations**: Poland, for example, has Government Centre for Security (*Rządowe Centrum Bezpieczeństwa*, RCB) alerts, but they are not operationalised for workplaces in light of extreme weather events; in Ireland, in contrast, the Health and Safety Authority (HSA) is part of the National Emergency Coordination Group (NECG) and regularly issues relevant safety alerts and reminders to workplaces ahead of and after extreme weather events;
- **Flood-readiness not addressed in inspections**: in Italy, inspections are suspended in flood zones; in addition, there are no flood-preparedness checks (a common gap in many MS). In the Netherlands, only Seveso establishments are required to conduct risk assessment for extreme weather conditions like floods; and
- **Uneven employer awareness and measures**: Spain's 2023 CALORADAPT survey showed that only one-third of workers considered heat protection measures in their workplaces adequate, while only 8% of respondents in a Finnish survey in 2021 reported that the impacts of climate change were discussed in their workplaces from the perspective of occupational safety.

4.2.4. National data collection and reporting on extreme weather-related OSH events

In addition to enforcement activities and inspections, labour inspectorates are usually the primary institutions collecting OSH-related data. Nevertheless, only a few systems maintain robust administrative datasets that make the scale of weather impacts and enforcement visible (e.g., logged hours of weather stoppage).

Box 5: Examples of existing data collection and reporting activities

- **Administrative logging of weather stoppage:** Austria's BUAK logs every hour of weather stoppage using GeoSphere data; Belgium's ONEm logs every hour of weather unemployment, while the Royal Meteorological Institute's warnings serve as operational benchmarks.
- **Campaign statistics and inspection outputs**: Several inspectorates publish seasonal campaign metrics (e.g., France's ~1,500 heat inspections; Hungary's 255 audited employers). Ireland reports 10,000+ inspections annually (overall OSH), with high-risk sectors prioritised. Most of the systems do not disaggregate by "extreme weather" specifically.
- **Complaint and hotline data**: Estonia and Bulgaria report complaint volumes (e.g., Bulgaria received 55 heat-related complaints in 2023), which help target inspections but do not measure prevalence in workplaces lacking complaints.
- **Sanctions and stop-work orders**: A few inspectorates can order immediate work stoppage in life-threatening conditions (e.g., Cyprus, Greece, Denmark Czechia). Greece notes per-employee fines for ignoring mandated stoppages. These powers are reported qualitatively; few systems publish aggregated heat/cold-specific sanction counts.

Source: Author's own elaboration based on policy mapping sources under *REFERENCES*.

Some overall limitations are clear: most MS do not routinely collect and publish any data that would clearly link the impact of extreme weather events on occupational health and safety. In addition, in countries where labour inspectorates rely primarily on complaints, there is a risk of leaving silent workplaces under-represented, meaning that much of the impact remains obscured. Many inspectors in MS where legal standards are general/qualitative are limited to what tools they can practically employ: proactive checks may take place, but they are uneven and systematic sanctioning is harder. In the Netherlands, for example, 775 heat-stress complaints were reported in 2018-2022 – this reveals temporal peaks during hot weather, particularly in summer, and can guide targeted inspections[244].

[244] Ministerie van Sociale Zaken en Werkgelegenheid (2024) *Verkenning hittestress*. Available at: https://www.nlarbeidsinspectie.nl/publicaties/publicaties/2024/05/22/verkenning-hittestress.

The biggest gap, however, remains in the lack of data that clearly shows how many workers are affected by adverse weather events, for example, workers experiencing work-related injuries that are prompted by exposure to extreme weather events. While some data exists on the deaths from heat and other extreme weather events, it tends to be on the general population level, not specifically focusing on the workers (see section 3.5).

Spanish example, however, could serve as a baseline, where specific explicit injury codes for heat/cold are included in the official accident dataset, managed by the Ministry of Labour and Social Economy (MITES) (for detailed analysis, see *ANNEX 3 – Spain*). Two coding dimensions in particular enable partial tracking of extreme temperature-related incidents. First, the 'material agents' category includes physical phenomena and natural environment elements (ESAW Category 20), which can be recorded as contributing factors. Second, injury types, since 2020, incorporate temperature-related codes for heatstroke and sunstroke (*Calor e insolación*), effects of low temperatures (*Efectos de las bajas temperaturas*), and other effects of extreme temperatures (*Otros efectos de las temperaturas extremas*). However, granular data on material agents and the nature of injury are not typically featured in MITES' annual reports, which emphasise broader accident trends. Systematic tracking of occupational accidents linked to other extreme weather events (such as floods, storms, or wildfires) is currently absent, highlighting a significant gap (in line with other EU MS).

A few MS have (e.g., Estonia, Italy, and Denmark) aligned their data collection and reporting practices with ESAW methodology, meaning that the registries can often classify heat-induced injuries (e.g., burns/scalds) and cold-induced injuries (frostbite), allowing a partial overview of the effects of extreme weather events (see policy mapping sources under *REFERENCES)*. Notably, the datasets do not differentiate between injuries experienced in outdoor or indoor settings, meaning that it is still unclear the actual causality of, for example, an extremely cold day on the workers' health (i.e. the cold-induced injury could happen in a cold indoor environment).

As some labour inspectors noted[245], tracking extreme-weather-induced workplace accidents or deaths can be complicated due to the privacy issues; personal work-related data is not made available, even to the government, meaning the national statistics can often only be estimated with public health data from the general population. This is particularly important for tracking long-term effects, such as chronic diseases stemming from consistent exposure to heat or other phenomena[246]. Others highlighted the issue of reporting the causal relationship between the impact of extreme weather events and the workers' injuries or deaths. In Finland, the Finnish Workers' Compensation Centre investigated some correlations showing a spike in travel-to-

[245] Interview with ITSS [26 August 2025].

[246] Interview with Marouane Laabbas el Guennouni [17 July 2025].

work accidents during the icy days, so much so that they accounted for 20% of the year's total[247]. Yet, these studies are inconsistent and can only show a small part of the overall impact.

4.2.5. Role of social partners

The policy mapping showed that, across the EU, social partners are consistently present in discussions on OSH and climate-related risks, but their involvement varies substantially by country, sector, and the form of instrument. Two broad patterns emerge:

- **Guidance and awareness-building dominate** — in most countries, unions and employer groups collaborate on campaigns, risk-assessment tools, or sector protocols; and
- **Binding collective agreements are still limited** — in only a handful of MS, there are embedded enforceable weather-related clauses in collective bargaining agreements (CBAs).

In roughly half of the MS, social partners are active or moderately engaged in co-developing practical guidance and implementation tools, especially to tackle heat/cold stress: examples include joint leaflets, sector toolkits, workplace checklists, or recommended work-rest cycles (e.g., in Austria, Czechia, Finland, Germany, Greece, Ireland, Italy, Netherlands, Poland, Slovenia, Spain, Sweden). This work often targets day-to-day OSH implementation—helping employers adapt schedules, organise shade and hydration, or incorporate heat/cold into risk assessments—especially where legislation sets only general obligations.

A smaller group of MS exhibits more institutionalised or systematic social-partner roles: co-drafting codes of practice, sustaining standing joint committees, or steering implementation frameworks (e.g., Cyprus, Denmark, France, Hungary, Luxembourg, Malta, Portugal). Here, the social partners are involved upstream (design) and downstream (roll-out), sometimes updating sector protocols after recent heatwaves or coordinating messaging to firms and safety reps. These MS are closer to co-regulation, even if not all outcomes are embedded in binding CBAs.

In addition, several Member States formally integrate social partners into OSH rulemaking via statutory tripartite councils. Examples from case studies include:

- Finland's Advisory Occupational Safety and Health Board;
- Ireland's Health and Safety Authority Board and sectoral committees;
- Italy's Permanent Advisory Committee for Health and Safety at Work;
- Lithuania's Commission on Safety and Health;
- Poland's Social Dialogue Council; and
- Spain's National Health and Safety Council.

[247] Interview with a representative from Finnish Occupational Safety and Health Administration [9 September 2025].

While these structures guarantee social partner representation, climate and extreme weather are rarely a priority agenda item, according to stakeholders (see *ANNEX 3*). In many cases (e.g., Finland, Italy, Poland, Lithuania), weather risks are raised by unions but remain peripheral to the formal tripartite agenda. This is also in line with Eurofound's finding that social partner involvement in addressing extreme weather events remains the lowest among all policy contexts analysed[248].

Despite that, there have been positive instances of social partner initiatives pushing for progress and better preparedness, adaptation, and mitigation of extreme weather impacts on OSH, particularly driven by worker mobilisation. Italian cases illustrate this: the 2016 Nardò ordinance banning midday agricultural work during heat alerts emerged directly from union strikes and later inspired similar regional rules; ports like Monfalcone have developed local heat protocols through structured dialogue (see more in *ANNEX 3 – Italy*). In Spain, unions negotiated seasonal heat protocols in Madrid's cleaning services, complementing national frameworks (see *ANNEX 3 – Spain*). For other examples, see *Box 6* below.

[248] Eurofound (2024) *Extreme weather events: Policy measures to cushion the effects on workers, businesses and citizens*. Available at: https://www.eurofound.europa.eu/en/publications/all/extreme-weather-events-policy-measures-cushion-effects-workers-businesses.

Box 6: Good practice examples of social partner action on extreme weather and OSH

- **Finland – Sectoral CBAs with explicit temperature provisions**
  - Construction: Finnish Construction Trade Union (Rakennusliitto) CBAs set frost limits (–15°C to –20°C) for outdoor work and stipulate protective measures during extreme cold.
  - Service sectors: the Service Union United (PAM) negotiated cold-work pay supplements (7–11%) and mandatory provision of protective clothing in winter for warehouse and ski resort workers.
  - Public sector: the Trade Union for the Public and Welfare Sectors (JHL) preparing to renegotiate CBAs to include employer obligations for protective clothing and sufficient breaks in extreme weather.
- **Netherlands – Arbocatalogi with quasi-regulatory status**: Jointly developed sectoral OSH catalogues (Arbocatalogi) often include heat and severe-weather protocols.
- **Austria & Belgium – Joint management of weather-related funds**:
  - Austria: BUAK construction fund compensates 60% of lost wages when work is halted for heat, frost, or rain; fund rules are shaped and overseen by social partners.
  - Belgium: "*Timbres intempéries*" scheme jointly managed by social partners tops up unemployment benefits for weather stoppages.

Source: Author's own elaboration based on policy mapping sources (see *REFERENCES* and *ANNEX 3*).

Connecting to the national policy framework classification discussed in section 4.2.1, we can draw some parallels: the more a national approach relies on robust legislation, guidance, sector protocols, or financial funds (Types A and C; for example, Austria, Finland), the more central social partners are in practice. In contrast, where the state enforces rigid rules without complementary instruments (Type B; for example, Latvia), social partners have less space to influence implementation. In transitional systems (Type D; for example, Italy), social partner mobilisation is often the catalyst pushing the system toward a more integrated framework.

Despite the differences in the level and intensity of social dialogue in addressing extreme weather risks to OSH, some overarching gaps and limitations can be identified:

- **Fragmentation in coverage and representation**: In addition to country-level differences, engagement is uneven across sectors; for example, good practices are often concentrated in construction, with less useful initiatives existing to support workers in other sectors. This difference is even more striking when it comes to atypical, migrant, and platform workers, who remain underrepresented in formal dialogue; and

- **Voluntarism over enforceability**: Even in MSs with active guidance and soft instruments, there is little conversion into binding, measurable clauses in collective bargaining agreements (e.g., clear temperature thresholds, automatic stop-work with income protection, mandatory rescheduling). As a result, protections can hinge on employer discretion and local capacity rather than guaranteed rights.

While the national and regional institutions remain the main actors in designing and implementing measures to tackle the impacts of extreme weather events on OSH, social partners' involvement is crucial in identifying the most appropriate forms and best ways to protect workers and support business. Moving forward, institutionalising climate and extreme weather risks in tripartite councils and other mechanisms, as well as extending coverage to precarious groups, will be key to scaling protection.

4.2.6. Best practice examples

This sub-section aims to showcase additional best practices and innovative approaches that actors in different MS have implemented to tackle the impact of extreme weather on occupational health and safety. While legislation, non-legislative initiatives, collective bargaining agreements and other social partner instruments have been discussed in earlier sub-sections, here we focus on other practices and examples that can effectively complement the policy framework and improve the working conditions in different sectors and MS. Each example is discussed in more detail in the respective country's case study located in *ANNEX 3*.

Table 9: Best practices and innovative approaches on extreme-weather OSH

Practice type	Examples	Policy value/innovative aspect
Digital tools	– Italy: INAIL Worklimate WBGT-based app – The Netherlands: union/sector weather apps (Werkklimaat, Weerverlet) – Company examples: Heijmans, BAM, Berner Logistics integrate alerts into planning	– Can be individualised with personal circumstances adjusting the risk level – Especially useful for non-unionised workers and SMEs – Can be used cross-sectors
Technological innovations	– Lithuania: GreenBee drone inspections replacing exposed manual tasks	– Reduces exposure – Leverages digitalisation to remove workers from hazardous environments
Emergency planning and OSH	– Ireland: NECG links weather alerts with HSA guidance	– Raises baseline compliance by coupling alerts with targeted

Practice type	Examples	Policy value/innovative aspect
		inspections and clear checklists – Strengthens coherence in emergencies
Data collection	– Finland: FIOH developing climate-OSH indicators	– Provides visibility on weather-linked incidents – Supports evidence-based inspection targeting and policy update
Inclusion of vulnerable groups	– Italy: Glovo court order mandating negotiation of heat safeguards for riders – Spain: multilingual union/inspectorate campaigns targeting migrants – Ireland: sector committees (farm, health/social care)	– Extends protection to atypical, migrant, and platform workers – Ensures accessibility of information through tailored materials
Innovative organisational measures	– Lithuania: Vilnius municipal roadworks rescheduled to night shifts – Italy and the Netherlands: rescheduling, shaded rest, hydration protocols, micro-breaks	– Reduces harmful exposure – Prevents harm and protects workers efficiently without losing efficiency

Source: Author's own elaboration.

5. CONCLUSIONS AND RECOMMENDATIONS

Taking all of the points discussed in previous chapters, the most prominent and impactful occupational risks stemming from extreme weather conditions are primarily concentrated around high temperatures and heatwaves, followed by hazards posed by storms, floods, and other conditions. These risks profoundly affect workers' health and safety, impact productivity across economic sectors, and display significant regional variation across Europe.

The current policy framework to manage these risks is built on the EU baseline comprised of the OSH Framework Directive 89/391/EEC and additional individual directives that oblige employers to assess and control all workplace risks, which implicitly include heat, cold, storms and floods. In reality, these risks are addressed in a fragmented way, given the national (and in some MS, regional) policies affecting the workers on the ground. The national frameworks can thus be categorised into four distinct types:

- **Type A – Advanced integrated**: explicit legal triggers, accompanied by guidance and some financing (e.g., Belgium, Spain, Austria);
- **Type B – Legislation-focused, support-light**: prescriptive rules but little targeted funding and a lack of large-scale guidance (e.g., Romania; Czechia, Slovakia; mostly indoor standards);
- **Type C – Guidance-centric**: minimal prescriptive law; heavy reliance on guidance, social dialogue and general welfare (e.g., Finland, Denmark, Lithuania); and
- **Type D – Emerging/adaptive**: rules in flux reacting to recent events (e.g., Greece emergency stoppages, Italy regional work stoppage ordinances and 2025 framework protocol, Slovenia 2025 amendments).

It is important to note that EU agencies like EU-OSHA and EEA play a crucial role in providing support and promoting knowledge sharing among MS. Their work is generally viewed positively, with some limitations voiced by trade unions and some institutional actors.

The primary gap, however, remains the fragmentation in legal protections across Member States, especially when it comes to the most acute extreme weather conditions as heat. There is no EU-level instrument that sets clear, science-based thresholds for heat exposure, leaving workers unevenly protected. Where limits are set nationally, they are often air-temperature caps rather than rules based on robust and complex indices such as WBGT that take into consideration different factors like humidity, wind and workload.

The challenge of adapting OSH standards to extreme weather risks and enhancing data collection is a priority for stakeholders across the EU[249], with some consensus emerging on the

[249] For example, see interviews with representatives from ETUC [27 June 2025], Dr Ivan Williams Jimenez [26 June 2025], FIOH [14 August 2025], HSA [19 August 2025] and SAK [16 September 2025].

necessary steps, despite disagreement on the legislative level required. Main recommendations and action points are discussed below.

Enhanced data collection, research and enforcement

Current injury and occupational disease systems rarely record whether weather conditions contributed to or caused an incident or other OSH harm, leading to systematic underestimation of risk[250]. Adjusting existing data collection methods to also record whether weather, temperature, or extreme events were a contributing factor in occupational injuries, accidents, and fatalities could make climate-related occupational risks more visible and comparable across different MS. EU lead on such initiative would be welcome in order to ensure a shared methodological approach to build a stronger, comparable evidence base on both injuries and long-term health consequences (e.g., skin cancer or chronic kidney diseases)[251].

In addition, strengthening labour inspectorates with specialised training and materials to effectively assess climate risks and evaluate the quality of climate-specific risk assessments could improve worker protection and company preparedness[252]. Even if new legislation is not introduced, better enforcement of existing rules (especially in MS where general-duty provisions prevail), as well as more resources dedicated to informing employers and the general public on these risks, can lead to more adoption of organisational measures and better protection of workers against extreme weather events on the ground. However, it is important to note that any guidelines or materials should be designed to address not only the weather conditions but the interaction with clothing, PPE, the type, intensity and duration of work[253].

Lastly, more applied research is welcome by various stakeholders, particularly if it would result in practical, tailored tools and measurable case studies showing the economic and health benefits of different adaptation measures[254]. At present, the scientific evidence base is extremely limited in many critical areas and what does exist is frequently focused on public health, rather than occupational health. Aside from heat stress, little is known about the most effective interventions to protect workers from the many impacts of climate change and increasing risks of other types of extreme weather conditions. The use of technological solutions should also be researched further to improve workplace safety and productivity[255]. Research is needed to develop and evaluate the effectiveness of preventive OSH measures in

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250 Interview with INAIL representative [17 September 2025].

251 Interviews with representatives from FNV [16 July 2025], and INAIL [17 September 2025].

252 Interview with Finnish Occupational Safety and Health Administration representative [9 September 2025].

253 World Health Organisation and World Meteorological Organisation (2025) *Climate change and workplace heat stress: technical report and guidance*. Available at: https://iris.who.int/server/api/core/bitstreams/5334aba1-063d-4163-94ae-a1154bb48e83/content.

254 Interview with representative from VNO-NCV and MKB [2 September 2025], Pimec [24 July 2025] and FIOH [14 August 2025].

255 World Health Organisation and World Meteorological Organisation (2025) *Climate change and workplace heat stress: technical report and guidance*. Available at: https://iris.who.int/server/api/core/bitstreams/5334aba1-063d-4163-94ae-a1154bb48e83/content.

different countries and sectors, and to estimate the economic costs and benefits of such policies and interventions[256].

Organisational, cultural, and more holistic adaptation

Stakeholders emphasise that change requires action at the workplace level. Educational campaigns and training programs could be developed to raise awareness among employers, workers, and the general public about the urgency and importance of climate-related OSH risks[257] and they should explicitly address the increased vulnerability of some groups of workers[258]. Employees may also be encouraged to use existing research and implement evidence-based prevention measures[259].

Equally important is systemic integration. OSH has long been treated as a self-contained policy field, but climate change exposes the limits of this silo. Effective adaptation requires embedding OSH considerations within wider climate and public health strategies, aligning workplace risk management with urban planning, health systems, and national adaptation plans[260]. The more holistic approach in that sense extends beyond the field of OSH: as experts highlighted, for example, heat risk does not stop beyond the workplace; it extends to commutes on overheated transport, recovery time in poorly insulated housing, and cumulative strain across a 24-hour cycle[261]. For lower-income or migrant workers in inadequate housing, this cycle intensifies vulnerability. Recognising these realities means connecting OSH policies with housing quality, transport infrastructure, and public health, ensuring that recovery is possible, not just that work tasks are modified.

Social dialogue is central to this integration. Collective bargaining offers an opportunity to translate broad obligations into sector-specific and regionally tailored solutions. Agreements can cover practical measures such as modifying working hours during peak heat, guaranteeing additional breaks, and establishing fair compensation when work must be suspended[262]. Recent Italian experience with a national Framework Protocol demonstrates how social partners can jointly anchor climate adaptation within labour relations, providing a template for other Member States (see Chapter 4). Embedding climate adaptation in collective agreements also ensures that negotiated solutions are enforceable and legitimate for both employers and workers.

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[256] International Labour Organisation (2024). *Ensuring safety and health at work in a changing climate.* Available at: https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate.

[257] Interviews with representatives from FNV [16 July 2025], ETUC [27 June 2025], FIOH [14 August 2025] and other representatives.

[258] World Health Organisation and World Meteorological Organisation (2025) *Climate change and workplace heat stress: technical report and guidance*. Available at: https://iris.who.int/server/api/core/bitstreams/5334aba1-063d-4163-94ae-a1154bb48e83/content.

[259] Ibid.

[260] Interview with representatives from Eurofound [6 August 2025], anonymous SME organisation [3 July 2025], unaffiliated expert [2 July 2025], and ETUI expert [17 July 2025].

[261] Interviews with ETUI and unaffiliated experts [2 and 17 July 2025].

[262] Interviews with ETUI expert [17 July 2025], and a representative from a regional Italian social partner organisation [30 July 2025].

Finally, effective adaptation must foreground protection for vulnerable groups. Migrant and seasonal workers, older workers, and those with chronic health conditions face disproportionate exposure and fewer resources to adapt. Legal provisions, training in multiple languages, and explicit organisational policies are necessary to ensure they are not left behind[263]. Measures must apply irrespective of contract type or formality of employment, reaching those in informal or precarious situations who are often excluded from OSH protections.

EU-level action addressing occupational heat and other extreme weather events

Taking all into consideration, some form of EU-level action to establish shared thresholds could be beneficial to address some concerns, especially when it comes to heat exposure. Among various solutions, some stakeholders argued that making targeted adjustments to existing EU OSH legislation could be beneficial. This could include updating the Workplace Directive to explicitly cover outdoor workers, who are currently excluded from temperature protections[264], and revising other directives (e.g., Biological Agents, Optical Radiation) to better address vector-borne diseases and UV exposure in work settings as related to extreme weather conditions[265].

Another recommendation that has been advocated by trade unions to address the intensifying risks of heat exposure to OSH are EU-level requirements (for example, in a form of a dedicated EU directive on occupational heat)[266]. It is argued that such an instrument would help bring in uniformity in working conditions, create legal certainty across the EU and extend explicit protection to outdoor as well as indoor workers. It could complement the OSH Framework Directive by specifying modern measurement methods (such as a WBGT-based system that would allow national variation on the specific thresholds based on local acclimatisation levels[267]) that reflect additional factors like humidity and workload, rather than air temperature alone (as most national thresholds are set, with the exception of Belgium and Cyprus).

In contrast, primarily employer organisations emphasise the need for flexibility, warning that prescriptive EU limits could misfit diverse sectors, climates and firm sizes, create unnecessary administrative burden for SMEs, and thus lower competitiveness in the long term[268]. There is also a concern that rigid limits could trigger disruptive stoppages without proportionate benefit if not calibrated to acclimatisation and task intensity.

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[263] Interviews with representatives from a European trade union [23 July 2025], INAIL [17 September 2025] and Marouane Laabbas el Guennouni [17 July 2025].

[264] Interview with ETUC representative [27 June 2025].

[265] Interview with INSST representative [16 September 2025].

[266] ETUC (2025) *The content of a Directive on the prevention of occupational heat risks.* Available at: https://etuc.org/en/document/content-directive-prevention-occupational-heat-risks.

[267] Interview with various experts, see *ANNEX 4*.

[268] Interviews with anonymous regional social partner organisation from Italy [30 July 2025] and an EU-level employers' organisation [19 August 2025] representatives.

Other stakeholders also emphasised that even with EU legislation, the effectiveness of such interventions would hinge on national transposition, inspectorate capacity and practical tooling. They noted that monitoring conditions in mixed environments (sun/shade, intermittent exertion) can be complex; employers require training and equipment to measure and interpret the heat indices properly; and some initiatives, while beneficial to tackle risks stemming from extreme weather (e.g., wholesale shift to night work), can also bring about new safety risks and psychosocial harms, such as distorted sleep schedules and subsequently increased risk of workplace accidents[269]. Transitional costs for SMEs (equipment, training, procedures) can be even more burdensome[270]. If such an intervention were to be designed, factors like regional acclimatisation and sectoral variability would necessitate careful discussions and social partner involvement to avoid a "one-size-fits-all" result that could be counterproductive.

Cross-cutting considerations

Maladaptation risks and hierarchy of controls: Several widely used adaptations (e.g., night-shift scheduling, heavy reliance on air-conditioning) can introduce new OSH or climate impacts if deployed uncritically. Any EU action should foreground engineering and organisational controls (shade, ventilation, workload management, recovery breaks) ahead of individual measures and require that proposed adaptations be assessed for secondary risks, including psychosocial effects and energy implications. Overall, it is imperative to consider practical feasibility, economic viability, and environmental sustainability of any recommendation or action[271].

Regional heterogeneity and subsidiarity in practice: Evidence suggests differentiated starting points, due to both geographical differences in exposure and existing legal frameworks. EU action that sets a binding baseline where justified, while resourcing localisation and allowing social-partner tailoring, is likelier to secure uptake and withstand legal and political scrutiny. It is key to involve various stakeholders, including managers and employers, workers, trade unions, representatives of self-employed people and SMEs, experts in environmental, physiological, ergonomic safety, OSH experts, and representatives from local authorities to develop efficient recommendations, action points, and policies[272].

To better protect workers in a changing climate, the following actions are recommended across policy, enforcement, and practice:

- **Improve data collection and attribution of weather-related incidents**: encourage systematic inclusion of weather and environmental conditions as contributing factors in workplace injury and illness reporting to support evidence-based policymaking.

[269] Interviews with unaffiliated expert [2 July 2025], CIOP-PIB and other Polish institutional representatives [21 August 2025].

[270] Interviews with representatives from Confartigianato [8 September 2025] and an anonymous EU-level SME organisation [3 July 2025].

[271] World Health Organisation and World Meteorological Organisation (2025) *Climate change and workplace heat stress: technical report and guidance*. Available at: https://iris.who.int/server/api/core/bitstreams/5334aba1-063d-4163-94ae-a1154bb48e83/content.

[272] Ibid.

- **Strengthen enforcement capacity and practical support**: equip labour inspectorates with tools, guidance, and training to properly assess weather-specific risks. Promote the development of sector-appropriate tools and risk assessment templates, with particular attention to the needs of SMEs.
- **Prioritise applied, sector-relevant research and knowledge transfer**: support the practical studies on effectiveness and cost benefits of preventive measures, including technological innovations and organisational practices across different work settings.
- **Promote cross-sectoral integration of OSH within broader adaptation**: align workplace protection with public health, housing, and mobility planning, recognising that worker exposure does not stop at the workplace and that recovery environments are critical to resilience.
- **Ensure inclusive protection of vulnerable and most exposed workers**: tailor OSH communication, training, and monitoring tools to consider vulnerability factors.
- **Promote social dialogue**: use collective bargaining to translate general obligations into sector- and region-specific solutions.
- **Clarify and strengthen EU-level provisions on climate-related OSH risks**: consider introducing a dedicated instrument or requirements on occupational heat or adapting existing directives to better reflect new climate-related exposures, ensuring clarity, flexibility, and equity across sectors and regions.
- **Avoid maladaptation**: encourage the pre-assessment of unintended consequences and prioritise engineering and organisational solutions over personal responsibility or energy-intensive fixes.

ANNEX 1. NATIONAL LEGISLATIVE AND NON-LEGISLATIVE MEASURES CLASSIFICATION

Table 10: Classification of legislative approaches to managing extreme weather impacts on OSH

Type	Features	Examples of MS
Comprehensive explicit regulation	– Specific, detailed legal provisions for heat/cold – Quantitative thresholds (°C or WBGT) – Mandatory protective measures or work stoppages once limits are reached – Limited employer discretion	– Belgium (WBGT limits) – Romania (≥ 37°C / ≤ –20°C rules) – Austria (indoor comfort ranges, 2026 heat regulation) – Czechia, Slovakia (indoor microclimate standards) – Hungary (temp thresholds by workload) – Poland (forthcoming caps: 35°C indoor / 32°C outdoor heavy work)
General duty with implicit coverage	– Extreme weather covered only under broad "all risks" OSH duty – No numeric temperature limits in law – Reliance on guidance and employer risk assessments – Flexible but potentially inconsistent	– Germany (general OSH Act) – Sweden (qualitative "suitable" indoor climate) – Denmark, Finland, Ireland, Luxembourg
Hybrid or intermediate approaches	– General duty plus some specific elements – Minimum but not maximum indoor temperature standards – Temporary/emergency rules during events	– Portugal (indoor 18–22°C comfort zone; proposals for outdoor bans) – Greece (emergency ministerial decrees in heatwaves) – Netherlands (sectoral agreements for work stoppages)

Type	Features	Examples of MS
	– Sector-specific rules (usually tied to collective agreements) or compensation schemes	– Latvia, Lithuania (binding methodological guidelines, no single heat law)

Source: Author's own elaboration.

Table 11: Classification of non-legislative approaches to managing extreme weather impacts on OSH

Type	Features	Examples of MS
Proactive comprehensive programs	– Multi-faceted programs (alerts, campaigns, inspections, training) – Strong inter-agency cooperation (OSH + meteorology/health) – Use of modern tools (apps, calculators) – Explicit climate change recognition in OSH strategies	– Spain (INSST seasonal campaigns, inspectorate inspections) – Ireland (integrated weather warnings into HSA guidance) – Italy (INAIL guides, Worklimate app, research-based prevention)
Standard guidance-focused approaches	– Most common model – Periodic bulletins and seasonal guidance – Reliance on EU-OSHA materials, inspectorate reminders – Reactive but routine response to forecasts – Limited technology/funding	– Poland (guides, annual reminders) – Portugal (translated EU-OSHA guidance, alerts) – Bulgaria, Croatia (seasonal notices) – Romania, Slovakia, Slovenia (inspectors step up during heat/cold alerts)
Limited or employer-driven approaches	– Minimal dedicated initiatives – General public alerts disseminated to workplaces	– Estonia, Lithuania (basic guidance, low-profile) – Hungary (uses general public health alerts)

Type	Features	Examples of MS
	– Few/no campaigns or funding – Employers largely responsible for compliance and adaptation	
Innovative partnerships and research-based initiatives	– Collaboration with unions, researchers, EU projects – Co-developed OSH catalogues, sectoral tools – Research-driven solutions (apps, studies) – Supplements other approaches with innovation	– Netherlands (union-developed catalogues and apps) – Italy (research partnerships with INAIL, Worklimate app) – Austria (heat hotline to improve guidance and awareness)

Source: Author's own elaboration.

ANNEX 2. DEFINED MAXIMUM TEMPERATURE LIMITS IN EU27 NATIONAL POLICY FRAMEWORKS

Table 12: Defined maximum temperature limits in EU27 national policy frameworks

Member State	Is there a binding maximum temperature?		Measures or sanctions connected to the limits
	Indoor	Outdoor	
Austria	Yes	No[273]	-
Belgium	Yes, the WBGT limit is 29 for light work, 26 for moderate work, 22 for heavy work, and 18 for very heavy work	Yes, same limits as indoors	If the WBGT index goes beyond the set values, employers are obliged to lighten workloads, introduce work/rest cycles (e.g. 15–30 min breaks per hour) and provide free cold beverages
Bulgaria	Yes, 28°C is the upper limit for light/moderate work and 26°C for heavy work	No	-
Croatia	No	No	-
Cyprus	Yes, WBGT limit is 32.2°C for low-intensity work, 31.1°C for moderate-intensity work or 30.0°C for high-intensity work	Yes, same limits as indoors	The employer is obligated to take technical or organisational measures (cooling, breaks, etc.)
Czechia	Yes, 27 °C for sedentary offices, 20 °C for very heavy work (limits depend on job category)	No, only requirement to stop work in "adverse weather"	Employers must provide protective breaks (10 min/hour above 2°C; 15 min/hour above 33°C) and other measures for indoor work
Denmark	No	No	During a heatwave, if indoor temperature climbs above 35 °C (at ~40–60% RH), AT practice is to require extra rest breaks for workers – e.g. for sedentary

[273] Although in construction a collective rule allows optional "heat leave" at ~32.5°C with workers receiving 60% pay during stoppages.

Member State	Is there a binding maximum temperature?		Measures or sanctions connected to the limits
	Indoor	Outdoor	
			work, 10 min break every hour when >35°C; for physically active work, breaks if >32°C.
Estonia	No	No	-
Finland	No	No	Guidelines define "hot work" as above 28°C and recommend work–rest cycles (50 minutes work/10 minutes break at 28–33°C; 45/15 at >33°C).
France	Yes, heatwave alert levels connected to Météo-France's vigilance system	Yes, same limits as indoors	Additional measures (fans, schedule changes, etc.) are required after the alerts are released.
Germany	Yes, workplace guidelines (ASR A3.5) stipulate indoor air "should not exceed +26°C"	No	Indoors, countermeasures are required above 30°C and work only under special measures above 35 °C. If indoor temperature rises above 35°C, the room is deemed unsuitable for work unless special hot-work protections are in place.
Greece	No	Yes, only temporarily in 2023–2025 summers (WBGT index exceeds 32.2 or air temperature rises above 40°C (with humidity criteria) and an even stricter 38°C cutoff applied	Work stoppages imposed in emergency situations.

Member State	Is there a binding maximum temperature?		Measures or sanctions connected to the limits
	Indoor	Outdoor	
		to shipyard activities)	
Hungary	Yes, 31°C for sedentary or light work, 29°C for moderate physical work and 27°C for heavy physical work	No	Employers must also provide drinking water when workplace temperature exceeds 24 °C (for physical work) or 26 °C (sedentary). Employers must also implement extra breaks and cooling provisions.
Ireland	No	No	-
Italy	No[274]	No	In summer 2025, ~12 regions issued ordinances banning outdoor work during peak afternoon hours (e.g. 12:30–16:00) on days with red alert heat warnings.
Latvia	Yes, 28°C for office/desk work, 27°C for moderate physical work, and 26°C for heavy work	No	Employers must improve cooling/ventilation or adjust work/rest schedules to comply.
Lithuania	Yes, ~28°C for light office work in warm periods (or 26°C for physically heavy work) with humidity 40–70%	Yes, +28°C ambient temperature	Employers are expected to implement immediate measures (fans, breaks, etc.) to cool the workplace.
Luxembourg	Yes, ~26°C ambient temperature	No	-
Malta	No	Yes, 40°C (ambient) for the	Construction employers must provide free drinking water (hydration stations), shaded rest areas, high-SPF sunscreen, and regular cooling breaks for

[274] A threshold of 35°C is used in practice (e.g., by INPS for wage support eligibility and in Ministry guidelines).

Member State	Is there a binding maximum temperature?		Measures or sanctions connected to the limits
	Indoor	Outdoor	
		construction sector	workers. Employers must also prohibit shirtless work (light, breathable protective clothing is required).
Netherlands	No	No	-
Poland	No (planned from 2027)	No (planned from 2027)	Employers must provide free cool drinks to workers when the temperature exceeds 28°C indoors or 25°C outdoors. Young workers are prohibited from working in rooms over 30°C (with high humidity).
Portugal	Yes, 18–22°C (allowing up to 25°C when outside conditions justify)	No	Ventilation, breaks or other controls are required.
Romania	Yes, 30°C	Yes, +37°C (or the thermal comfort index > 80 units)	Indoors, employers must implement special protections (e.g. provision of 2–4 litres of mineral water per worker per shift and access to cooling spaces. Outdoors, employers must reduce work duration or cease work during the hottest part of the day, while providing cool water, ventilation and rest breaks.
Slovakia	Yes, by work category (approx. 26–27°C for light sedentary work)	No	The employer is required to take immediate steps, such as shortening work periods, increasing breaks, and supplying drinks, in order to reduce workers' heat exposure.
Slovenia	Yes, +28 °C. The exception is hot work spaces, where the air	No	While no temperature limit is set, specific heat-mitigation measures for outdoor work are

Member State	Is there a binding maximum temperature?		Measures or sanctions connected to the limits
	Indoor	Outdoor	
	temperature can exceed +28°C, but in this case the employer must ensure that the air temperature in auxiliary rooms, corridors and staircases connected to hot workspaces is not higher than +20°C		mandated, such as regular rest breaks, adjusted work hours, cool drinking water, shaded/cool rest areas, and worker heat–stress training.
Spain	Yes, 27°C for sedentary work and 25°C for light physical work	Yes, connected to the National Meteorological Agency's alerts	When an orange or red heat alert is declared, employers must adjust or halt outdoor work to safeguard workers.
Sweden	No	No	Swedish employers are encouraged to take action once it gets very warm (>30°C).

Source: Author's own elaboration based on policy mapping sources (see *REFERENCES* and *ANNEX 3*).

ANNEX 3. CASE STUDIES

Finland

Main extreme weather events and associated OSH risks

Finland is experiencing changes in weather patterns due to climate change, with projected increases in extreme weather events that will have both direct and indirect implications for occupational safety and health. The most prominent risks arise from increased precipitation and flooding, extreme temperatures – including summer heatwaves, droughts and short-term spikes in cold spells.

Increased precipitation and floods. Similar to other parts of Northern Europe, Finland is projected to experience to experience more frequent, intense, and unpredictable precipitation events, which heighten the likely occurrence of stormwater floods, riverine floods[275], ice floods[276], and seawater floods[277] (see *Figure 27* below). These developments will place increasing pressure on water drainage and supply systems, heightening flood risks in urban and industrial settings. Flooding and water accumulation are also expected to increase the risk of slip and fall[278] as well as traffic accidents[279] due to increased slipperiness and hazardous road conditions, such as flooding of underpasses, roads and streets, collapse of earthworks, blockage of drains and erosion of roadsides[280], with significant implications for the

[275] For example, in Kokemäenjoki, Kymijoki river basins in Southern Finland, and the Kyrönjoki, Kalajoki, and Oulujoki river basins in Ostrobothnia, Western Finland, and especially during to increased precipitation in winter and summer. See: Parjanne, A., Rytkönen, A.-M. and Veijalainen, N. (2021) Framework for climate proofing of flood risk management strategies in Finland, *Water Security*, 14, 100096. Available at: https://doi.org/10.1016/j.wasec.2021.100096. Veijalainen, N. (2012) *Estimation of climate change impacts on hydrology and floods in Finland*. Aalto University publication series DOCTORAL DISSERTATIONS, 55/2012. Available at: https://aaltodoc.aalto.fi/items/13a8d89d-443c-4e5d-89c3-2e9ced96a3ab.

[276] With the heaviest floods caused by melting snow projected to happen in Northern Finland, especially in Lapland, mostly in early stages of climate change. See: Marttila, V., Granholm, H., Laanikari, J., Yrjölä, T., Aalto, A., Heikinheimo, P., Honkatukia, J., Järvinen, H., Liski, J., Merivirta, R. and Paunio, M. (2005) *Finland's National Strategy for Adaptation to Climate Change.* Ministry of Agriculture and Forestry, 1a/2005. Available at: https://urn.fi/URN:ISBN:952-453-231-X.

[277] Particularly along the Gulf of Finland, where average sea levels are projected to rise by 30–90 cm by the end of 21st century. However, some assessments point our that land uplift may mitigate some coastal flood risks. See: Tuomenvirta, H., Haavisto, R., Hildén, M., Lanki, T., Luhtala, S., Meriläinen, P., Mäkinen, K., Parjanne, A., Peltonen-Sainio, P., Pilli-Sihvola, K., Pöyry, J., Sorvali, J. and Veijalainen, N. (2018) *Sää- ja ilmastoriskit Suomessa – Kansallinen arvio.* Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja, 43/2018. Available at: https://urn.fi/URN:ISBN:978-952-287-601-0; Pellikka, H., Leijala, U., Johansson, M.M., Leinonen, K. and Kahma, K.K. (2018) Future probabilities of coastal floods in Finland, *Continental Shelf Research*, 157, 32–42. Available at: https://doi.org/10.1016/j.csr.2018.02.006.

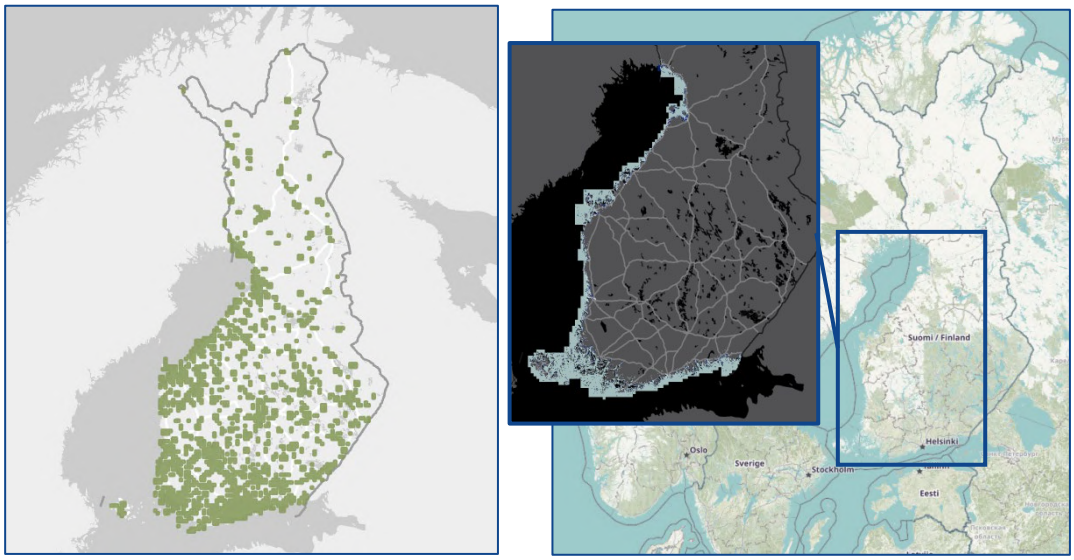
[278] Malin, F., Mesimäki, J. and Penttinen, M. (2022) *Liukastumistapaturmat ja niiden ehkäisy toiminnallisen tasa-arvon ja yhdenvertaisuuden näkökulmasta.* Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja, 2022:15. Available at: https://julkaisut.valtioneuvosto.fi/handle/10024/163848; Haikonen, K. and Lounamaa, A. (eds.) (2010) *Suomalaiset tapaturmien uhreina 2009: Kansallisen uhritutkimuksen tuloksia. Terveyden ja hyvinvoinnin laitos (THL)*, Raportti 13/2010. Available at: https://urn.fi/URN:NBN:fi-fe201205085395.

[279] Freistetter, N.-C., Médus, E., Hippi, M., Kangas, M., Dobler, A., Belušić, D., Käyhkö, J. and Partanen, A.-I. (2022) Climate change impacts on future driving and walking conditions in Finland, Norway and Sweden, *Regional Environmental Change,* 22(2), 58. https://doi.org/10.1007/s10113-022-01920-4; Tuomenvirta, H. et al. (2018) *Sää- ja ilmastoriskit Suomessa – Kansallinen arvio.* Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja, 43/2018. Available at: https://urn.fi/URN:ISBN:978-952-287-601-0.

[280] European Environment Agency (2014) *Adaptation of transport to climate change in Europe.* EEA Report, No 8/2014. Available at: https://www.eea.europa.eu/en/analysis/publications/adaptation-of-transport-to-climate.

transportation sector and outdoor workers[281], as well as commuters. Long-term, increased precipitation is expected to contribute to increased humidity and worsened indoor air quality due to moisture damage and mould, which is likely to contribute to respiratory issues among indoor workers[282].

Figure 27: Finland's general storm-water flood map in 2024 (*left*) and marine flood maps of the coastal zone under the medium flood risk (1/100 likelihood of a flood in a year), RCP8.5 scenario (*right*)



Sources: Syke – Finnish environmental Institute, Yleispiirteinen hulevesitulvakartta 2024 (testipalvelu) (left) and Rannikkoalueen meritulvakartat (kommenttiversio 2022), OpenStreet maps (right).

Cold spells. Although cold spells are expected to become less frequent overall, climate change–induced weather variability may increase the likelihood of short-term extreme cold events. These conditions can be particularly harmful for people with chronic illnesses such as type 2 diabetes, cardiovascular disease, or respiratory problems[283]. They also affect outdoor workers more broadly, increasing the risk of slip-and-fall accidents during freeze–thaw cycles, reduced visibility in winter due to lack of snow, and frostbite in colder weather[284].

Heatwaves and droughts. Rising average temperatures and more frequent, prolonged heatwaves, especially in southern and central Finland[285], will expose workers to increased heat

[281] Karstila, H., Ruuhela, R., Rajala, R. and Roivainen, P. (2024) Recognition of climate-related risks for prehospital emergency medical service and emergency department in Finland – A Delphi study, *International Emergency Nursing*, 73, 101421. Available at: https://doi.org/10.1016/j.ienj.2024.101421.

[282] Lahdensivu, J., Pakkala, T., Pikkuvirta, J., Räsänen, A., Alastalo, S., Karvonen, A., Täubel, M., Pekkanen, J., Juntunen, M., Velashjerdi Farahani, A., Jokisalo, J., Kosonen, R., Jylhä, K., Lanki, T., Leino, O. and Kollanus, V. (2023) *Rakennusten kosteusvauriot ja ylilämpeneminen muuttuvassa ilmastossa – RAIL.* Suomen ympäristökeskus. Available at: https://julkaisut.valtioneuvosto.fi/handle/10024/164539.

[283] Mori, M., Kosaka, Y., Watanabe, M., Nakamura, H. and Kimoto, M. (2019) A reconciled estimate of the influence of Arctic sea-ice loss on recent Eurasian cooling, *Nature Climate Change*, 9, 123-129. Available at: https://doi.org/10.1038/s41558-018-0379-3.

[284] Interview with representative of the Finnish employers' organisation [14 August 2025].

[285] Tuomenvirta, H. et al. (2018) *Sää- ja ilmastoriskit Suomessa – Kansallinen arvio.* Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja, 43/2018. Available at: https://urn.fi/URN:ISBN:978-952-287-601-0.

stress. By the 2030s, average workday temperatures are expected to be 0.5–1°C higher than in the previous decade[286]. These conditions raise the risk of heat-related illnesses such as dizziness, dehydration, and cardiovascular strain, especially for outdoor and manual workers, particularly in construction, agriculture, transportation, emergency, and maintenance roles[287]. Indoor workers can also face heat stress risks, especially those in poorly insulated or older buildings (such as staff in social and healthcare services), as well as employees performing hot work indoors, including in foundries, bakeries, and laundries[288]. Some regional adaptation plans and risk assessments also highlight increased wildfire risk, with implications for occupational exposure among rescue and emergency response workers[289]. More broadly, rising average temperatures are expanding the geographic range of vector-borne diseases in Finland[290], putting workers across multiple sectors, particularly in forestry, agriculture, tourism and emergency services, at increased risk[291].

Some of the above-mentioned extreme weather events, such as storms, floods, and cold spells, also have spillover occupational health risks emerging from the compromised integrity of working facilities. For example, power outages are expected to increase stress and emergency response demand on emergency and rescue services, healthcare, transportation and communication. At high-risk facilities, such as Seveso establishments[292], extreme weather events can cause leaks, fires, or explosions, which could expose employees to hazardous substances. Lastly, the Finnish government and OSH authorities have highlighted mental health impacts as a serious but underexplored risk related to extreme weather events, both for the general population and workers specifically[293]. These risks, ranging from eco-anxiety to depression induced by darker winters[294], may exacerbate already rising trends in psychological distress and depressive symptoms among working-age populations in Finland[295].

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[286] Ruosteenoja, K., Jylhä, K. and Kämäräinen, M. (2016) Climate Projections for Finland Under the RCP Forcing Scenarios, *Geophysica*, 51(1), 17–50. Available at: https://www.geophysica.fi/pdf/geophysica_2016_51_1-2_017_ruosteenoja.pdf.

[287] Tuomenvirta, H. et al. (2018) *Sää- ja ilmastoriskit Suomessa – Kansallinen arvio.* Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja, 43/2018. p. 92. Available at: https://urn.fi/URN:ISBN:978-952-287-601-0; Schulte, P.A., Jacklitsch, B.L., Bhattacharya, A., Chun, H., Edwards, N., Elliott, K.C., Flynn, M.A., Guerin, R., Hodson, L., Lincoln, J.M., MacMahon, K.L., Pendergrass, S., Siven, J. and Vietas, J. (2023) Updated assessment of occupational safety and health hazards of climate change, *Journal of Occupational and Environmental Hygiene*, 20(5-6), 183–206. https://doi.org/10.1080/15459624.2023.2205468.

[288] Interview with representatives of Finnish Institute of Occupational Health (FIOH) [12 and 14 August].

[289] Kymenlaakson liitto (2022) *Kymenlaakso Regional Programme 2022–2025.* Available at: https://maakuntaohjelma.kymenlaakso.fi/.

[290] Mäkelä, H., Dub, T., Nuorti, J.P., Sane, J. (2025) Knowledge, attitudes, and practices towards vector-borne diseases in changing climate in Finland, *Epidemiology & Infection,* 153, e12. https://doi.org/10.1017/s0950268824001468.

[291] Zöldi, V., Turunen, T., Lyytikäinen, O., Sane, J. (2017) Knowledge, attitudes, and practices regarding ticks and tick-borne diseases, Finland, *Ticks and Tick-borne Diseases*, 8(6), 872-877. https://doi.org/10.1016/j.ttbdis.2017.07.004.

[292] Seveso establishments include industrial sites that, because of the presence of dangerous substances in sufficient quantities, are regulated under the Directive 2012/18/EU (EU Seveso III Directive).

[293] Tuomenvirta, H. et al. (2018) *Sää- ja ilmastoriskit Suomessa – Kansallinen arvio.* Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja, 43/2018. p. 63. Available at: https://urn.fi/URN:ISBN:978-952-287-601-0; See more: Meriläinen et al. 2021, pp. 38–39; *Ympäristöahdistus.fi*, 2023, Pilli-Sihvola et al. 2023, p. 103.

[294] Interview with SAK representatives [16 September 2025].

[295] Virtanen, M., Törmälehto, S., Partonen, T., Elovainio, M., Ruuhela, R., Hakulinen, C., Komulainen, K., Airaksinen, J., Väänänen, A., Koskinen, A. and Sund, R. (2023) Seasonal patterns of sickness absence due to diagnosed mental disorders: a nationwide 12-

Table 13: Summary of the main weather events and related OSH risks in Finland

Weather events	Occupational exposure	Key OSH risks	Key sectors and worker groups
Increased precipitation and flooding	Outdoor work in wet/slippery conditions Overloaded water infrastructure	Slip and traffic accidents Drowning Respiratory issues resulting from street dust produced by sanding roads to prevent slipperiness	- Transport and communications - Emergency and rescue services - Construction - Mining - Agriculture - Outdoor services Also: commuters
	Increased humidity, moisture damage to buildings	Indoor air quality issues from the mould	Multiple
	Chemical leaks, fires, or explosions under extreme conditions	Exposure to hazardous substances	Chemical sector and high-risk industrial sites
	Power outage	Increased stress and emergency response	- Healthcare and social care - Emergency and rescue services - Energy and utilities - Transport and communications
Heatwaves and droughts	Higher average temperatures, more frequent and extended heat waves, and high levels of ultraviolet lights	Strain on the respiratory, cardiovascular and circulatory systems Heat load-induced dizziness, fatigue, and concentration lapses	Outdoor: - Agriculture and fisheries - Construction - Mining and quarrying - Energy and utilities (incl. renewable

year register linkage study, *Epidemiology and Psychiatric Sciences*, 32, e64. https://doi.org/10.1017/S2045796023000768. See also: Interview with representatives of Finnish Institute of Occupational Health (FIOH) [14 August 2025].

Weather events	Occupational exposure	Key OSH risks	Key sectors and worker groups
		Increased perspiration or fogging of protective equipment	energy and circular economy sectors) - Chemical sector - Hot indoor work (metal foundries, industrial kitchens, laundries, greenhouse work)
	Forest and wildfires	Smoke inhalation, air quality hazards	Emergency and rescue services
Cold spells	Sudden temperature drops amid general warming trends Slippery surfaces	Risk to workers with chronic conditions (e.g., heart/respiratory issues Physical injuries from frost or icy conditions	Workers with preexisting and special conditions Outdoor workers

Sources: Author's own elaboration based on Tuomenvirta et al. 2018., Tervahattu et al. 2005.

Current OSH legislation

Currently, Finnish legislation on OSH provides a broad framework that implicitly covers weather-related occupational risks but does not directly reference weather- or climate-induced hazards, nor set specific binding thresholds, limits, or obligations concerning exposure to extreme weather events. The Finnish Occupational Safety and Health Act (738/2002) places a general duty on employers to ensure a safe and healthy working environment, including the obligation to carry out risk assessments and implement preventive measures. The Act also requires employers to prevent health risks caused by physical agents – such as thermal conditions, noise, vibration, or radiation. However, it does not specifically mention extreme weather as a source of occupational risk, nor does it establish binding thresholds, exposure limits, or duties related to extreme weather events. Furthermore, no sector-specific regulations currently provide detailed or systematic requirements concerning weather- or climate-related OSH risks.

As a result, the identification and management of such risks remain largely at the discretion of employers, guided primarily by non-binding recommendations and good practice guidelines. For example, in the area of thermal exposure**,** the Finnish Occupational Safety and Health Administration provides guidance on safe workplace temperatures differentiated by the level

of physical work[296], though it does not specify binding maximum temperature thresholds. Instead, the guidance recommends actions such as adjusting workloads, improving ambient conditions, offering regular breaks, and arranging medical examinations when thermal conditions exceed recommended ranges[297].

For ventilation, indoor air quality, and moisture-related risks, the Government Decree on Safety and Health Requirements in Workplaces (577/2003) includes provisions on workspace capacity and ventilation (Section 9), as well as on windows (Section 12), aimed at ensuring healthy indoor air and protection from glare, overheating, and cold. These legal requirements are further supported by guidance from the Occupational Safety and Health Administration on ventilation and moisture control[298]. On vector-borne diseases, Section 9 of the Government Decree on Protection of Workers from the Dangers of Biological Agents (933/2017) mandates that there should be effective control of vectors such as rodents and insects.

Additional provisions relevant to **weather-exposed** or **physically demanding work** are scattered across sector-specific decrees. For example, the Government Decree on the Safe Use and Inspection of Work Equipment (403/2008) includes Section 13, which requires that outdoor equipment be suitable for prevailing weather conditions, and Section 17, which mandates adequate insulation and ventilation in equipment cabins. The Government Decree on Medical Examinations (1485/2001) also lists work in hot conditions as a potential health risk requiring occupational medical assessment, while the Government Decree (427/2021) on the Selection and Use of Personal Protective Equipment at Work requires employers to provide employees exposed to natural and artificial UV radiation with personal protective equipment[299].

While in principle these regulations apply to all Finnish employers, there are several notable complications and gaps in ensuring uniform protection. Some laws impose obligations to maintain continuity of critical services during emergencies, which can increase workers' exposure to hazardous conditions. For example, under the Postal Act (Postilaki, 415/2011), postal service providers are required to 'prepare for exceptional circumstances and disruptions to normal conditions' in order to maintain delivery 'even in the midst of a crisis,' which has direct implications for postal workers' exposure during extreme weather events and thus calls for robust protective measures and planning[300]. Elsewhere, entrepreneurs and self-employed

[296] For example, classifying hot work as above 28°C and recommending work-rest cycles (50 minutes work/10 minutes break at 28–33°C; 45/15 at >33°C). Also see: Finnish Institute of Occupational Health (n.d.) *Thermal conditions.* Available at: https://tyosuojelu.fi/en/working-conditions/physical-factors/thermal-conditions.

[297] Ibid.

[298] Finnish Institute of Occupational Health (n.d.) *Ventilation.* Available at: https://tyosuojelu.fi/en/working-conditions/work-environment/ventilation.

[299] The decree includes a non-exhaustive list of jobs and industries with workers most likely to be exposed to these risks, such as fishing and agriculture, construction and engineering, iron and steel industry, manufacturing, mining etc., included in Annex III. UV radiation is formally recognised as a cause of occupational diseases in the Government Decree on the List of Occupational Diseases (*Laki työterveyshuollosta,* 769/2015). See: Finland (2021) *Laki työturvallisuustiedoista annetun lain 11 luvun muuttamisesta (427/2021)*. Available at: https://www.finlex.fi/fi/lainsaadanto/2021/427#OT11.

[300] See Finland (2011) *Postal Act* (*Postilaki* 3.6.2011/415), Section 44. Available at: https://www.finlex.fi/en/legislation/2011/415.

individuals are not legally required to arrange occupational health services for themselves, which makes it difficult to access comprehensive occupational health coverage and access to preventive or medical care. Small workplaces with fewer than 10 employees, despite being covered by these obligations in principle, have also been identified as harder to reach in practice[301], likely due to limited resources and support structures.

Finland also operates a compensation mechanism for work stoppages due to adverse weather, primarily applied in winter conditions. Under relevant collective agreements, particularly in sectors such as construction and forestry, workers are entitled to unemployment benefits on days when severe weather, such as extreme frost, prevents work from continuing on site. This practice effectively functions as an "adverse weather" allowance, helping to maintain income security during climate-related work interruptions. These benefits are coordinated through the earnings-related unemployment insurance system[302] and detailed in sectoral agreements[303].

National policy frameworks and climate adaptation plans

Finland has acknowledged occupational health and safety (OSH) risks from extreme weather events across several national and sectoral policy frameworks. The most detailed recognition appears in climate adaptation plans under the public health domain, while more limited references can be found in the National Climate Change Adaptation Plan (NAP2030) and sectoral strategies for the climate and labour domains. Although specific adaptation measures targeting OSH are still in development, these frameworks signal growing institutional awareness of climate-related workplace risks and the need for a coordinated response.

Climate, energy, and labour domains: limited acknowledgement

Finland's National Climate Change Adaptation Plan (NAP2030), coordinated by the Ministry of Agriculture and Forestry, is the overarching national strategy that most explicitly acknowledges potential occupational health risks arising from rapid climatic changes and unpredictable extreme weather events[304]. While it assesses the net impact of climate change on health and work ability in Finland as "limited"[305], it commits to exploring the need for relevant national-level measures in line with the EU Adaptation Strategy.

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[301] Ministry of Social Affairs and Health (2017) *Valtioneuvoston periaatepäätös. Työterveys 2025 – yhteistyöllä työkykyä ja terveyttä*, p. 11. Available at: https://julkaisut.valtioneuvosto.fi/handle/10024/79471.

[302] The Social Insurance Institution of Finland (Kela) (n.d.) *Unemployment benefits.* Available at: https://www.kela.fi/web/en/unemployment-benefits. The relevant unemployment benefit rules are administered by the Employment Fund (Työllisyysrahasto) and outlined by Kela, Finland's social insurance institution.

[303] Rakennusliitto (n.d.) *Kylmässä ja kuumassa työskentely*. Available at: https://rakennusliitto.fi/tyoelamatietoa/tyosuojelu-ja-hyvinvointi/kylmassa-ja-kuumassa-tyoskentely.

[304] Pilli-Sihvola, K., Halonen, J., Meriläinen, P., Laapas, M., Ruuhela, R., Munck af Rosenschöld, J., Hällfors, M., Knuuti, S. and Sorvali, J. (2023) *Ilmastonmuutokseen liittyvät riskit ja haavoittuvuudet Suomessa: Tarkastelu kansallisen ilmastonmuutokseen sopeutumissuunnitelman 2030 taustaksi*. Valtioneuvoston julkaisuja 2023, 72. pp. 33, 119. Available at: https://urn.fi/URN:ISBN:978-952-383-566-5.

[305] The NAP highlights Finland's low average temperatures, strong infrastructure, and robust welfare system as factors that could help cushion the impacts of climate change. It suggests the effects may be mixed: for instance, outdoor work might become easier overall, but more frequent heatwaves could still decrease productivity on hot days.

Finland's Climate Act (423/2022), Finland's legal framework for long-term climate policy planning and monitoring, makes no mention of occupational safety. Similarly, the Ministry of Economic Affairs and Employment's National Climate and Energy Strategy (2022)[306], which outlines Finland's pathway to carbon neutrality, focuses primarily on structural changes and job creation driven by the green transition, without addressing occupational safety or extreme weather risks.

On the labour side, the WORK2030 programme presents one of the main national-level frameworks for developing working life in Finland, coordinated by the Ministry of Social Affairs and Health, the Ministry of Economic Affairs and Employment, the Ministry of Education and Culture, and the Ministry of Finance, together with social partners. It mentions multiple OSH risks, but those are not extreme weather-related and are mostly related to future-of-work challenges like digitalisation, hybrid work, and psychosocial strain[307].

Public health: high level of recognition and articulation within the climate adaptation plans

Public health policy frameworks, which fall within the purview of the Ministry of Social Affairs and Health, most explicitly acknowledge climate change impacts on the increased risks of extreme weather events to occupational safety risks. The Ministry's sectoral adaptation plan (SAP, titled "Action Plan for Adaptation to Climate Change in the Ministry of Social Affairs and Health (2021–2031)"), released in 2021, articulates in more detail several key weather-related occupational health risks, including occupational heat and UV exposure during prolonged heatwaves (including in interaction with chemical exposure); increased risk of slips in winter and worsened indoor air quality due to moisture damage to buildings; and psychological impacts of climate change on workers[308]. The plan also recognises potential spillover and indirect effects of climate adaptation measures on occupational safety[309], and situates the necessary OSH

[306] Ministry of Economic Affairs and Employment (2022) C*arbon neutral Finland 2035 – national climate and energy strategy.* Publications of the Ministry of Economic Affairs and Employment, 2022:55. Available at: https://tem.fi/documents/1410877/2769658/Carbon+neutral+Finland+2035+%E2%80%93+national+climate+and+energy+strategy.pdf/7d9d4a71-81c7-c11f-ec7e-df3eee446e81/Carbon+neutral+Finland+2035+%E2%80%93+national+climate+and+energy+strategy.pdf.

[307] Alasoini, T., Antila, J., Hakala, L., Hakonen, N., Kulmala, S., Lautala, K., Lyly-Yrjänäinen, M., Närhinen, A. and Rissanen, M. (n.d.) *Work life development in tripartite co-operation: The WORK2030 programme*. Työterveyslaitos. Available at: https://www.julkari.fi/bitstream/handle/10024/146305/TTL-978-952-391-095-9.pdf.

[308] Meriläinen, P., Paunio, M., Kollanus, V., Halonen, J., Tuomisto, J., Virtanen, S., Karvonen, S., Hemminki, E., Kuusipalo, H., Koivula, R., Mäkelä, H., Huusko, S., Voutilainen, L., Huldén, L., Raulio, S., Keskimäki, I., Partonen, T., Mänttäri, S., Viitanen, A.-K., Kangas, P., Sarlio, S., Lyyra, K., Viljamaa, S. and Mukala, K. (2021) *Ilmastonmuutos sosiaali- ja terveyssektorilla – Sosiaali- ja terveysministeriön ilmastonmuutokseen sopeutumisen suunnitelma (2021–2031)*. Sosiaali- ja terveysministeriö. pp. 45-46. Available at: https://julkaisut.valtioneuvosto.fi/handle/10024/163160.

[309] One set of factors with spillover effects concerns the changing economic landscape, including agricultural and industrial transformation due to the shift to circular economy / alternative fuel, which all imply potential exposure to new biological, chemical, and physical hazards. Another set of factors is linked to the public health challenges such as an ageing population, rising prevalence of chronic illnesses, the spread of vector-borne diseases linked to warming climates, and climate-induced migration. See: Laitinen, J., Moliis, K. and Surakka, M. (2017) Resource efficient wastewater treatment in a developing area—Climate change impacts and economic feasibility, *Ecological Engineering,* 103(Part A), 217-225. Available at: https://doi.org/10.1016/j.ecoleng.2017.04.017.

action within the broader umbrella of public health action in the climate adaptation framework[310].

To tackle these, the SAP outlines a set of interlinked action areas to be implemented in collaboration with sectoral and research institutions under the leadership of the Finnish Institute of Occupational Health (FIOH) and the Occupational Safety and Health Centre, including:

- Identifying OSH risks related to climate change and developing climate-informed risk assessment tools and guidelines (adaptation actions 45, 49).
- Awareness-raising and training for occupational health services (adaptation action 44), the government (adaptation action 46), and workplaces (adaptation action 47), including specifically in relation to occupational hazards linked to the circular economy (adaptation action 45), renewable energy production (adaptation action 50), and UV radiation protection (adaptation action 53), as well as psychological impacts of climate change (adaptation action 55).
- Developing preparedness and adaptation programmes, including action plans for exceptional situations such as floods, storms and power outages *(adaptation action 48)*, as well as working in high temperatures (adaptation actions 51, 52), slip accident prevention programmes (adaptation action 54).

These actions are designed to be pursued collaboratively with multiple stakeholders in the areas of public health, education, labour and economic affairs, and occupational health, among others (see *Table 14*). According to the Ministry of Social Affairs and Health's schedule, a more concrete adaptation programme with clearly designated measures[311], responsible parties, and monitoring and implementation details are expected to be outlined in the next implementation phase (Action Plan 2025–2035), to be published in 2025, as depicted in the timeline in *Figure 28*.

Table 14: Specific actors responsible for co-designing climate mitigation and adaptation measures in the area of occupational safety

Category	Partner institutions	Action
Identifying OSH Risks	Finnish Institute of Occupational Health (FIOH) Centre for Occupational Safety Universities of applied sciences, universities, private education providers	44, 45, 49

[310] Mattila, P. (ed.) (2024) *Safe and healthy working conditions and work ability for everyone: Policy for the work environment and wellbeing at work until 2030*. Publications of the Ministry of Social Affairs and Health, 2024:28. pp. 23, 119. Available at: http://urn.fi/URN:ISBN:978-952-00-8418-9.

[311] The SAP itself mentions some examples of targeted actions which offer an idea of what such specific measures could be, such as improved cooling, heating, and lighting in construction; anti-slip footwear and heel caps; and early-warning systems for heatwaves.

Category	Partner institutions	Action
Awareness-Raising & Training	Ministry of Social Affairs and Health OSH Divisions of Regional State Administrative Agencies (AVI)	46
	Centre for Occupational Safety Finnish Institute of Occupational Health (FIOH) Labour market organisations, Entrepreneurial organisations Vocational schools, universities of applied sciences, universities	47
	Finnish Institute of Occupational Health (FIOH) Centre for Occupational Safety	50
	Finnish Institute of Occupational Health (FIOH) Centre for Occupational Safety	53
	Finnish Institute of Occupational Health (FIOH)	55
Developing Preparedness & Adaptation Programmes	Finnish Institute of Occupational Health (FIOH) Occupational health care services / representatives	48
	Finnish Institute of Occupational Health (FIOH) Centre for Occupational Safety Technical Research Centre of Finland (VTT) Finnish Standards Association (SFS) Finnish Meteorological Institute (FMI) Universities of applied sciences, universities UKK Institute Finnish Defence Forces Likes/KIHU FIOH	51, 52
	Finnish Institute of Occupational Health (FIOH) Centre for Occupational Safety Finnish Meteorological Institute (FMI) Workplaces Occupational health and safety representatives	54

Source: Author's own elaboration based on Finland's Climate Change in the Healthcare and Social Welfare Sector: Adaptation Plan 2021–2031 (p. 72).

Figure 28: Schedule of the Ministry of Social Affairs and Health's climate change adaptation work

Source: Author's own elaboration based on Meriläinen et al. (2021). Climate Change in the Healthcare and Social Welfare Sector: Adaptation Plan 2021–2031 (p. 72). Ministry of Social Affairs and Health, Finland.

Kymenlaakso Regional Adaptation Plan

The Kymenlaakso Regional Adaptation Plan is the only publicly available regional adaptation strategy that provides more context-specific mapping of local occupational safety and health risks linked to extreme weather, alongside targeted actions. The report identifies critical hazards, including heatwaves, flooding, storms, and icy conditions, that disproportionately impact workers in sectors like agriculture, forestry, construction, and logistics, and points to several high-risk facilities such as Seveso industrial plants, the Port of Haminakotka, and energy infrastructure, together with their employees, as at risk of operational disruptions, chemical spills, and equipment failures. The plan also outlines a range of adaptation measures focusing on infrastructure hardening, emergency protocols, and sector-specific training and commits regional authorities to cross-sectoral collaboration with municipalities, employers, and rescue services to implement these measures (see *Table 15*).

Table 15: The main weather-related occupational hazards and adaptation actions, Kymenlaakso Region

Extreme weather event	Areas / Facilities exposed	OSH risks	Worker groups exposed	Identified actions	Partners mentioned
Heatwave	Industrial zones Construction sites	Heat stress Equipment overheating	Construction workers Port staff Firefighters	Cooling breaks Hot work guidelines (pp. 68–70)	Employers Health services Municipalities (p. 70)
Flooding	Port of Haminakotka Wastewater plants Seveso plants	Electrical hazards Chemical spills Fires/explosions	Logistics staff Wastewater plant operators	Backup power for critical facilities Emergency equipment	Water utility company Rescue services Municipal agencies

Extreme weather event	Areas / Facilities exposed	OSH risks	Worker groups exposed	Identified actions	Partners mentioned
	(Kotka, Hamina, Kouvola)			(pp. 46–48)	(pp. 72, 74)
Storms/ Strong winds	Forests Power lines	Falling trees Power line collapses Debris	Forestry workers Energy technicians	Wind damage contingency plans (p. 34)	Natural Resources Institute Finland Forest Centre (p. 65)
Freezing Rain/Icy Condition	Roads Outdoor worksites	Slip-and-fall injuries Vehicle crashes	Road maintenance crews Delivery drivers	Improved winter road maintenance Anti-slip measures (pp. 14–15, 50)	Municipal road authorities Transport agencies (p. 50)
Drought	Agricultural fields	Dust exposure (implied) Machinery overheating Reduced crop yields	Farmers Irrigation technicians	Adjusted work protocols / hours (implied, p. 59)	Farmers' associations Ministry of Agriculture (p. 60)

Source: Author's own elaboration based on Kymenlaakso Regional Council. (2022). Climate-Resilient Kymenlaakso Adaptation Plan.

Labour inspectorates and enforcement

The Occupational Safety and Health Administration, the main agency overseeing workplace inspections in Finland, currently does not play a strong role in supervising or enforcing extreme weather-related OSH obligations. None of the occupational safety observation methods used by the Administration – including the HALMERI method used during inspections, sector-specific internal tools like ELMERI+, TR and MVR, or survey tools like VALMERI and the psychosocial workload factors survey[312] – explicitly address extreme weather-related

[312] See: Occupational Safety and Health Administration in Finland (n.d.) *Occupational safety and health indicators*. Available at: https://tyosuojelu.fi/en/safety-and-health-in-workplace/indicators and Occupational Safety and Health Administration in

occupational risks. While the checklist used by inspectors as part of the HALMERI method[313] includes some relevant factors (such as thermal conditions, temperature, air movement, and humidity), these are treated as general physical working conditions and are not explicitly linked to extreme weather events[314].

This lack of framing is consistent with the near-absence of information on environmental or climate-related issues or extreme weather events in the OSH Administration's recent annual reports. These reports have traditionally focused on physical hazards, psychosocial workload and discrimination, and documented active inter-agency cooperation with law enforcement, tax authorities, border control, and other labour-related bodies such as the TE Office and the Finnish Centre for Pensions[315]. Consistent with these patterns, a 2021 Occupational Safety and Health Panel, carried out by the FIOH and the Centre for Occupational Safety, found that while overall awareness of climate change in the workplace was high, only 8% of respondents reported its impacts were discussed in their workplace from the perspective of occupational safety[316]. The panel also surfaced uneven levels of recognition of weather-related occupational hazards across companies, with some actively including them in risk assessments and others not, as well as diverging views among OSH professionals on whether consequences of extreme weather events fall within their remit. This points to the need for more comprehensive training and information on identifying weather-related OSH risks, including sector- and profession-specific guidance, for both inspectors and employers[317]. This area of focus was also highlighted in the recommendations of a Nordic expert group comprising senior figures from Finland's and other Nordic countries' labour inspectorates[318].

Finland (n.d.) *Halmeri method*. Available at: https://tyosuojelu.fi/en/safety-and-health-in-workplace/indicators/halmeri-method.

313 See: *Halmeri tarkastuksen ohje* (n.d.). Available at: https://tyosuojelu.fi/documents/154017715/168016241/Halmeri+ohje.pdf/f24954f2-98dc-45fc-976d-d4846f2198a3?t=1715846153086.

314 This limiting framing was noted in a 2013 assessment of the HALMERI method by the Finnish Institute of Occupational Health, which found that the model was useful for 'describing the existence of occupational safety management systems', but not for effectively assessing their quality or day-to-day implementation. It also observed that the model may have contributed to the notion in some workplaces that 'occupational safety was the same as machine safety'. See: Merivirta, M.-L., Lappalainen, J., Mattila, S., Puro, V., Savinainen, M., Toivio, P. & Uusitalo, H. (2013) Työsuojelu- ja työhyvinvointitoiminnan tehokkuus työpaikoilla (TS-teho). Finnish Institute of Occupational Health. p. 41. Available at: https://www.julkari.fi/handle/10024/134969.

315 Occupational Safety and Health Administration in Finland (2024) *Annual Report of the Occupational Safety and Health Administration in Finland 2024.* Available at: https://tyosuojelu.fi/documents/154017715/203855449/TSH-vuosikertomus-2024-EN.pdf/f7dc12dd-333d-3a20-8701-74f2fd1d2457/TSH-vuosikertomus-2024-EN.pdf.

316 Finnish Institute of Occupational Health (n.d.) *Occupational safety and climate.* Available at: https://www.tyoelamatieto.fi/en/home/data/occupational-safety-and-climate/.

317 Interview with representative of Occupational Safety and Health Administration [9 September 2025].

318 The recommendations do not mention extreme weather events specifically, instead broadly highlighting the need to understand, incorporate into risk assessments, and raise awareness about the environmental and climate change impacts on occupational safety and health (see Mattila-Wiro, P., Samant, Y., Husberg, W., Falk, M., Knudsen, A., & Saemundsson, E. (2020). *Work today and in the future: Perspectives on occupational safety and health challenges and opportunities for the Nordic labour inspectorates*. Nordic Future of Work Group, Ministry of Social Affairs and Health. Available at: https://urn.fi/URN:ISBN:978-952-00-7172-1).

Data collection and reporting

At present, Finland does not have a dedicated system for tracking occupational accidents, illnesses, or fatalities specifically linked to extreme weather events. Finland's official authority responsible for occupational accident and disease statistics, the Finnish Workers' Compensation Centre (TVK), collects and publishes data on three main types of occupational risks: work-related injuries, commuting accidents and occupational diseases, which can be filtered down by year and sector[319]. The database also details the frequency of accidents by industry and the duration of injury. Each of the three main risk categories is further broken down using variables defined in the European Statistics on Accidents at Work (ESAW) and section 17 of the Finnish Workers' Compensation Act[320]. While some of these variables theoretically could capture weather-related incidents, they relate primarily to the physical work environment and circumstances of injury, and do not explicitly identify accidents caused by extreme weather conditions (see *Table 16* below).

Table 16: Selected indicators from the Finnish Workers' Compensation Centre's (TVK) data on occupational accidents and diseases, with highlighted classifications that could theoretically be used to report extreme weather-related accidents

Case types		Workplace injuries		Commuting accidents	Occupational diseases
Relevant indicators*		**Content – Mode of injury**	**Deviation (abnormal event)**	**Cause of the accident**	**Exposure factor**
Category	Potentially relevant for extreme weather events	heat sudden physical or psychological strain hazardous substances (skin or eye exposure) hazardous substances (inhalation)	slipping tripping stumbling electrical fault, explosion, fire	falling slipping tripping	chemical physical biological unknown

[319] Vakes (n.d.) Tikku portal: *Occupational accident and disease statistics.* Available at: https://viya4.vakes.fi/SASVisualAnalytics/?reportUri=%2Freports%2Freports%2F4764782f-ac58-4ea8-bb8a-39bd9335fefb&sectionIndex=0&sso_guest=true&reportViewOnly=true&reportContextBar=false&sas-welcome=false.

[320] Finnish Workers' Compensation Center (TVK) (n.d.) *Classifications*. Available at: https://www.tvk.fi/en/statistics/classifications.

Case types		Workplace injuries		Commuting accidents	Occupational diseases
Relevant indicators*		**Content – Mode of injury**	**Deviation (abnormal event)**	**Cause of the accident**	**Exposure factor**
	Other	collision with fixed surface injury caused by sharp or cutting object impact or collision with moving object animal or human bite/kick/etc. crushing or bruising other unspecified causes of injury electric shock arc flash/lightning unknown no info on cause in accident report	stepping on sharp object, bumping, etc. sudden physical strain breakage/fall/etc. of object loss of control of device/tool/animal violence, disturbing situation, unauthorised presence shock other unspecified deviations leaking/spilling/etc. of substances no deviation info in accident report falling to a lower level unknown	collision with a car vehicle going off-road or tipping over collision with bicycle/moped/motorcycle stepping on objects violence unknown collision with rail vehicle other accident types	

** Other available indicators include:*

For the Workplace Injury category — Physical Activity (Nature of the physical work action being performed at the time of injury), Injured body part, Working environment (Occupational function or duty being carried out), Work environment, Situation / Circumstance

For the Commuting Accidents category — Accident month, Mode of transport, Region

For the Occupational diseases category — Disease status (confirmed vs speculated)

Source: Author's own elaboration based on Finnish Workers' Compensation Center's (TVK) Register of Occupational Accidents and Diseases (Tikku).

The Finnish Institute of Occupational Health is currently in the process of developing indicators to support the systematic collection of data on climate change impacts on working life[321], informed in part by the aforementioned 2021 Occupational Safety and Health Panel. This marks the first dedicated effort in Finland to collect data on occupational risks related to climate change. The indicators, once finalised, will be made available through the Work-Life Knowledge service[322], an open-access platform providing research and statistics to support decision-making and development in working life.

Due to the nascent nature of these efforts, current policy frameworks only occasionally reference selective sector-specific data from official surveys and academic studies[323], and this use remains unsystematic. Nonetheless, the Ministry of Social Affairs and Health has identified the need for accurate data as a priority area for future policy development and enforcement planning, explicitly stating in its Sectoral Adaptation Plan the goal of supporting workplaces with integrating climate change-related aspects into their risk assessments[324].

Role of social partners

Finland has a strong tradition of social dialogue, and social partners like trade unions, employer organisations, professional associations and NGOs are frequently consulted during the design OSH legislation and policy plans[325]. The tripartite consultation approach is also institutionalised via the Advisory Committee on Occupational Safety and Health[326], which serves as a special consultative body under the Ministry' of Social Affairs and Health and includes 3-year-rotational-membership of representatives of the labour market parties, who advise the ministry on national occupational safety policies. However, there are currently no active tripartite consultations on climate- and weather-related occupational risks in Finland[327].

Separately, employer and employee representing organisations have taken initiatives to address extreme-weather OSH risks. One area of activity is sectoral collective bargaining, where some unions have begun to address weather-specific risks in their negotiations. For

[321] Finnish Institute of Occupational Health (TTL) (n.d.) *Climate change and work – systematic collection of data on the impact of climate change on work life*. Available at: https://www.ttl.fi/en/research/projects/climate-change-and-work-systematic-collection-of-data-on-the-impact-of-climate-change-on-work-life.

[322] *Open data and observations on work life phenomena* (n.d.). Available at: https://www.tyoelamatieto.fi/en/home/.

[323] E.g., Meriläinen (2021) pp. 36, 39, 45-46. Pilli-Sihvola et al. (2023) p. 97.

[324] Meriläinen et al. (2021) p. 58.

[325] Broughton, A. (2024) *Working conditions and social dialogue.* Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/working-conditions-and-social-dialogue.
See also: Ministry of Social Affairs and Health (2006) *National Occupational Safety and Health Profile of Finland*, 2006:8. p. 26. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_protect/%40protrav/%40safework/documents/publication/wcms_179869.pdf.

[326] See Section 4 of Finland's Act on Occupational Safety and Health Administration 16/1993.

[327] Interview with SAK representatives [16 September 2025].

example, the Finnish Construction Trade Union (Rakennusliitto) includes provisions on thermal conditions and frost limits (typically set between –15°C and –20°C) for outdoor work in their collective agreements and promotes guidelines for working safely in both hot and cold environments[328]. Elsewhere, the Service Union United (PAM), while leaving specific temperature thresholds to be negotiated at the company level, has secured supplementary cold work pay in some sectors, such as a 7–11 per cent environmental supplement for warehouse employees working in outdoor or unheated spaces during winter[329], as well as requirements for the provision of protective equipment and clothing for ski resort workers[330]. In contrast to these targeted provisions for high-exposure occupations, the Trade Union for the Public and Welfare Sectors (JHL), Finland's largest public sector union, has announced its intent to renegotiate multiple collective agreements in 2025, with one key aim being the inclusion of employer obligations to provide protective clothing for extreme weather and ensure sufficient breaks[331].

Alongside collective bargaining, some unions engage in national and EU-level advocacy. The Central Organisation of Finnish Trade Unions (SAK) has called for OSH regulations to better address health risks linked to climate change[332], including clearer rules on rest breaks and protection from severe weather phenomena such as heatwaves, UV exposure, and storms[333]. At the EU level, both Rakennusliitto and JHL have signed the European Trade Union Confederation's (ETUC) Zero Deaths at Work Manifesto, which explicitly highlights the need to address health and safety challenges posed by extreme weather events and changing temperatures as part of the goal to eliminate workplace deaths in the EU by 2030[334]. At the same time, SAK and The Finnish Confederation of Professionals (STTK) have advanced similar demands for climate-adaptive OSH policies through the FinUnions platform[335], and together with Akava (Confederation of Unions for Professional and Managerial Staff in Finland), have highlighted the issue globally at COP29, calling for international climate finance to support just transition efforts for workers[336].

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328 Rakennusliitto (n.d.) *Kylmässä ja kuumassa työskentely.* Available at: https://rakennusliitto.fi/tyoelamatietoa/tyosuojelu-ja-hyvinvointi/kylmassa-ja-kuumassa-tyoskentely/.

329 Service Union United PAM (n.d.) *Workplace temperatures*. Available at: https://www.pam.fi/en/working-life/guide-to-working-life/occupational-health-and-safety/working-environment/workplace-temperatures/.

330 PAM (n.d.) *Hiihtokeskusalan työehtosopimus,* 20 § Työasut. Available at: https://www.pam.fi/tes/hiihtokeskusalan-tyoehtosopimus/taysi/20-%C2%A7-tyoasut/.

331 JHL (n.d.) *Collective agreement negotiations.* Available at: https://www.jhl.fi/en/latest-news/collective-agreement-negotiations/.

332 Interview with SAK representatives [16 September 2025].

333 SAK (n.d.) *Healthy and safe work.* Available at: https://www.sak.fi/en/goals/healthy-and-safe-work/.

334 ETUC (n.d.) *Manifesto: Zero death at work.* Available at: https://www.etuc.org/en/publication/manifesto-zero-death-work.

335 Finnish Trade Unions (2024) *Legislative program needed to implement the EU's occupational Safety and Health Strategy.* Available at: https://finunions.org/wp-content/uploads/2024/05/FU-ENG_Kanta_tyoterveys-ja-tyoturvallisuus_verkkoon_2024.pdf.

336 STTK (2024) *COP29: Työntekijät tarvitsevat ilmastorahoitusta oikeudenmukaisen siirtymän edistämiseen*. Available at: https://www.sttk.fi/2024/11/11/cop29-tyontekijat-tarvitsevat-ilmastorahoitusta-oikeudenmukaisen-siirtyman-edistamiseen/.

Good practices and innovations

The Public Health Sectoral Adaptation Plan (SAP) is notable for moving from vague awareness to assigned, actionable measures (such as developing climate-informed risk tools and sector-specific training). Its mandated collaboration between key agencies like the Finnish Institute of Occupational Health (FIOH) and the Occupational Safety and Health Centre creates a coordinated national framework.

Sectoral collective agreements, exemplified by the Finnish Construction Trade Union's negotiation of enforceable frost limits (–15°C to –20°C) and the Service Union United's (PAM) securing of "cold work pay", demonstrate the power of social dialogue to fill legislative gaps. These could be considered good practices in tripartite negotiation.

The development of dedicated climate-OSH indicators by FIOH to systematically track weather-related incidents addresses a core problem of invisibility in current data. It is notable for its potential for creating the essential evidence base for targeted policy and enforcement.

Ireland

Main extreme weather events and associated OSH risks

As an island state with 40% of its population living in immediate proximity to the coast, Ireland faces significant risks from extreme precipitation events, which are projected to increase and will be exacerbated by rising sea levels, thus leading to more frequent instances of fluvial and coastal flooding. The island is also frequently exposed to intense windstorms, which cause physical damage and disruption to critical infrastructure and services, especially in combination with extreme rain- or snowfall. Heatwaves and droughts are equally serious threats to the health of Ireland's general and working population, especially given that the infrastructure and industries all not equipped to handle higher temperatures in a country whose temperate oceanic climate has historically translated into milder conditions.

More frequent intense precipitation events and flooding. Ireland's coastal areas, which host around 40% of the country's population[337], are already vulnerable to fluvial and coastal floods (see *Figure 29*). These areas are expected to face even higher risks due to projected increases in the frequency of intense storms and extreme precipitation events[338], which will drive coastal erosion[339] and will themselves be exacerbated by sea level rise. Accordingly, Ireland's national risk assessments identify human risks from fluvial, pluvial, and groundwater floods – including drownings, physical injury, and increased mental health impacts[340] – as becoming critical by the middle of the 21st century, and catastrophic by its end under both moderate and high emission scenarios[341] (see *Figure 30*).

[337] Around 40% of Ireland's population in 2016, or 1.9 million people, lived within 5 km of the coast, including over 40,000 less than 100 metres from the shoreline (Central Statistics Office (2016) *Census of Population 2016*. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-cpr/censusofpopulation2016-preliminaryresults/geochan).

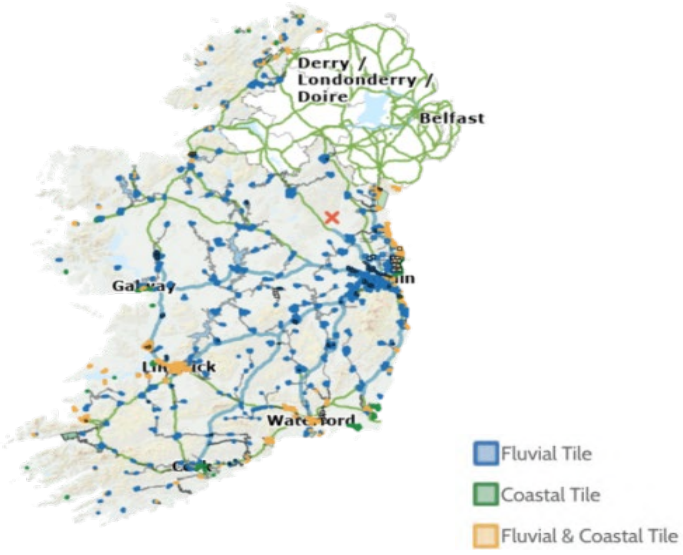
[338] Likely increase in the number of very wet days by 5–19% in winter and autumn (Environmental Protection Agency (EPA) (2025) *National Climate and Climate-Related Risk Assessment (NCCRA) Main Report.* Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/EPA_NCCRA_Main-Report_Published_June_2025.pdf).
Also see: Nolan, P. and Flanagan, J. (2020) *High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach.* EPA Research Report 339, Part 1. Environmental Protection Agency. Available at: https://www.epa.ie/publications/research/climate-change/Research_Report_339_Part1.pdf.

[339] Clare County Council (2024) *Clare Climate Action Plan 2024–2029*. p. 34. Available at: https://www.clarecoco.ie/services/climate/planning-and-implementation/clare-climate-action-plan-2024-2029-55368.pdf.

[340] Roche, B. (2024) Midleton after the flood: 'You've no idea of the mental trauma of doing business in this town, let alone living here.' *The Irish Times.* Available at: https://www.irishtimes.com/ireland/2024/10/12/midleton-after-the-flood-youve-no-idea-of-the-mental-trauma-of-doing-business-in-this-town-let-alone-living-here/.

[341] Environmental Protection Agency (2025) *National Climate and Climate-Related Risk Assessment (NCCRA) Main Report.* Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/EPA_NCCRA_Main-Report_Published_June_2025.pdf, pp. 32–33.

Figure 29: Map of Ireland with areas vulnerable to fluvial, coastal, and mixed floods under current conditions, based on CFRAM predictive models



Source: Author's own elaboration based on data from Floodinfo.ie, available at: https://www.floodinfo.ie/map/floodmaps.

Windstorms. Ireland is often struck by storms, with recent examples including Barra (2021), Eunice (2022), Kathleen (2024), and Éowyn (2025)[342], the latter registering the highest sustained and gust wind speeds on record[343,344]. While most projections indicate no change in the frequency of windstorms in the country, their current recurrence already poses significant risks and can exacerbate the impacts of other weather events when combined with rain or snowfall. Occupational risks from windstorms are primarily associated with damage to physical infrastructure and disproportionately affect outdoor workers, such as those employed in transportation, emergency services, maintenance, and tourism sectors, as well as commuters[345].

Heatwaves. Studies have shown that the number of extremely hot events in Ireland has increased. One recent study found that 33 °C heat events in Dublin, which used to be a 1-in-180-year event in 1942, became a 1-in-9-year event by 2020[346]. Climate projections show that the number of extreme temperature events will rise more dramatically than average temperatures, with extreme hot days are expected to increase by 1–8 under RCP4.5 and 3–15

[342] Met Éireann (2025) *Major weather events.* Available at: https://www.met.ie/climate/major-weather-events.

[343] Met Éireann (2025) *Storm Éowyn: Meteorological report*. Available at: https://www.met.ie/cms/assets/uploads/2025/08/Eowyn.pdf.

[344] *BBC News* (2025) *Storm Éowyn: Impact on Ireland*. Available at: https://www.bbc.co.uk/news/articles/c4gz8x1j0v2o.

[345] Interview with an Irish employers' organisation representative [17 July 2025].

[346] Healy, D., Tawn, J., Thorne, P., & Parnell, A. (2021) Inference for extreme spatial temperature events in a changing climate with application to Ireland. *arXiv*. Available at: https://arxiv.org/pdf/2111.08616.

under RCP8.5 between 2041 and 2060 (compared to 1981–2000)[347]. The trend is strongest in the eastern and southern parts of the country (see *Figure 30*). Substantial decreases in summer precipitation[348] add the prospect of droughts. In response, several local authorities consider bog and wildfires both an immediate[349] and long-term hazard[350]. However, considering the expected increase in the variability of future precipitation trends, reliable regional predictions remain difficult to make. Ireland's national risk assessment expects human risks from extreme hot weather events to become critical by mid-century (see *Table 17*), including increased cancer risks from UV light exposure for outdoor workers[351], as well as heat stress, cognitive strain, dehydration, and elevated aeroallergen levels for both outdoor and indoor workers[352], especially among older people and/or those with preexisting chronic conditions.

[347] UNFCCC (2023) *Ireland's Eighth National Communication and Fifth Biennial Report (NC8 & BR5).* p. 25.3 Available at: https://unfccc.int/sites/default/files/resource/92073861_Ireland-NC8-BR5-2-NC8%202023%20Clean%20for%20uploading.pdf.

[348] Projected increases in summer temperatures: +11% under RCP4.5 and +18% under RCP8.5 for 2041–2060 compared to 1989–2000; decreases of 8% under SSP5-8.5 for 2071–2100 (Nolan 2014, p. 31).

[349] Cork County Council (2024) *Climate Action Plan 2024–2029*, p. 31. Available at: https://www.corkcoco.ie/sites/default/files/2024-02/cork-county-council-climate-action-plan-2024-2029.pdf; Dún Laoghaire-Rathdown County Council (2024) *Climate Action Plan 2024–2029*, p. 34. Available at: https://www.dlrcoco.ie/sites/dlrcoco/files/2024-03/98531%20Dun%20Laoghaire%20Climate%20Action%20Plan%2024-29%20Updates%20V13.pdf.

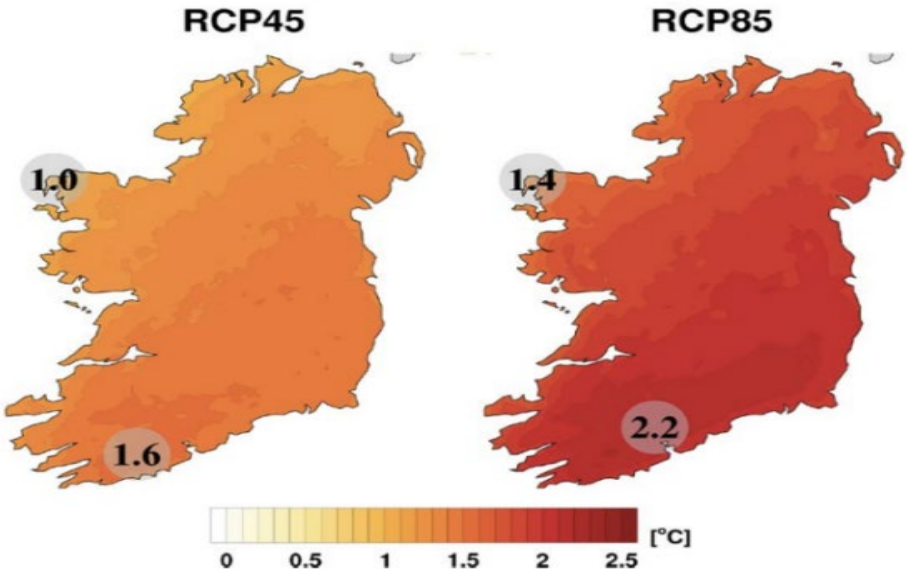
[350] Cavan County Council (2024) *Climate Change Adaptation Strategy*, p. 49. Available at: https://www.cavancoco.ie/file-library/environment/climate-change/climate-change-adaptation-strategy-pdf.pdf; Carlow County Council (2024) *Climate Change Adaptation Plan*, p. 40. Available at: https://carlow.ie/media/637/download?inline.

[351] United Nations Framework Convention on Climate Change (2023) *Ireland's 8th National Communication*, p. 261. Available at: https://unfccc.int/sites/default/files/resource/92073861_Ireland-NC8-BR5-2-NC8%202023%20Clean%20for%20uploading.pdf.

[352] Climate Action Regional Offices (CARO) (2024) *Research Report 402*. Available at: https://www.caro.ie/getattachment/a39614ed-a4df-4226-b0f0-ded454dd63b3/Research_Report_402.pdf.

Figure 30: Top 5% of projected extremely hot days in Ireland under RCP4.5 and RCP8.5, 2041–2060

Numbers on the map indicate projected increases (in °C) in 2041–2060, compared to 1981–2000



Source: Author's own elaboration based on data from EPA (2025) *High-resolution Climate Projections for Ireland*. Available at: https://www.epa.ie/publications/research/epa-research-2030-reports/research-471-updated-high-resolution-climate-projections-for-ireland.php, p. 28.

Cold spells. Cold spells, along with heavy snowfall events, are common in northern counties in Ireland[353]. Despite a projected decrease in their overall frequency, sudden snowfall events still have significant impacts, especially given Ireland's ill-equipped infrastructure[354]. Associated hazards include slips and falls as well as dangerous driving conditions due to road and rail disruptions.

Table 18 summarises the main extreme weather events and their associated OSH risks across key sectors.

[353] Cavan County Council (2024) *Cavan Climate Risk Assessment Report*. Available at: https://www.cavancoco.ie/file-library/environment/climate-change/cavan-climate-risk-assessment-report.pdf.

[354] Ibid.

Table 17: The priority risks for Ireland identified through the National Climate Change Risk Assessment based on timing of impact and level of consequence

Hazards	Risks	Consequences		
		Current	Mid-century	Late century
Extreme wind	Disruption and damage to energy transmission and distribution infrastructure			
	Disruption and damage to communication infrastructure			
Sea level rise, coastal erosion and flooding	Disruption, damage, and loss of transport infrastructure			
	Damage and loss of buildings			
Extreme precipitation and flooding (fluvial / surface water / groundwater)	Damage and loss of buildings			
	Disruption and damage to transport infrastructure			
	Physical injury and mental health risks			
Heat	Physical and mental health risks			
	Exposure to decreased indoor air quality			
	Extreme demand on healthcare services and facilities			

Source: Author's own elaboration based on EPA's National Climate Change Risk Assessment (June 2025).

Table 18: Summary of the main weather events and related OSH risks in Ireland

Weather events	Occupational exposure	Key OSH risks	Key sectors / groups
Windstorms	Falling objects (trees) Gusts of wind Disruption and damage to physical infrastructure (e.g., energy, communications)	Traffic accidents Physical injury	Emergency services Transportation (including aviation and maritime) Maintenance Pharmaceutical Manufacturing Also: commuters

Weather events	Occupational exposure	Key OSH risks	Key sectors / groups
More frequent intense precipitation events and flooding	Disruption and damage to transport infrastructure Erosion and landslides Damage to the buildings	Slip and fall accidents Exposure to water-borne diseases Exposure to indoor mould and fungus Mental health risks (anxiety, depression, etc.)	Outdoor workers: agriculture, transportation, tourism and hospitality, fisheries and maritime Healthcare and emergency services Retail Also: commuters
Heatwaves	Increased and prolonged exposure to UV radiation and heat Wildfires Exposure to decreased indoor air quality	Cognitive strain and heat stress (esp.) Higher rates of skin cancer Increased aeroallergen levels Mental health risks (anxiety, depression, etc.)	Outdoor workers: agriculture, transportation, tourism and hospitality, fisheries and maritime workers, emergency and rescue services Indoor workers in poorly ventilated /areas Healthcare and emergency services Also: older workers, workers with chronic diseases
Cold spells	Icy surfaces Disruption and damage to transport infrastructure	Slip and fall accidents Frostbites	Outdoor workers: transportation, maintenance, energy sector Retail Healthcare and emergency services Also: commuters

Source: Author's own elaboration.

Current OSH legislation

Ireland's Safety Health and Welfare at Work (SHWW) Act (adopted in 1989, updated in 2005)[355] is the country's cornerstone OSH framework, outlining the fundamental responsibilities of workplace stakeholders, including the employer's duty to identify, assess, and protect employees from workplace hazards. The Health and Welfare at Work (General Application) Regulations (GAR, adopted in 1993, updated in 2007)[356] elaborate on the SHWW Act's provisions by detailing standards and specific requirements for a wide range of workplace hazards.

Irish law has enforceable minimum thresholds for workplaces, set in the GAR at 17.5°C for sedentary office work and 16°C for light work in indoor workplaces. There is no legal maximum for either indoor or outdoor work. Official guidelines by Ireland's Health and Safety Authority (HSA), the official enforcement authority for OSH under the Department of Business, Enterprise and Innovation, indicate 18–23°C as a comfortable range and mention ISO standard 7730 as the benchmark for thermal comfort used during workplace inspections. HSA and Ireland's national health provider, Health Service Executive (HSE), offer various recommendations for employee protection during extremely hot[357] and cold[358] weather, including via references to international standards for workplace temperature[359].

Regarding the broader extreme weather provisions, the SHWW Act's requires employers to protect employees from adverse natural/weather conditions (Schedule 7 (36) (a)) and prepare and revise plans and measures to be taken in case of emergencies serious and imminent danger (Section 11). When it comes to sector- or profession-specific protections, the GAR provide overarching duties to protect certain categories of workers, including outdoor workers[360], those working at height[361], and those working with electrical equipment[362], from weather-related

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355 Health and Safety Authority (2005) *Safety, Health and Welfare at Work Act 2005*. Available at: https://www.hsa.ie/eng/Legislation/Acts/Safety_Health_and_Welfare_at_Work/SI_No_10_of_2005.pdf.

356 Irish Statute Book (2007) *Safety, Health and Welfare at Work (General Application) Regulations 2007.* Available at: https://www.irishstatutebook.ie/eli/2007/si/299/made/en/print.

357 Common recommended measures include UV protection, limiting outdoor work hours, adjusting work schedules to avoid the hottest times of the day, and signing up for Met Éireann weather warnings. Health Service Executive (HSE) (n.d.) *Be Summer Ready – Severe Weather Preparedness Booklet.* Available at: https://www.hse.ie/eng/services/list/3/emergencymanangement/severe-weather/be-summer-ready-booklet.pdf.

358 Government of Ireland (n.d.) *Preparing Businesses and Farms for Severe Weather – Be Winter Ready*. Available at: https://www.gov.ie/en/department-of-defence/publications/preparing-businesses-and-farms-for-severe-weather-be-winter-ready/#impact-on-employees.

359 The HSA references ACGIH recommendations for employees performing fine work with bare hands in cold environments, suggesting 10–20 minute work intervals below 16°C. Health and Safety Authority (n.d.) *Safety, Health and Welfare at Work (General Application) Regulations – Guidance.* Available at: https://www.hsa.ie/eng/publications_and_forms/publications/general_application_regulations/gen_apps_workplace.pdf. See also: Chartered Institution of Building Services Engineers (CIBSE) (2015) *Guide A – Environmental Design*. Available at: https://www.cibse.org/knowledge-research/knowledge-portal/guide-a-environmental-design-2015.

360 Safety, Health and Welfare at Work (General Application) Regulations (GAR) Regulation 23, "Outdoor places of work, special provisions".

361 GAR Regulation 97, "Weather conditions", and Regulation 107, "Scaffolding, additional requirements".

362 GAR Regulation 77, "Adverse or hazardous environments".

hazards. In addition, several sector-specific regulations mention employer obligations related to temperature, sun exposure, and weather conditions, which are summarised in *Table 19* below.

Table 19: Employer obligations vis-a-vis weather events, temperature, and sunlight in Ireland's sector-specific regulations

Sector	Regulation	Weather aspects and mandated requirements		
		Weather conditions	Temperature	Sunlight
Work at height	2006 Work at Height Regulations[363], Art. 4	Assess weather risks and postpone work if conditions are dangerous	-	-
Construction	2013 General Application Regulations for the Construction sector[364], Reg. 98	Provide employees with adequate and suitable enclosed accommodation for taking shelter during interruptions of work owing to bad weather	-	-
Fisheries	1999 Safety, Health and Welfare At Work (Fishing Vessels) Regulations[365], Regulation 4, Art. 7	-	Ensure adequate temperature during working hours considering physical demands and actual or potential weather conditions in	-

[363] Irish Statute Book (2006) *Safety, Health and Welfare at Work (Work at Height) Regulations 2006*. Available at: https://www.irishstatutebook.ie/eli/2006/si/318/made/en/print#article4.

[364] Health and Safety Authority (2013) *Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2013*. Available at: https://www.hsa.ie/eng/Legislation/New_Legislation/SI_291_2013.pdf.

[365] Irish Statute Book (1999) *Safety, Health and Welfare at Work (Fishing Vessels) Regulations 1999*. Available at: https://www.irishstatutebook.ie/eli/1999/si/325/made/en/print.

Sector	Regulation	Weather aspects and mandated requirements		
		Weather conditions	Temperature	Sunlight
			the area in which the vessel operates	
Mining	2018 Safety, Health and Welfare At Work (Mines) Regulations[366], Part 13, Art. 128	-	Ensure suitable temperature in rooms with workstations	Avoid excessive effects of sunlight in relation to windows, skylights and glass partitions

Source: Author's own elaboration based on sources indicated in the Table.

Beyond these mentions, no binding weather-related or workplace temperature provisions can be found in national legislation or in collective agreements, including Registered Employment Agreements (REAs)[367], Sectoral Employment Orders (SEOs), and Employment Regulation Orders (EROs). Instead, official codes of practice and semi-official guidelines provide broader business adjustment recommendations[368]. Some sector-specific guidelines also exist, with the most explicit recommendations in guidelines for the healthcare[369], agriculture[370], and fisheries[371].

366 Irish Statute Book (1999) *Safety, Health and Welfare at Work (Mines) Regulations 1999.* Available at: https://www.hsa.ie/eng/Your_Industry/Mining/Mining_Legislation_and_Notifications/Mines_Legislation.pdf.

367 Labour Court (n.d.) *Registers of Decisions and Awards.* Available at: https://www.labourcourt.ie/en/publications/registers/.

368 DBEI extreme weather guidance recommends flexible work arrangements (remote or shift work) and policies on sick and compassionate leave during weather emergencies, including for high-risk commuting employees. See also: Government of Ireland (n.d.) *Business Continuity Planning – Guidance Document*, p. 14. Available at: https://assets.gov.ie/static/documents/business-continuity-planning.pdf.

369 HSE (Ireland's national healthcare provider) guidelines for extreme weather assign senior managers responsibility for preparedness and advise line managers on PPE, contingency supplies, and seasonal vaccinations (HSE 2023, Section 1.8.1, "Severe weather planning for HSE Services"). See also: Health Service Executive (n.d.) *Severe Weather Information and Guidance.* Available at: https://www.hse.ie/eng/services/list/3/emergencymanangement/severe-weather/.

370 Farmers' guidelines from Teagasc and the Department of Agriculture, Food and the Marine provide outdoor work safety advice during freezing conditions, e.g., clearing walkways, gritting slopes, herding livestock before nightfall, carrying mobile phones, and using RCD-protected electrical equipment. See also: Teagasc (2011) *Weather Advice for Farmers*. Available at: https://teagasc.ie/wp-content/uploads/media/website/publications/2011/Weather_Advice.pdf; Teagasc (n.d.) *Be Winter Ready – Farm Management Safety Advice.* Available at: https://teagasc.ie/rural-economy/farm-management/farm-health-safety/be-winter-ready/; Teagasc (n.d.) *The Hidden Dangers of Working Outdoors.* Available at: https://teagasc.ie/news--events/daily/the-hidden-dangers-of-working-outdoors/.

371 The HSA's *Managing Health and Safety in Fishing* guidance highlights how environmental conditions aggravate workplace accidents and recommends protective equipment for fishermen. See: Health and Safety Authority (n.d.) *Managing Health and Safety in Fishing.* Available at: https://www.hsa.ie/eng/publications_and_forms/publications/fishing/managing_health_and_safety_in_fishing.pdf.

Among vulnerable groups, underage, pregnant, post-natal and breastfeeding employees, and employees with disabilities are separately mentioned under the General Application Regulations 2007. Dedicated Chapters covering the protection of children and young persons (Chapter 1 of Part 6) as well as pregnant, post natal and breastfeeding employees (Chapter 2 of Part 6) require protection from extreme cold, heat, and radiation[372]. However, no mention is made of protection from extreme weather events more broadly. Seasonal, migrant, self-employed and platform workers are also at risk of facing practical barriers, such as short contracts, language difficulties, or unclear employment status, that limit their access to workplace protections during severe weather events[373].

National policy frameworks and climate adaptation plans

Ireland's policy frameworks acknowledge extreme weather risks, but primarily through infrastructure, business continuity, and public health lenses rather than as explicit occupational safety concerns. Sectoral strategies, particularly in health, provide stronger recognition of worker vulnerabilities, such as outdoor staff exposed to heat or UV risks, and outline some targeted preventive measures. Overall, OSH considerations remain fragmented, largely indirect, and inconsistently integrated across climate adaptation, labour, and emergency response frameworks.

Climate adaptation and national frameworks: rare mention of OSH

Ireland's core climate governance frameworks acknowledge extreme weather and its health impacts in increasingly explicit terms, but occupational health and safety is rarely, if ever, singled out. Where specific adaptation measures, mostly on the sub-national level, touch on labour, they remain generic (skills, awareness, business continuity planning) rather than focused on weather-related worker safety.

Ireland's Climate and Low Carbon Development Act (the Climate Act) is the country's main law committing government to a low-carbon, climate resilient economy by 2050[374]. Under it, several instruments govern adaptation actions at a national level:

[372] Irish Statute Book (2007) *Safety, Health and Welfare at Work (General Application) Regulations 2007.* Available at: https://www.irishstatutebook.ie/eli/2007/si/299/made/en/print.

[373] Health and Safety Authority (n.d.) *Vulnerable Workers*. Available at: https://www.hsa.ie/eng/topics/vulnerable_workers/vulnerable_workers.html; Government of Ireland (2022) *Minister of State for Business, Employment and Retail Damien English TD Launches the Health and Safety Authority's New Strategy Statement 2022–2024*. Available at: https://www.gov.ie/en/department-of-enterprise-tourism-and-employment/press-releases/minister-of-state-for-business-employment-and-retail-damien-english-td-launches-the-health-and-safety-authoritys-new-strategy-statement-2022-2024/.

[374] Irish Statute Book (2015) *Safety, Health and Welfare at Work Act 2015.* Available at: https://www.irishstatutebook.ie/eli/2015/act/46/enacted/en/pdf.

- National Adaptation Framework (NAF)[375] is the most central of these umbrella tools, acting as the main five-year framework that operationalises national adaptation goals and directs both sectoral and local adaptation plans.
- National Development Plan 2021–2030 (NDP)[376], which provides the funding backbone for many adaptation-relevant projects (transport, flood protection, energy, health infrastructure) and embeds climate objectives as a strategic investment priority.
- Climate Action Plan (CAP)[377], updated annually, which functions as a cross-government delivery and monitoring tool. While its primary focus is on mitigation, it also links sectoral and local adaptation plans back to the NAF.
- National Planning Framework (NPF) and associated Regional Spatial and Economic Strategies (RSES), which steer spatial development and focus on infrastructure resilience and land use.

Among these, only the NAF explicitly considers health impacts of climate change. The 2024 NAF links extreme weather, flooding, drought, biodiversity loss, sea level rise, and higher temperatures to health risks, and identifies assessment of health impacts, including mental health, as a research priority[378]. However, the framework does not translate these health concerns into specific occupational safety measures, instead stressing broader goals such as skills[379], awareness campaigns, and data standards.

Sectoral adaptation plans provide occasional but limited references to OSH. For example, the draft Transportation plan notes storm Éowyn's impact on Dublin Airport Authority workers[380] and the draft Tourism plan lists OSH risks in its screening exercises[381]. In both cases, however, measures remain generic (skills, training, business continuity) rather than targeted OSH protections[382].

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375 Government of Ireland (n.d.) *National Adaptation Framework (NAF).* Available at: https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/national-adaptation-framework-naf/.

376 Government of Ireland (2021) *National Development Plan 2021–2030.* Available at: https://www.gov.ie/en/department-of-public-expenditure-infrastructure-public-service-reform-and-digitalisation/publications/national-development-plan-2021-2030/.

377 Government of Ireland (2025) *Climate Action Plan 2025 – Updated Version*. Available at: https://assets.gov.ie/static/documents/Climate_Action_Plan_2025_updated_cover.pdf.

378 Government of Ireland (2024) *National Adaptation Framework 2024*, p. 72. Available at: https://assets.gov.ie/static/documents/national-adaptation-framework-2024-0fa761a3-84e5-4bcf-ac40-0f91f6431ae8.pdf.

379 NAF 2024, Action 1a, calls for updating sectoral guidance to analyse resource and skill gaps for climate adaptation and training needs but does not mention occupational safety (NAF 2024, p. 81).

380 Transportation sector draft plan highlights OSH aspects, including Storm Éowyn impacts on Dublin Airport Authority workers. See: Government of Ireland (2025) *Transport Sector Adaptation Plan II – Draft for Public Consultation.* Available at: https://assets.gov.ie/static/documents/T-SAP_II_First_Draft_4_June25_-_Draft_for_Public_Consultation.pdf.

381 Tourism sector draft plan broadly identifies OSH risks from rising temperatures and floods in Climate Impact Screening. See: Government of Ireland (2025) *Tourism Sector Adaptation Plan – Draft for Public Consultation. Available at:* https://assets.gov.ie/static/documents/draft-tourism-climate-change-sectoral-adaptation-plan-2025-2030.pdf.

382 Tourism plan, for example, mentions the example of Fáilte Ireland, the National Tourism Development Authority, which incorporated weather-related questions into its 2024 Tourism Barometer, collecting insights on the business impact of heavy

At the sub-national level, Local Authority Climate Action Plans (LACAPs) are somewhat more explicit, citing occupational risks such as thermal discomfort[383] and slip-and-fall accidents[384] in hazard risk assessments of extreme weather events[385]. These references, however, are illustrative and not translated into specific protective measures for workers. Instead, the standardised adaptation measures focus on staff behaviour change and competence for business continuity and carbon neutrality.

OSH and Labour strategies: mostly overlook extreme weather risks

Sectoral approaches in the OSH and Labour domains mirror the broader fragmentation: key frameworks vaguely address climate change beyond risk acknowledgement or climate action priorities of institutional greening. Health and Safety Authority, the country's main government body responsible for occupational safety and health issues, only briefly mentions the 'impact of environmental changes on the adoption of new practices and ways of working' among the challenges that arose during its stakeholder consultation process for the Strategy Statement 2025–2027. Neither this concern nor other, more specific, weather-related occupational risks are featured among the strategy's key activities. HSA's parent Department of Jobs and Enterprise and Innovation (DETE)'s White Paper on Enterprise 2022-2030[386] focuses mostly on economic growth opportunities, acknowledging climate change mainly in terms of just transition and green economy opportunities, but not worker safety. Both HSA's and DETE's latest Climate Action Roadmaps[387] focus on reducing the institutions' own carbon footprint through measures in energy efficiency, waste management, and green procurement.

Public health frameworks: worker safety included more explicitly

Health sector frameworks are more explicit in both acknowledging the repercussions of severe weather for workers' health and integrating these into more measurable actions. The Health Sector Adaptation Plan 2025–2030[388], an overarching framework for the public health sector,

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rainfall, flash floods, severe windstorms, and higher temperatures. The questions do not appear to cover employee safety (Tourism SAP 2025, p. 27).

383 Cavan County Council (n.d.) *Cavan Climate Risk Assessment Report.* Available at: https://www.cavancoco.ie/file-library/environment/climate-change/cavan-climate-risk-assessment-report.pdf.

384 Ibid.

385 Local authority climate adaptation plans: Carlow County Council (n.d.) *Climate Change Adaptation Strategy*. pp. 34–35. Available at: https://carlow.ie/media/637/download?inline; Cork County Council (2024) *Climate Action Plan 2024–2029,* pp. 31-36. Available at: https://www.corkcoco.ie/sites/default/files/2024-02/cork-county-council-climate-action-plan-2024-2029.pdf; Dublin City Council (2024) *Climate Action Plan 2024–2029*. Available at: https://www.dublincity.ie/sites/default/files/2024-06/final-cap-2024-2029.pdf.

386 Department of Enterprise, Trade and Employment (2022) *White Paper on Enterprise 2022–2030.* Available at: https://enterprise.gov.ie/en/publications/publication-files/white-paper-on-enterprise-2022-2030.pdf.

387 Health and Safety Authority (2024) *Climate Action Roadmap 2024.* Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/climate_action_roadmap_2024.pdf; Department of Enterprise, Trade and Employment (2024) *DETE Climate Action Roadmap 2024.* Available at: https://enterprise.gov.ie/en/publications/publication-files/dete-climate-action-roadmap-2024.pdf.

388 Government of Ireland (2025) *Draft Health Sectoral Adaptation Plan 2025–2030.* Available at: https://assets.gov.ie/static/documents/Draft_Health_Sectoral_Adaptation_Plan_2025-2030.pdf.

sets three relevant priorities. These include systematically assessing the resilience of healthcare infrastructure to extreme weather (SMART Actions 1, 2), establishing a permanent National Adaptation and Resilience Core Group to coordinate sector-wide action (SMART Action 2), and monitoring how severe weather disrupts health services in order to strengthen both staff safety protocols and service continuity (SMART Action 3). Considering that some services already mention HR and safety protocols tailored to extreme weather in post-event evaluations (e.g. Dublin Airport Authority after storm Éowyn[389]) SMART Action 3 appears especially promising as a cross-cutting target measure. Somewhat complementing this, the Climate Action Strategy 2023–2050[390] of the national healthcare provider, the HSE, includes post-event evaluations to strengthen staff safety during extreme weather events, as well as preventive measures relevant to occupational safety, such as developing a national heatwave plan and assessing healthcare infrastructure resilience (see *Figure 31* below).

Figure 31: HSE's Climate Action Strategy 2023–2050 – actions pertaining to severe weather events

Severe weather events
Actions
2.1. Development of a new public health heat wave plan *(aligns with action 481 of Climate Action Plan).*
2.2. Conduct a major survey of health infrastructure resilience to severe weather events: wind events, heat waves, flooding, extreme cold snaps *(aligns with action 482 of Climate Action Plan).*
2.3. Identify and put in place appropriate business continuity measures to ensure continuity of service provision during severe weather events.
2.4. As standard, conduct and widely share lessons learned (effectiveness of actions, cost, new risks) following each severe weather event.

Source: HSE Climate Action Strategy 2023–2050, Appendix F.

In addition to the broader health-sector adaptation plans, the National Cancer Strategy 2017-2026 specifically singles out outdoor workers as a priority group for skin cancer prevention[391], with the National Skin Cancer Prevention Plan 2023-2026 detailing four action areas targeting outdoor workers[392] (see *Figure 32* below).

[389] Government of Ireland (2025) *Transport Sector Adaptation Plan II – Draft for Public Consultation*, p. 33. Available at: https://assets.gov.ie/static/documents/T-SAP_II_First_Draft_4_June25_-_Draft_for_Public_Consultation.pdf.

[390] Health Service Executive (2023) *HSE Climate Action Strategy 2023–2050*. Available at: https://www.hse.ie/eng/about/who/climate-and-health/hse-climate-action-strategy-2023-50.pdf.

[391] Government of Ireland (2017) *National Cancer Strategy 2017–2026*, p. 48. Available at: https://assets.gov.ie/static/documents/national-cancer-strategy-2017-2026.pdf.

[392] Government of Ireland (2023) *National Skin Cancer Prevention Plan 2023–2026*. Available at: https://assets.gov.ie/static/documents/national-skin-cancer-prevention-plan-2023-2026.pdf.

Figure 32: National Skin Cancer Prevention Plan 2023–2026, Action Area 4 – Outdoor Workers

Ref	Action	Lead Responsibility	Partners	Timeframe
4.1	Continue to identify and pursue opportunities to raise awareness of UV risk and skin cancer prevention among outdoor workers through the development of training and education.	Implementation group	Employer bodies, Employee representative groups, HSA	Ongoing
4.2	Promote resources to support employers to adopt policies for UV risk and skin cancer prevention for outdoor workers.	Implementation group	Employer bodies, Employee representative groups, HSA	Ongoing
4.3	Incorporate skin cancer prevention messaging and behaviours into healthy workplaces initiatives.	HI	Healthy workplace partners	Ongoing
4.4	Continue to partner with relevant stakeholders to develop skin cancer prevention best practice in the workplace.	Implementation group	Employer bodies, Employee representative groups, HSA	Ongoing

Source: *National Skin Cancer Prevention Plan 2023–2026*, p. 41. Available at: https://assets.gov.ie/static/documents/national-skin-cancer-prevention-plan-2023-2026.pdf.

Emergency response and inter-institutional coordination strong, with the need to integrate longer-term disaster risk adaptation

Emergency response in Ireland is well developed, coordinated by the National Emergency Coordination Group under the *Strategic Emergency Management Framework*, and complemented by functioning Met Éireann's colour-coded weather alert system[393] and national Emergency Alerts. As part of its mandate, the National Emergency Coordination Group works with national agencies across multiple sectors and domains. This includes the Health and Safety Authority (HSA), which acts as the lead government body for incidents involving hazardous materials, building collapses or accidental explosions, and as a supporting agency in cases of local radioactive contamination, aircraft or railway accidents, airport emergencies, and malicious Chemical, Biological, Radiological, and Nuclear (CBRN) incidents[394].

Coordination between emergency and occupational safety structures is reported to have worked well[395] (see section *Labour inspectorates and enforcement* below), although workplace-level communication on work adjustments is still sometimes poor or delayed[396].

[393] Met Éireann (2024) *Severe Weather Chart.* Available at: https://www.met.ie/cms/assets/uploads/2024/10/Severe-weather-chart.pdf.

[394] Department of Defence & Office of Emergency Planning (2020) *Strategic Emergency Management (SEM) National Structures and Framework,* ANNEX A ('Roles and Responsibilities of Lead and Support Government Departments/Agencies'). Available at: https://www.gov.ie/en/department-of-defence/publications/strategic-emergency-management-sem-national-structures-and-framework/.

[395] Interview with the HSA representative [19 August 2025].

[396] Interview with an Irish employers' organisation representative [17 July 2025].

Looking ahead, the Irish government aims to strengthen the integration of long-term disaster risk and climate change adaptation into emergency response planning under the National Adaptation Framework[397].

Labour inspectorates and enforcement

In Ireland, the Health and Safety Authority (HSA), established under the Safety, Health and Welfare at Work Act, is the main statutory body[398] responsible for enforcing occupational safety and health (OSH) regulations, promoting accident prevention, and providing consultation services. The HSA's mandate under Article 34 of the SHWW Act gives it authority to monitor and enforce employer compliance with all OSH obligations, including those arising from extreme weather conditions.

The HSA performs both reactive and proactive inspections, guided by the targets and priorities for sectors and occupational hazard set in its annual Programmes of Work[399]; it also conducts investigations into workplace fatalities. The inspections are not specifically scheduled around extreme weather seasons. Instead, the HSA focuses on broader hazards, such as slips, trips and falls, fire risk, and vehicle safety, often within high-risk sectors like construction, manufacturing, and transport and retail receiving the majority of visits[400]. At the same time, the HSA has an internal working group with a horizon-scanning function, which monitors emerging trends for workplaces and tracks international practices, including the European Commission's Advisory Committee on Safety and Health at Work (ACSH) Working Party (WP) on 'Climate Change and Occupational Health and Safety'[401].

While there are no mandated inspection protocols, statutory checklists, or systematic inspector training exclusively addressing weather-related occupational risks, the HSA pursues a range of activities to support employers facing extreme weather hazards. One includes issuing advisory guidance for employers and inspectors to prepare for seasonal hazards[402] and manage risks linked to extreme weather. For example, the HSA advises employers to monitor Met Éireann weather warnings for ice and snow and incorporate those into dynamic risk assessments, especially for slips, trips, and falls[403]. To tackle UV exposure, the HSA provides guidance on sun

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397 Government of Ireland (2024) *National Adaptation Framework 2024*, pp. 70–71. Available at: https://assets.gov.ie/static/documents/national-adaptation-framework-2024-0fa761a3-84e5-4bcf-ac40-0f91f6431ae8.pdf.

398 Workplace Relations Commission handles employment relations but not (weather-related) OSH enforcement.

399 Health and Safety Authority (2024) *HSA Programme of Work 2024*. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/hsa_programme_of_work_2024.pdf.

400 Health and Safety Authority (2024) *Annual Report 2024,* p. 12. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/annual_report_2024.pdf.

401 Interview with HSA representative [19 August 2025].

402 Health and Safety Authority (n.d.) *Be Winter Ready* – WinterPreparedness *Guidance.* Available at: https://www.hsa.ie/eng/topics/winter_readiness;
Government of Ireland (n.d.) *Be Summer Ready.* Available at: https://www.gov.ie/en/department-of-defence/campaigns/be-summer-ready.

403 Health and Safety Authority (n.d.) *Snow and Ice – Weather Guidance*. Available at: https://www.hsa.ie/eng/topics/slips_trips_falls/snow_and_ice/weather;

protection[404], including optional employer checklists such as the SunSmart Audit Tool for outdoor workers[405]. As an agency participating in Ireland's National Emergency Co-ordination Group (NECG), the HSA proactively issues relevant safety alerts and reminders to workplaces ahead of and after extreme weather events[406]. For instance, ahead of Storm Éowyn, the HSA, with guidance from the NECG, issued warnings and advice to workplaces[407]. After the storm, the HSA reminded employers to inspect equipment and ensure workplaces were safe before resuming operations[408].

The HSA also collaborates with social partners and industry representatives through its Board's several advisory committees: the Construction Safety Advisory Committee, Farm Safety Partnership Advisory Committee, and Health and Social Care Advisory Committee. The committees identify persistent challenges, gather feedback from sectors, and promote standardisation and good workplace practices. For example, joint activities of the Construction Safety Partnership Advisory Committee in 2022–2024 resulted in several deliverables[409], including the free online risk assessment and safety statement tool BeSMART.ie[410]. While extreme weather is not listed as a standalone hazard in the tool, it allows users to account for weather factors under "Outdoor Work" and "Slips, Trips, and Falls" (see *Figure 33* below). As part of the joint activities, the HSA has also run UV radiation awareness campaigns[411] and produced and translated information sheets[412].

Health and Safety Authority (n.d.) *Weather Safeguards for Ice and Snow*. Available at: https://www.hsa.ie/eng/Topics/Slips_Trips_Falls/Snow_and_Ice/Weather/Weather_Safeguards_for_Ice_and_Snow.html.

404 Health and Safety Authority (n.d.) *SunSmart Employee Information Sheet*. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/latest_publications/sunsmart_employee_information_sheet.104957.shortcut.html.

405 Health Service Executive (n.d.) *SunSmart Audit Tool for Skin Cancer Prevention in Outdoor Workers*. Available at: https://www.hse.ie/eng/services/list/5/cancer/prevention/sunsmart-audit-tool-for-skin-cancer-prevention-in-outdoor-workers.pdf.

406 Interview with HSA representative [19 August 2025].

407 For example, the HSA offered advice to construction sites, including securing scaffolding, anchoring temporary structures, limiting outdoor work, and monitoring Met Éireann updates – see NISO (n.d.). National Irish Safety Organisation (n.d.) *HSA Guidance Ahead of Storm Éowyn.* Available at: https://niso.ie/hsa-guidance-ahead-of-storm-eowyn; Department of the Taoiseach (2025) *Update from the National Emergency Co-ordination Group on storm recovery response*. Available at: https://www.gov.ie/en/department-of-the-taoiseach/press-releases/update-from-the-national-emergency-co-ordination-group-on-storm-recovery-response-3/.

408 Trant O'Meara (2024) *HSA Remind Employers to Inspect Scaffolding After a Storm.* Available at: https://trantomeara.ie/hsa-remind-employers-to-inspect-scaffolding-after-a-storm.

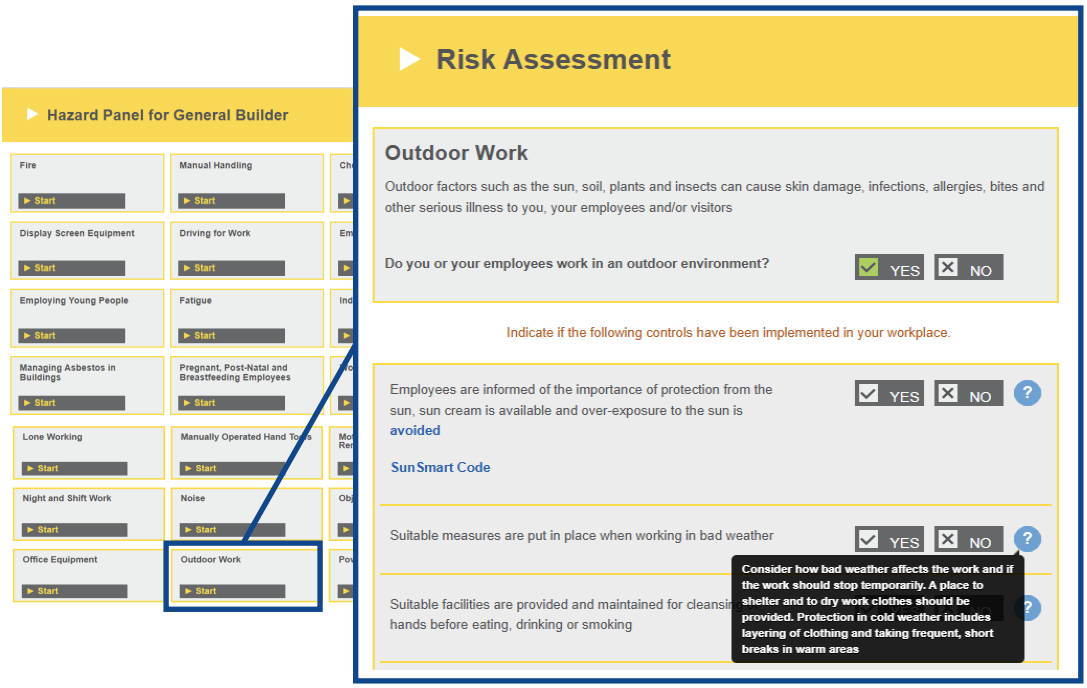
409 Health and Safety Authority (2025) *Construction Safety Action Plan 2025–2027*. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/construction_safety_action_plan_2025_2027.pdf.

410 BeSMART (n.d.) *Risk Assessment Tool.* Available at: https://besmart.ie/risk-assessment.

411 Health and Safety Authority (2024) *HSA Remind Outdoor Workers and Employers That Sun Protection Is Vital During Summer Months*. Available at: https://www.hsa.ie/eng/news_events_media/archive/press_releases_archive/press_releases_2024/the_hsa_remind_outdoor_workers_and_employers_that_sun_protection_is_vital_during_summer_months.html.

412 Health and Safety Authority (n.d.) *SunSmart Employee Information Sheet*. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/safety_and_health_management/sunsmart_employee_information_sheet.pdf.

Figure 33: Screenshots from the BeSMART.ie tool



Source: BeSMART.ie risk assessment tool.

Data collection and reporting

In Ireland, occupational accident and illness data are collected primarily through three complementary mechanisms. The Health and Safety Authority maintains a national register of workplace accidents and fatalities based on employer reporting obligations under the Safety, Health and Welfare at Work (General Application) Regulations. In parallel, the Central Statistics Office (CSO) compiles annual statistics on work-related injury and illness as a special module within its quarterly Labour Force Survey (LFS)[413]. Finally, the Agriculture and Food Development Authority (Teagasc) collects accident data specifically for farmers as part of its national farm survey's safety modules[414].

Regarding accident and injury classification, the HSA provides the most granular data, broken down by injured body parts, fatality, and recovery time, alongside triggers (such as falls, vehicle-related events, or contact with machinery), and location[415,416]. Teagasc offers similar

[413] Health and Safety Authority (2023) *Annual Review of Workplace Injuries, Illnesses and Fatalities 2022–2023*. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/annual_review_of_workplace_injuries_illnesses_and_fatalities_20222023.pdf.

[414] Health and Safety Authority (2025) *Farm Safety Action Plan 2025–2027,* pp. 21–24. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/farm_safety_action_plan_2025_2027.pdf.

[415] Health Information and Quality Authority (2017) *Catalogue of National Health and Social Care Data Collections.* Available at: https://www.hiqa.ie/sites/default/files/2017-10/Catalogue-national-health-social-care-data-collections.pdf.

[416] HSA (2023) *Annual Review of Workplace Injuries, Illnesses and Fatalities.* Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/annual_review_of_workplace_injuries_illnesses_and_fatalities_20222023.pdf.

breakdowns, but for the farming sector; due to fragmented year-on-year data[417,418,419], it is challenging to trace consistent trends over time. In contrast, CSO employs a different classification system, focusing on specific injury types (such as poisoning, infection, asphyxiation, amputation, concussion, internal injury, burns, scalds or frostbite, etc.)[420] and specifying recovery time, although it does not capture further accident triggers or circumstances. Notably, CSO also reports on occupational illnesses, such as hearing problems, heart diseases, and mental health issues like depression and anxiety, areas not covered by the HSA or Teagasc[421].

All three systems disaggregate data by economic activity, age group, occupation, and geography (NUTS-3 regions), allowing some degree of vulnerability mapping. However, none systematically track climate-related hazards such as heat stress, cold exposure, storm-related accidents, or UV-induced conditions.

Table 20 below visualises various dimensions of data classification used by the HSA, CSO, and Teagasc.

Table 20: Classification dimensions used by Ireland's authorities for OSH incidents and occupational diseases

Classification dimension	HSA (non-fatal and fatal incident reports)	CSO (Labour Force Survey)	Teagasc (National Farm Survey – Safety Modules)
Type and severity of injury	By injured body parts Fatality (fatal, non-fatal, non-work related, dangerous occurrence) By work days lost / recovery time	By work days lost / recovery time Injury type (poisoning, infection, asphyxiation etc; amputation, concussion, internal injury, burn, scald or frost bite; bone fracture; dislocation, sprain or strain; wound or superficial injury)	By fatality (fatal vs non-fatal) By treatment required (attending a hospital; seeing a doctor; requiring first aid) By work days lost / recovery time

[417] Teagasc (2023) Estimating Farm Accident Levels in Ireland. Available at: https://teagasc.ie/news--events/daily/estimating-farm-accident-levels-in-ireland/.

[418] European Union (2024) *Regulation (EU) 2024/2746.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024R2746.

[419] Hanly, J. (2024) Farm accident question to be added to national farm survey. *Farmers Journal*. Available at: https://www.farmersjournal.ie/news/news/farm-accident-question-to-be-added-to-national-farm-survey-844799.

[420] Health and Safety Authority (2024) *Annual Review of Workplace Injuries, Illnesses and Fatalities 2022–2023.* Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/annual_review_of_workplace_injuries_illnesses_and_fatalities_20222023.pdf.

[421] Ibid.

Classification dimension	HSA (non-fatal and fatal incident reports)	CSO (Labour Force Survey)	Teagasc (National Farm Survey – Safety Modules)
Illnesses	-	Type (hearing problem, headache, eyestrain, heart problem, disease; bone, joint or muscle problem; stress, depression or anxiety; breathing or lung problem; skin problem, other)	-
Injury trigger / mechanism / deviation	Trigger (fall on same level (slip, stumble, etc.); lifting, carrying; pushing, pulling; twisting, turning; loss of control of machine; struck by vehicle; etc[422])	-	Type of accident[423] (handling livestock; trips, falls, or blows; use of farm vehicles or machinery; buildings)
Working area / environment	Location of incident (production area, factory, workshop; hospital; service activity area, office; public area (including roads; shop, sales area; etc.)	-	Location of accident (in the farmyard; in farm buildings; in fields; on the roadways or lanes; etc.)
Economic activity / sector	NACE-coded by sector (agriculture, construction, manufacturing, health and social care, etc.)	By farm system (dairy, cattle rearing, cattle finishing, sheep, tillage)	-

[422] Data.gov.ie (2025) *Workplace incidents 2017–2021*. Available at: https://data.gov.ie/dataset/workplace-incidents-2017-2021.

[423] Teagasc accident typology is adapted for comparison with the HSA's "triggers".

Classification dimension	HSA (non-fatal and fatal incident reports)	CSO (Labour Force Survey)	Teagasc (National Farm Survey – Safety Modules)
Economic activity / sector	NACE-coded by sector (agriculture, construction, manufacturing, health and social care, etc.)		By farm system (dairy, cattle rearing, cattle finishing, sheep, tillage)
Worker demographics	Age groups (15–24, 25–34, ..., 65+), Gender, Nationality		Age group (< 40, 40–50, ..., 70+)
Employment characteristics	Contract type (employee, non-worker, self-employed, trainee, family worker, unknown)	Occupation[424] (skilled trades; professional occupations; managers, directors and senior officials; sales and customer services occupations; etc.)	Farm household role (farmer, spouse, child, hired worker)
Geographic level	National and regional (NUTS-3)		National and regional (survey sampling frame)
Temporal factors	Year, month, season Working day/shift (for accidents)	Year	Within one year of survey (starting in 2020[425])

Source: Author's own elaboration based on annual reports by the HSA.

Aggregated accident and illness statistics are actively used by the HSA in policy proposals[426] and to inform its risk-based approach to prevention campaigns targeting high-risk hazards, such as slips, trips, and falls, which explicitly mention accident statistics[427]. Combined with the insights from the previous section, this shows that, while there is some awareness of the growing risks from extreme weather, Ireland's OSH data collection does not allow for precise capture of weather-related risks.

[424] CSO's Occupational classifications are adapted from UK SOC 2010/2020, mapped to ISCO-08 major groups.

[425] Teagasc (2025) *Over 4,500 farm accidents in Ireland.* Available at: https://teagasc.ie/news--events/news/over-4500-farm-accidents/.

[426] Health and Safety Authority (2022) *Strategy Statement 2022–2024,* p. 14. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/strategy-statement-2022-2024.pdf.

[427] Health and Safety Authority (2025) *High-Risk Areas: Slippery Surfaces*. Available at: https://www.hsa.ie/eng/topics/slips_trips_falls/high-risk_areas/slippery_surfaces.

Role of social partners

Ireland's collective bargaining culture is mostly 'voluntarist', with no strong constitutional recognition of unions, fairly low union density, and back-and-forth challenges on the binding extension effects of collective agreements[428]. However, the country maintains a strong tradition of social participation, with employer and worker representatives actively shaping the drafting and revision of legislation[429]. Despite this, atypical and self-employed workers remain underrepresented in formal consultations, even though they are among the groups most exposed to financial and physical risks[430].

Within the OSH domain, a structured system of social dialogue exists. At the national level, OSH policy is determined by a twelve-member tripartite Board overseeing the Health and Safety Authority (HSA), with nominees from social partners and stakeholders concerned with workplace safety and health[431]. This framework extends to the HSA's several sectoral advisory committees, mentioned in the section *Labour inspectorates and enforcement*: the Farm Safety Partnership Advisory Committee (FSPAC), Construction Safety Partnership Advisory Committee (CAC), and Health and Social Care Advisory Committee, which serve as platforms for social dialogue with the respective sectors and for deliberating input on OSH matters[432].

Engagement on the regulatory aspects of extreme weather-related OSH remains limited. Most employer organisations and unions tackle extreme weather via guidelines, either individually, such as e.g. the Irish Business and Employers Confederation (Ibec)[433], or in collaboration with the HSA. To date, Unite the Union has provided the clearest set of proposals for statutory regulation of weather-affected work. Following Storm Éowyn, Unite conducted a member

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428 ETUI (2025) *Ireland: Collective Bargaining and Minimum Wage Regime*. Availableat: https://www.etui.org/sites/default/files/2025-06/Ireland_Collective%20bargaining%20and%20minimum%20wage%20regime_2025.pdf;
Reidy, O. (2024) *Opening Statement, Joint Committee on Enterprise, Trade and Employment, Oireachtas*. Available at: https://data.oireachtas.ie/ie/oireachtas/committee/dail/33/joint_committee_on_enterprise_trade_and_employment/submissions/2024/2024-01-24_opening-statement-owen-reidy-general-secretary-ictu_en.pdf.

429 Social partner input was critical for reforming industrial relations institutions and establishing the WRC; employer and union representatives also influenced pensions and wage-setting policies, see: Oireachtas (2012) *Legislating for a World-Class Workplace Relations Service*. Available at: https://www.workplacerelations.ie/en/publications_forms/legislating_for_a_world-class_workplace_relations_service.pdf;
Gibbons, G. (2025) Ireland. In T. Müller (ed.) *Collective Bargaining and Wage-Setting in Ireland.* Irish Congress of Trade Unions (ICTU). Available at: https://www.etui.org/sites/default/files/2025-07/Full%20version_27%20Country_Collective%20bargaining%20and%20minimum%20wage%20regime_2025.pdf.pdf.

430 Kelly, E., and Barrett, A. (2017) Atypical Work and Ireland's Labour Market Collapse and Recovery, *ESRI*. Available at: https://www.esri.ie/publications/atypical-work-and-irelands-labour-market-collapse-and-recovery.

431 Health and Safety Authority (2025) *Role of the HSA*. Available at: https://www.hsa.ie/eng/About_Us/Role_of_the_HSA/.

432 Health and Safety Authority (2025) *Construction Safety Action Plan 2025–2027*. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/corporate/construction_safety_action_plan_2025_2027.pdf.

433 Ibec's 'Safety in the Sunshine' guidance addresses UV exposure and heat stress, recommending employers monitor Met Éireann UV indexes and implement protective measures, see: Ibec (2025) *Safety in the Sunshine*. Available at: https://www.ibec.ie/connect-and-learn/insights/insights/2025/06/30/ibec-networks-safety-in-the-sunshine.

survey[434,435] and called for three groups of legally enforceable measures: (1) extreme weather and natural disaster protections, including employer obligations to conduct risk assessments, introduce alert-based work cessation protocols, and extend protections to self-employed and platform workers; (2) four days of statutory "climate leave" where travel is impossible and/or caring obligations arise; and (3) statutory maximum working temperatures of 30°C for regular work and 27°C for strenuous work, with mandatory heat management procedures at 24°C[436].

Good practices and innovations

Structured social dialogue and sectoral risk management. The HSA's sectoral advisory committees (CAC, FSPAC, and Health & Social Care Advisory Committee) maintain continuous dialogue with businesses and employees, identifying emerging risks and sector-specific challenges. Insights from these committees directly inform inspection priorities and feed into practical tools – such as BeSMART.ie – that help employers implement actionable OSH measures, including guidance on weather-related hazards.

Emergency coordination with OSH integration. The National Emergency Co-ordination Group (NECG), the country's main emergency response mechanism, coordinates with various government departments and authorities, including the HSA, to ensure public and occupational safety is embedded in responses to severe weather and other crises. NECG has successfully coordinated with the HSA in issuing alerts and targeted advice for employers during the Storm Éowyn.

Storm and flood protocols in energy infrastructure. ESB (Electricity Supply Board), Ireland's state-owned energy company, developed storm and flood protocols in consultation with safety and union representatives[437].

[434] In both Northern Ireland and the Republic of Ireland.

[435] Unite the Union Ireland (2025) *Eye of* the Storm*, Northern Ireland.* Available at: https://unitetheunionireland.org/wp-content/uploads/2025/06/eyeofthestorm_ni_a4_final-copy-2.pdf.

[436] Unite the Union Ireland (2025) *Extreme Weather Briefing*. Available at: https://unitetheunionireland.org/wp-content/uploads/2025/04/extreme-weather-briefing-april-2025.pdf.

[437] Interview with an Irish employers' organisation representative [17 July 2025].

Italy

Main extreme weather events and associated OSH risks

Italy faces accelerating climate threats, notably heatwaves and wildfires occurring with increasing frequency and intensity. This leads to significant risks for outdoor workers in sectors such as construction and agriculture, and indoor hot work professions. Concurrently, changing precipitation patterns, featuring less frequent but more intense rainfall, heighten flood risks, particularly in northern river basins and southern regions prone to flash floods, further endangering mobile and outdoor professions.

Heat waves and wildfires. Italy has been experiencing fast increases in average temperature and the number and frequency of heatwave events marked by wildfires in both southern[438] and northern[439] regions. Risk assessments point to significant continuing growing trends in the number of hot summer days (>30C°), as well as overall warm days across all seasons compared to the 1971–2000 average (see *Figure 34)*[440]. Urban areas, which host over 56% of Italian population, will see more pronounced health impacts due to the urban heat island effect and other factors like air pollution[441]. Workers in construction[442], agriculture[443] (especially younger[444] male workers), fisheries, quarrying[445], infrastructure maintenance, are at risk[446], as are workers

[438] Reuters (2021) *Italian wildfires rage after 49-degree heat record*. Available at: https://www.reuters.com/world/europe/italian-wildfires-rage-after-49-degree-heat-record-2021-08-12.

[439] Za, V. (2022) Italy battles wildfires, hundreds evacuated in Tuscany. *Reuters*. Available at: https://www.reuters.com/business/environment/italy-battles-wildfires-hundreds-evacuated-tuscany-2022-07-20/.

[440] Spano, D., Mereu, V., Bacciu, V., Marras, S., Trabucco, A., Adinolf, M., Barbato, G., Bosello, F., Breil, M., Chiriacò, M. V., Coppini, G., Essenfelder, A., Galluccio, G., Lovato, T., Marzi, S., Masina, S., Mercogliano, P., Mysiak, J., Noce, S., Pal, J., Reder, A., Rianna, G., Rizzo, A., Santini, M., Sini, E., Staccione, A., Villani, V., and Zavatarelli, M. (2020) Analisi del rischio. I cambiamenti climatici in Italia. *CMCC*. Available at: https://files.cmcc.it/200916_REPORT_CMCC_RISCHIO_Clima_in_Italia.pdf.

[441] Spano, D., Mereu, V., Bacciu, V., Barbato, G., Casartelli, V., Ellena, M., Lamesso, E., Ledda, A., Marras, S., Mercogliano, P., Monteleone, L., Mysiak, J., Padulano, R., Raffa, M., Ruiu, M.G.G., Serra, V., Villani, V. (2021) Analisi del rischio. I cambiamenti climatici in sei città italiane. *CMCC*. Available at: https://files.cmcc.it/rischio_clima_2021/CLIMA_sei_citta.pdf.

[442] Gariazzo, C. Taiano, L., Bonafede, M., Leva, A., Morabito, M., Donato, F., Marinaccio, A. (2022) Association between extreme temperature exposure and occupational injuries among construction workers in Italy: An analysis of risk factors, *Environment International*, 171, 107677. https://doi.org/10.1016/j.envint.2022.107677.

[443] Di Blasi C., Marinaccio A., Gariazzo .C, Taiano L., Bonafede M., Leva A., Morabito M., Michelozzi P., De' Donato F., On Behalf Of The Worklimate Collaborative Group (2023) Effects of Temperatures and Heatwaves on Occupational Injuries in the Agricultural Sector in Italy, *International Journal of Environmental Research and Public Health*, 20(4), 2781. Available at: https://doi.org/10.3390/ijerph20042781;
Riccò, M. (2018). Air temperature exposure and agricultural occupational injuries in the Autonomous Province of Trento (2000–2013, North-Eastern Italy), *International Journal of Occupational Medicine and Environmental Health*, 31(3), 317–331. Available at: https://doi.org/10.13075/ijomeh.1896.01114.

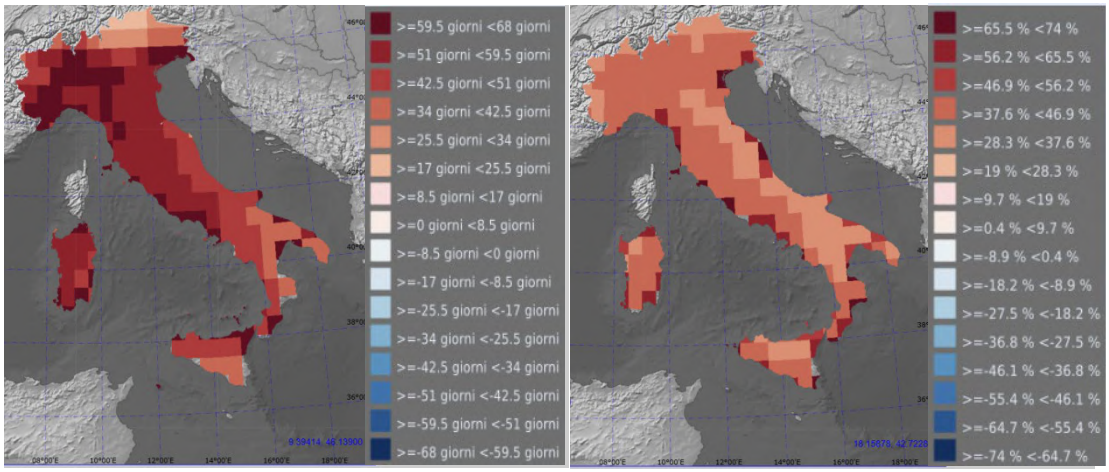
[444] Interview with INAIL representative [17 September 2025].

[445] de Martino, A., De Sario, M., de'Donato, F., Ancona, C., Renzi, M., and Michelozzi, P. (2019) *Piano Nazionale di Prevenzione degli effetti del caldo sulla salute: Linee di indirizzo per la prevenzione. Ondate di calore e inquinamento atmosferico,* p. 23, Ministero della Salute. Available at: https://www.quotidianosanita.it/allegati/allegato7519094.pdf.

[446] Marinaccio, A., Scortichini, M., Gariazzo, C., Leva, A., Bonafede, M., De' Donato, F.K.; Stafoggia, M., Viegi, G., Michelozzi, P., and BEEP Collaborative Group (2019) Nationwide epidemiological study for estimating the effect of extreme outdoor temperature on occupational injuries in Italy, *Environment International*, 133(Part A), 105176. https://doi.org/10.1016/j.envint.2019.105176;
Portale Agenti Fisici (n.d.) *Fonti di rischio naturali.* Available at: https://www.portaleagentifisici.it/fo_ro_naturali_index.php?lg=IT.

in hot indoor professions, such as catering and metallurgy[447].

Figure 34: Variations in the number of hot summer days* (left) and warm days** (right) in Italy by 2061 compared to the 1971–2000 average (RCP8.5 scenario, CMCC-CCLM4-8-19 model)



** days where the maximum temperature exceeds 30°C*

*** days where the maximum temperature is above the 90th percentile of a reference period*

Source: *CLIMA FUTURO variazioni rispetto alla media 1971-2000*. Available at: https://scia.isprambiente.it/serverclimachange/climachange400.php.

Variability of precipitation and flood risks. While precipitation projections are not as definitive compared to the temperature, Italy's climate is trending toward an overall decrease in annual precipitation, but with a critical shift in pattern: less frequent yet more intense rainfall events[448]. Projections indicate this intensification will be most pronounced in winter, particularly across the north. Conversely, summers are expected to feature longer consecutive dry periods, raising the risk of drought and water scarcity[449], especially in central and southern parts[450] – a significant concern for a country classified by the OECD as facing medium-high water stress[451].

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447 Interviews with representatives of CNA [18 July 2025] and Confartigianato [8 September 2025].

448 Ministero dell'Ambiente e della Sicurezza Energetica (MASE) (2023) *Piano Nazionale di Adattamento ai Cambiamenti Climatici. ALLEGATO III IMPATTI E VULNERABILITÀ SETTORIALI.* pp. 11, 15. Available at: https://www.mase.gov.it/portale/documents/d/guest/pnacc_iii_allegato_impatti_e_vulnerabilita-pdf.

449 A 40% decrease in average rainfall is expected in southern regions under RCP8.5 model.

450 Coppola, E., Verdecchia, M., Giorgi, F., Colaiuda, V., Tomassetti, B., and Lombardi, A. (2014) Changing hydrological conditions in the Po basin under global warming, *Science of the Total Environment*, 493, 1183–1196. Available at: https://doi.org/10.1016/j.scitotenv.2014.03.003; Vezzoli, R., Mercogliano, P., Pecora, S., Zollo, A.L., and Cacciamani, C. (2015) Hydrological simulation of Po River (North Italy) discharge under climate change scenarios using the RCM COSMO-CLM, *Science of the Total Environment,* 521–522, 346–358. https://doi.org/10.1016/j.scitotenv.2015.03.096; Romano, E. and Preziosi, E. (2012) Precipitation pattern analysis in the Tiber River basin (central Italy) using standardized indices, *International Journal of Climatology,* 33, 1781–1792. https://doi.org/10.1002/joc.3549; Pumo, D., Caracciolo, D., Viola, F. and Noto, L.V. (2016) Climate change effects on the hydrological regime of small non-perennial river basins, *Science of the Total Environment,* 542, 76–92. https://doi.org/10.1016/j.scitotenv.2015.10.109.

451 Ministero dell'Ambiente e della Sicurezza Energetica (MASE) (2023) *Piano Nazionale di Adattamento ai Cambiamenti Climatici. ALLEGATO III IMPATTI E VULNERABILITÀ SETTORIALI.* p. 11. Available at: https://www.mase.gov.it/portale/documents/d/guest/pnacc_iii_allegato_impatti_e_vulnerabilita-pdf.

This increased variability is projected to alter river regimes[452].

These changes directly translate into heightened flood risks. Northern regions, particularly in the Po Valley (Lombardia, Veneto, Emilia-Romagna, Piemonte), face a greater probability of widespread fluvial flooding in winter and autumn due to intense rainfall on saturated soils[453]. In contrast, regions like Calabria and Tuscany are highly vulnerable to flash floods. Their steep, short river basins (*fiumare*) can transform from dry gullies to raging torrents within hours of an intense rainfall event. This unique geography marks a significant percentage of their territory as high-risk flood zones. *Figure 35* and *Figure 36* (left) below illustrate areas that face high and medium flood hazards, with *Figure 36* (right) specifying percentages of flood-prone municipal area under the medium probability hazard scenario.

[452] Major basins like the Po are expected to experience reduced annual runoff and earlier seasonal snowmelt, while rivers in central and southern Italy (e.g., the Tiber and Sicilian basins) face increased volatility and sharper swings between extreme high and low flows. Coppola, E., Verdecchia, M., Giorgi, F., Colaiuda, V., Tomassetti, B., and Lombardi, A. (2014) Changing hydrological conditions in the Po basin under global warming, *Science of the Total Environment*, 493, 1183–1196. https://doi.org/10.1016/j.scitotenv.2014.03.003; Vezzoli, R., Mercogliano, P., Pecora, S., Zollo, A.L., and Cacciamani, C. (2015) Hydrological simulation of Po River (North Italy) discharge under climate change scenarios using the RCM COSMO-CLM, *Science of the Total Environment,* 521–522, 346–358. https://doi.org/10.1016/j.scitotenv.2015.03.096; Pumo, D., Caracciolo, D., Viola, F. and Noto, L.V. (2016) Climate change effects on the hydrological regime of small non-perennial river basins, *Science of the Total Environment,* 542, 76–92. https://doi.org/10.1016/j.scitotenv.2015.10.109; Romano, E. and Preziosi, E. (2012) Precipitation pattern analysis in the Tiber River basin (central Italy) using standardized indices, *International Journal of Climatology,* 33, 1781–1792. https://doi.org/10.1002/joc.3549; Confortola, G., Soncini, A. and Bocchiola, D. (2013) Climate change will affect hydrological regimes in the Alps, *Journal of Alpine Research | Revue de géographie alpine,* 101-3. https://doi.org/10.4000/rga.2176; Ravazzani, G., Ghilardi, M., Mendlik, T., Gobiet, A., Corbari, C., and Mancini, M. (2014) Investigation of climate change impact on water resources for an Alpine basin in Northern Italy: implications for evapotranspiration modeling complexity, *PLoS One*, 9, e109053. https://doi.org/10.1371/journal.pone.0109053; Gunawardhana, L.N. and Kazama, S. (2012) A water availability and low-flow analysis of the Tagliamento River discharge in Italy under changing climate conditions, *Hydrology and Earth System Sciences*, 16, 1033–1045. https://doi.org/10.5194/hess-16-1033-2012.

[453] The risk here is exacerbated by a human-engineered water management system of canals and levees that can be overwhelmed, leading to extensive inundation. Ravazzani, G., Ghilardi, M., Mendlik, T., Gobiet, A., Corbari, C., and Mancini, M. (2014) Investigation of climate change impact on water resources for an Alpine basin in Northern Italy: implications for evapotranspiration modeling complexity, *PLoS One*, 9, e109053. https://doi.org/10.1371/journal.pone.0109053; Confortola, G., Soncini, A. and Bocchiola, D. (2013) Climate change will affect hydrological regimes in the Alps, *Journal of Alpine Research | Revue de géographie alpine,* 101-3. https://doi.org/10.4000/rga.2176; Groppelli, B., Soncini, A., Bocchiola, D. and Rosso, R. (2011) Evaluation of future hydrological cycle under climate change scenarios in a mesoscale Alpine watershed of Italy, *Natural Hazards and Earth System Sciences*, 11, 1769–1785. https://doi.org/10.5194/nhess-11-1769-2011.

Figure 35: Areas prone to flooding* under High Probability Hazard scenario ISPRA mosaic, 2020

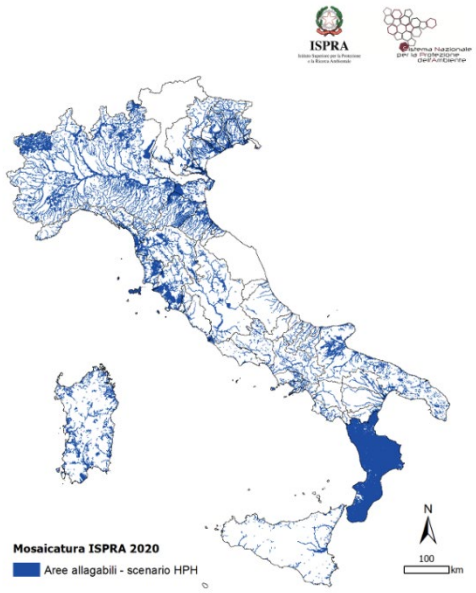
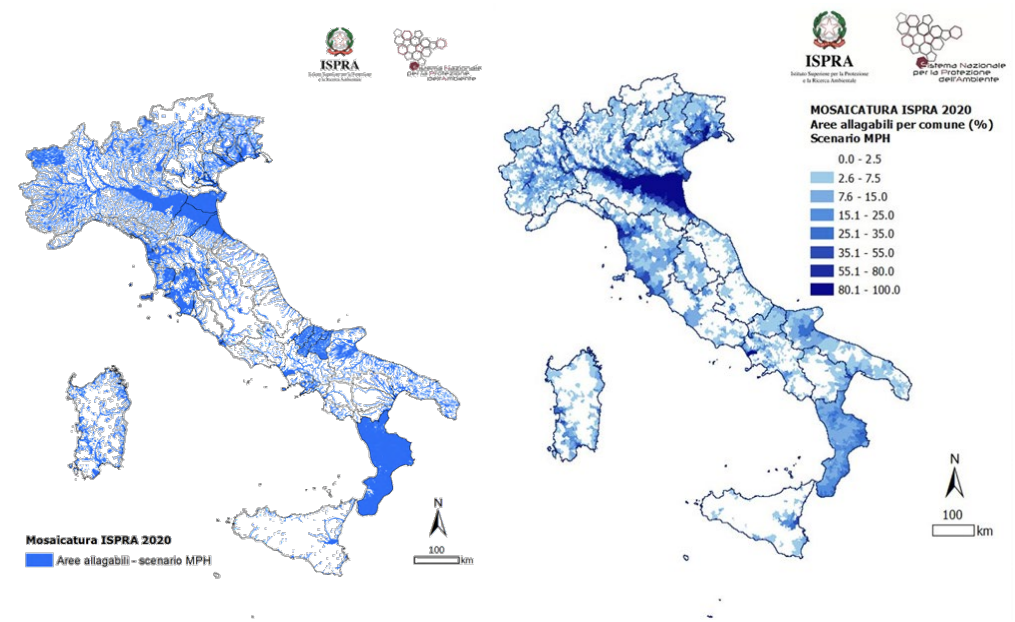


Figure 36: Areas prone to flooding* under Medium Probability Hazard scenario (left), with percentages of flood-prone municipal area (right), Mosaicatura ISPRA, 2020



** In Figures 35 and 36, the precise area of high-probability flooding in the region of Calabria is likely overestimated, since the model uses a fixed-distance zone (buffer) due to the absence of detailed advanced flood studies.*

Source: Trigila, A., Iadanza, C., Lastoria, B., Bussettini, M., and Barbano, A. (2021) *Dissesto idrogeologico in Italia: pericolosità e indicatori di rischio*. ISPRA, Rapporti 356/2021. pp. 45, 46, 55. Available at: https://www.isprambiente.gov.it/files2022/pubblicazioni/rapporti/rapporto_dissesto_idrogeologico_italia_ispra_356_2021_finale_web.pdf.

Consequently, outdoor and mobile professions face the most immediate threats. Agricultural workers in regions like Po Valley and the arid South are at risk of being caught in sudden inundations and being exposed to waterborne contaminants. Transportation and logistics personnel, as well as construction workers and first responders face risks operating in environments with physical dangers of structural collapse, rapid water rise, and unstable terrain[454].

Table 21: Summary of the main weather events and related OSH risks in Italy

Weather events	Occupational exposure	Key OSH risks	Key sectors / groups
Heatwaves and forest fires	Increased UV exposure Presence of large reflective surfaces Heat stress Insufficient hydration / nutrition / acclimatisation period Limited air movement Use of heavy clothing and PPE Increased toxicity of pollutants	Burns Heat strokes Skin cancer Cognitive strain and decrease in psycho-motor performance Dehydration and hydromineral imbalance Cardiovascular system strain	Construction and maintenance Agriculture and greenhouse work Mining and quarrying Delivery drivers Transportation and logistics Tourism and hospitality Forestry Emergency services
	Wildfire exposure	Respiratory issues and burns	
	Exposure to endemic agents and diseases	Diseases (tick-borne encephalitis, Lyme disease, Mediterranean spotted fever, West Nile fever[455])	
Heavy rainfall and floods	Erosion of coastal areas	Road accidents	Transportation Construction

[454] Italian Ministry of Environment and Energy Security (2022) *Italy Eighth National Communication under the United Nations Framework Convention on Climate Change*. Available at: https://unfccc.int/sites/default/files/resource/Italy%20Eigth%20National%20Communication.pdf.

[455] Ibid.

Weather events	Occupational exposure	Key OSH risks	Key sectors / groups
	Flooding of land adjacent to roads, insufficient drainage	Exposure to contaminated waters Mental distress	Emergency services

Source: Author's own elaboration.

Current OSH legislation

Foundational legal basis: general OSH duties and specific ordinances

Italy's legal regime on extreme weather-related occupational risks is multi-level, combining general national-level OSH frameworks with climate-specific legislation and regional instruments. On the most fundamental level, Italy relies on two instruments. One is its Civil Code (Article 2087), which requires employers to protect the physical integrity of workers. The other is Italy's consolidated occupational safety statute (*Testo Unico sulla Sicurezza*, D.Lgs. 81/2008), which mandates employer obligations to identify and mitigate workplace risks, including those related to microclimate and solar radiation[456].

While Italy lacks definitive statutory temperature thresholds in the Testo Unico, it has recently seen a range of seasonal regime instruments adopted in the form of regional ordinances dealing specifically with periods of extreme heat. The ordinances, informed by two national-level documents – the Framework Protocol for the Management of Climate Risks in the Work and the Conference of Regions' *Linee di indirizzo*, discussed in the section *National policy frameworks and climate adaptation plans* below – required suspension of outdoor work during peak afternoon hours on 'High' risk days according to Worklimate, which the ordinances organically adopted as a reference tool[457].

Such binding limits were adopted by a large number of regional authorities; however, some regions (e.g., Veneto) only issued recommendations, which created divergence across regions[458]. The divergence is further illustrated by the differences in targeted professions: while all ordinances include agriculture, floriculture, and construction, some extended bans to logistics, quarrying, and delivery services. A key implementation gap remains, as the national reimbursement scheme covers only employee salaries, not the commercial losses (e.g., contract

[456] *Protocollo quadro,* discussed in the following paragraph, stresses that these general obligations extend to extreme weather events and emergencies. See also: Ispettori del Lavoro Associati (2008, updated 2023) *D.Lgs. 81/2008 — Testo Unico sulla Sicurezza* (see Arts. 28, 180). Available at: https://www.ispettorato.gov.it/files/2023/03/TU-81-08-Ed-Gennaio-2023.pdf.

[457] This regional ordinance regime is workplace-centric and operates independently from Italy's national civil protection and emergency response infrastructure. National system is coordinated via a network of Functional Centresunder the Department of Civil Protection, which issues colour-coded meteorological alerts for risks like floods and landslides. The civilian protection regime is complemented by the IT-Alert cell-broadcast system, but it does not yet cover extreme heat events or workplace safety warnings. Amante, M. (2025) Working during hot hours, each region has its own rules. And the measurement systems also change. *Il Sole 24 Italy*. Available at: https://en.ilsole24ore.com/art/working-hot-hours-each-region-its-own-rules-and-measurement-systems-also-change-AHKTLBUB; Interview with INAIL representative [17 September 2025].

[458] Interview with representatives of Confartigianato [8 September 2025].

penalties, lost commissions) that deter full compliance, especially among subcontractors[459]. *Table 22* below lists regional ordinances adopted in summer 2025, with a comparison of targeted sectors.

Table 22: Summary of regional ordinances enacted across Italy in summer 2025

Region	Valid until	Affected sectors
Sardinia[460]	31/08/2025	Agriculture, horticulture, construction
Umbria[461]		
Basilicata[462]		
Tuscany[463]	31/08/2025	Agriculture, horticulture, construction, quarrying
Apulia[464]		
Campania[465]		
Liguria[466]		
Veneto[467]		

[459] This was observed in an interview by a representative of a regional Italian social partner organisation [30 July 2025].

[460] Regione Autonoma della Sardegna (2025) *Emergenza caldo: la presidente Todde firma un'ordinanza che vieta il lavoro all'aperto nelle ore più critiche nei settori agricolo, florovivaistico ed edilizio*. Available at: https://www.regione.sardegna.it/notizie/emergenza-caldo-la-presidente-todde-firma-un-ordinanza-che-vieta-il-lavoro-all-aperto-nelle-ore-piu-critiche-nei-settori-agricolo-florovivaistico-ed-edilizio.

[461] Regione Umbria (2025) *La presidente Proietti emana ordinanza per prevenire i rischi legati all'esposizione prolungata al sole*. Available at: https://www.regione.umbria.it/dettaglionotizie/-/asset_publisher/lU1Y2yh4H8pu/content/la-presidente-proietti-emana-ordinanza-per-prevenire-i-rischi-legati-all-esposizione-prolungata-al-sole?read_more=true.

[462] Regione Basilicata (2025) *Stop al lavoro edile nelle ore più calde*. Available at: https://agr.regione.basilicata.it/post/stop-al-lavoro-edile-nelle-ore-piu-calde.

[463] Pucci, P. (2025) Rischio calore, un'ordinanza per tutelare chi lavora all'aperto. *Toscana Notizie*. Available at: https://www.toscana-notizie.it/-/rischio-calore-un-ordinanza-per-tutelare-chi-lavora-all-aperto.

[464] Apulia was an early forerunner to the 2025 ordinances. In 2021, the regional government piloted a climate adaptation project to protect agricultural workers from heat. Coordinated by regional health and labour authorities, the initiative combined early-warning tools, tailored guidance for farmers, and pilot suspension protocols for fieldwork during peak heat hours (see: Ordinanza del Presidente della Giunta Regionale n. 258 del 13 luglio 2021 – Attività lavorativa nel settore agricolo in condizioni di esposizione prolungata al Sole. Ordinanza contingibile ed urgente per motivi di igiene e sanità pubblica).

[465] Giunta Regionale della Campania (2025) *ORDINANZA n. 1 del 18 giugno 2025*. Available at: https://www.regione.campania.it/assets/documents/ordinanza-del-presidente-n-1-del-18-6-2025-lavoratori-esposti-al-sole.pdf.

[466] Regione Liguria (2025) *Tutela dei lavoratori dal rischio calore*. Available at: https://www.regione.liguria.it/homepage-salute/cosa-cerchi/emergenza-caldo/informazioni-ordinanza-presidente-regione-su-tutela-lavoratori-da-rischio-calore.html.

[467] Regione del Veneto (2025) *Ordinanza del Presidente della Giunta regionale n. 34 del 01 luglio 2025*. Available at: https://bur.regione.veneto.it/BurvServices/pubblica/DettaglioOrdinanzaPGR.aspx?id=559446.

Region	Valid until	Affected sectors
Sicily[468]		
Calabria[469]	31/08/2025	Agriculture, horticulture, construction, related activities
Molise[470]		
Emilia-Romagna[471]	15/09/2025	Agriculture, horticulture, construction, logistics
Marche[472]	31/08/2025	
Lombardy[473]	15/09/2025	Agriculture, horticulture, construction, quarrying (excludes urgent and public utility work)
Piedmont[474]	31/08/2025	Agriculture, horticulture, construction, related activities, quarrying, logistics, delivery drivers
Lazio[475]		

[468] Ance | Catania (2025) *Presidenza Regione Siciliana: Ordinanza n. 1 del 26 giugno 2025. Misure straordinarie per il settore edile – Stop alle attività causa delle ondate di calore*. Available at: https://www.ancecatania.it/2025/07/07/presidenza-regione-siciliana-ordinanza-n-1-del-26-giugno-2025-misure-straordinarie-per-il-settore-edile-stop-alle-attivita-causa-delle-ondate-di-calore.

[469] Regione Calabria Giunta Regionale (2025) *ORDINANZA DEL PRESIDENTE DELLA REGIONE N. 1 DEL 10/06/2025*. Available at: https://www.regione.calabria.it/wp-content/uploads/2025/06/ORDINANZA-n.-1_2025.pdf.

[470] Regione Molise (2025) *Tutela salute e sicurezza dei lavoratori, divieto di svolgimento di attività lavorative nelle ore calde della giornata*. Available at: https://www.regione.molise.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/21467.

[471] Regione Emilia-Romagna (2025) *Lavoro, caldo estremo: in Emilia-Romagna, tra le ore 12.30 e le 16, stop per chi opera nei cantieri edili, in agricoltura, nel florovivaismo e nei piazzali della logistica*. Available at: https://www.regione.emilia-romagna.it/notizie/2025/luglio/lavoro-caldo-anomalo-o-estremo-in-emilia-romagna-tra-le-ore-12-30-e-le-16-stop-per-chi-opera-nei-cantieri-edili-in-agricoltura-nel-florovivaismo-e-nei-piazzali-della-logistica.

[472] Regione Marche (2025) *Stress termico e lavoro all'aperto: firmata l'Ordinanza dal presidente Acquaroli*. Available at: https://www.regione.marche.it/News-ed-Eventi/Post/112071/Stress-termico-e-lavoro-all-aperto-firmata-l-Ordinanza-dal-presidente-Acquaroli.

[473] Regione Lombardia (2025) *Ordinanza urgente finalizzata a tutelare la salute e la sicurezza dei lavoratori esposti alle alte temperature*. Available at: https://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioRedazionale/istituzione/attivita-istituzionali/ordinanza-n-348-1-luglio-2025-caldo-tutela-lavoratori/ordinanza-n-348-1-luglio-2025-caldo-tutela-lavoratori.

[474] Gennaro, G. (2025) Ordinanze della Regione per regolare il lavoro nelle ore più calde. *Piemonteinforma*. Available at: https://www.regione.piemonte.it/web/pinforma/notizie/ordinanze-della-regione-per-regolare-lavoro-nelle-ore-piu-calde.

[475] Regione Lazio (2025) *Ordinanza contingibile e urgente in materia di igiene e sanità pubblica. Misure di prevenzione per l'attività lavorativa nel settore agricolo e florovivaistico, nonché nei cantieri edili e affini, nelle cave e nelle relative pertinenze esterne, all'aperto in condizioni di esposizione prolungata al sole*. Available at: https://www.aslroma1.it/uploads/files/52_22_Ordinanza_del_Presidente_Z00001.pdf.

Region	Valid until	Affected sectors
Abruzzo[476]	31/08/2025	Agriculture, horticulture, construction, related activities (discussion ongoing to extend the ban to delivery drivers[477])

Source: Author's own elaboration based on sources indicated in the Table.

As part of these measures, Worklimate has emerged as the key operational tool connecting climate monitoring with workplace protection. Launched in 2023 by INAIL and partner institutions, it provides a forecasting platform based on Wet Bulb Globe Temperature (WBGT), generating three-day risk maps with four alert levels (green to red), with the 2.0 version adding a geospatial WebGIS interface to support employer decisions on scheduling, protective measures, or suspensions of work[478]. Worklimate, as well as INAIL, also offer a repository of guiding documents[479] and trainings[480] to support preventative measures against heat.

Complementary protections: wage support and a sectoral collective agreement

Complementing this regulatory framework is a national social protection mechanism, which covers various unavoidable events (*eventi oggettivamente non evitabili – EONE*), including extreme weather and natural disasters. For example, under the operational rules of Italy's social protection budget National Institute of Social Security (INSP)[481], companies can request wage-support benefits through CIGO (Ordinary Wage Guarantee Fund) in the event of work stoppages during extreme heat events. The rules mention 35°C as a practical benchmark but stipulate that claims will also be considered on the basis on perceived temperatures[482]. Additionally, CISOA (Agricultural Wage Guarantee Fund) covers weather-related work stoppages. Flooding is also explicitly covered under these schemes. Employers in flood-affected areas can access CIGO/CISOA using the specific causale (cause code) *Incendi – crolli – alluvioni* (en. Fires – Collapses – Floods). This mechanism was activated following major floods

476 Regione Abruzzo (2025) *Emergenza caldo: stop ai lavori sotto il sole nelle* ore più *calde fino al 31 agosto*. Available at: https://www.regione.abruzzo.it/notizie/emergenza-caldo-stop-ai-lavori-sotto-il-sole-nelle-ore-piu-calde-fino-al-31-agosto.

477 Partito Democratico Abruzzo (2025) *Emergenza caldo, Gileno (Gd Abruzzo): "Estendere lo stop anche ai rider. Il lavoro estivo e precario non può essere un rischio di vita"*. Available at: https://www.pd-abruzzo.it/2025/07/07/emergenza-caldo-gileno-gd-abruzzo-estendere-lo-stop-anche-ai-rider-il-lavoro-estivo-e-precario-non-puo-essere-un-rischio-di-vita.

478 Worklimate (n.d.) *The Project.* Available at: https://www.worklimate.it/en/the-project.

479 Worklimate (n.d.) *Information material*. Available at: https://www.worklimate.it/en/information-material/; Levi, M., de'Donato, F., De Sario, M., Crocetti, E., Bogi, A., Pinto, I., Morabito, M., Messeri, A., Marinaccio, A., Del Ferraro, S., Falcone, T., Molinaro, V., and Bonafede, M. (2024) *Decalogue for the prevention of heat illnesses in the workplace*. Available at: https://www.worklimate.it/wp-content/uploads/2024/02/Decalogue-for-the-prevention-of-heat-illnesses-in-the-workplace_19.02.2024.pdf.

480 Worklimate (n.d.) *Formazione.* Available at: https://www.worklimate.it/formazione/.

481 INPS (2025) *Messaggio numero 2130 del 03-07-2025.* Available at: https://www.inps.it/it/it/inps-comunica/atti/circolari-messaggi-e-normativa/dettaglio.circolari-e-messaggi.2025.07.messaggio-numero-2130-del-03-07-2025_14973.html.

482 Ibid.

in Emilia-Romagna (2023) and Toscana (2023), where a national state of emergency was declared[483].

On a sectoral level, the 2024–2027 national collective agreement for transport and logistics (*CCNL Logistica, Trasporti e Spedizione 2024-2027*) stands out as the frontrunner in introducing weather-related protections ahead of the layered measures adopted in 2025**.** The agreement's Article 46, drawing on the Ministry of Labour and Social Policies' Handbook for the management of heat stress of 20 July 2023 (*vademecum*)[484], requires employers to carry out risk assessments for both driving and non-driving staff, with attention to gender-specific vulnerabilities, and to provide appropriate clothing, protective equipment, and working environments during both the hottest (>35°C) and coldest periods of the year[485]. Article 20 further establishes that, in the event of official Civil Protection weather alerts, companies must reassess risks facing their driving personnel and adopt protective measures such as reducing workloads, cutting back the number of routes, or suspending deliveries in affected areas[486].

Protection of the vulnerable worker groups

Vulnerable workers, including those with atypical, temporary, or otherwise precarious contracts, as well as special-status groups such as underage, pregnant, or disabled workers, benefit from different degrees of protection under Italy's OSH framework. Some groups enjoy targeted statutory safeguards: under D.Lgs. 81/2008 (*Testo Unico sulla Sicurezza*), Articles 41 and 68 explicitly prohibit exposing pregnant and underage workers to extreme heat, cold, or adverse weather, and require employers to carry out individualised risk assessments for pregnant employees with particular attention to temperature risks[487]. Workers with disabilities are similarly covered under Law 104/1992 and D.Lgs. 81/2008, which obliges employers to conduct individualised assessments, though enforcement in practice varies.

For other categories, protections are more limited and often dependent on sectoral or regional measures. In theory, all workers regardless of their contract status are entitled to safe workplaces as stipulated in *Testo Unico*, and the national Protocol and several regional ordinances affirm that heat-related measures apply regardless of contract type. Some regions

[483] Dipartimento della Protezione Civile (2023) *Decreto legge n. 61 del 1° giugno 2023 - Interventi urgenti per fronteggiare l'emergenza provocata dagli eventi alluvionali verificatisi a partire dal 1° maggio 2023*. Available at: https://www.protezionecivile.gov.it/it/normativa/decreto-legge-n-61-del-1deg-giugno-2023/; Confindustria Benevento (2023) *INPS – Cassa Integrazione per eventi alluvionali – Indicazioni.* Available at: https://confindustriabn.it/bacheca/news/inps-cassa-integrazione-per-eventi-alluvionali-indicazioni/.

[484] Ministero del Lavoro e delle Politiche Sociali (2025) *Emergenza caldo: firmato il Protocollo quadro per la tutela dei lavoratori.* Available at: https://www.misterlex.it/doc/emergenza-caldo-protocollo-tutela-lavoratori; Dottrina Per il Lavoro (2023) *Min.Lavoro: rischi lavorativi da esposizione ad alte temperature – il vademecum*. Available at: https://www.dottrinalavoro.it/notizie-c/min-lavoro-rischi-lavorativi-da-esposizione-ad-alte-temperature-il-vademecum.

[485] Federazione Italiana Metalmeccanici (FIM-CISL) (2024) *Ipotesi di Accordo di Rinnovo del CCNL Logistica, Transporto Merci e Spedizione*. Available at: https://fimfederation.it/wp-content/uploads/2024/12/Testo-accordo-del-6.12.2024.pdf, Art. 46.

[486] Ibid. Art. 20.

[487] Ispettori del Lavoro Associati (2008, updated 2023) *D.Lgs. 81/2008 — Testo Unico sulla Sicurezza* (see Arts. 41, 68). Available at: https://www.ispettorato.gov.it/files/2023/03/TU-81-08-Ed-Gennaio-2023.pdf.

(e.g. Lazio and Piedmont) explicitly listed delivery drivers as beneficiaries of the work ban during extreme temperature events. Likewise, INPS guidance has clarified that wage-support mechanisms (CIGO, CISOA, FIS) can be activated during weather-related suspensions, also covering temporary and seasonal workers. Yet for platform-based couriers and the self-employed, enforcement remains limited. The Glovo case in July 2025, where a court ordered the company to negotiate extreme-heat safeguards with trade unions after it suspended riders' heat bonuses, illustrates both the gaps in initial protection and the judiciary's role in enforcing OSH standards[488]. Finally, migrant workers often simultaneously experience more difficulty in protection enforcement while facing compounded risks due to individual conditions (such as gender, chronic health conditions, or religious fasting during heatwaves[489])[490].

National policy frameworks and climate adaptation plans

Italy treats extreme-weather risks, especially heat, solar radiation, and floods, as a cross-cutting policy issue that links labour protection, public health, climate adaptation, and civil protection. The labour domain has developed the most concrete operational tools, while public health frameworks institutionalise coordination between health and environmental systems but remain population-focused. Climate adaptation plans explicitly recognise workers as a vulnerable group, mandating regulatory reviews and training. Broader sectoral strategies (economy, energy, and agriculture) support broader resilience and decarbonisation but only indirectly intersect with occupational safety.

Labour domain: laser-focused on workers' safety during extreme heat events

In summer 2025, two landmark instruments, including the Framework Protocol for the Management of Climate Risks in the Workplace (*Protocollo quadro*, signed 2 July 2025) and the Conference of Regions' *Linee di indirizzo* (19 June 2025), brought occupational safety into sharper and more operational focus than any other recent frameworks or the general duties in the *Testo Unico* (D.Lgs. 81/2008) alone. Overseen by the Ministry of Labour, the Protocol[491] brings labour, social partners, technical agencies (INAIL, ISS/CNR) and other actors together to

[488] Business & Human Rights Resource Centre (2025) *Italy: Court orders Glovo to negotiate with unions over extreme heat safety risks.* Available at: https://www.business-humanrights.org/en/latest-news/italy-curt-orders-glovo-to-negotiate-with-unions-over-extreme-heat-safety-risks/.

[489] Riccò, M., Garbarino, S., and Bragazzi, N. L. (2019) Migrant Workers from the Eastern-Mediterranean Region and Occupational Injuries: A Retrospective Database-Based Analysis from North-Eastern Italy, *International Journal of Environmental Research and Public Health*, 16(4), 673. Available at: https://doi.org/10.3390/ijerph16040673.

[490] Messeri, A., Morabito, M., Bonafede, M., Bugani, M., Levi, M., Baldasseroni, A., Binazzi, A., Gozzini, B., Orlandini, S., Nybo, L., Marinaccio, A. (2019) Heat Stress Perception among Native and Migrant Workers in Italian Industries-Case Studies from the Construction and Agricultural Sectors, *International Journal of Environmental Research and Public Health,* 16(7), 1090. https://doi.org/10.3390/ijerph16071090; Interviews with representatives from INAIL [17 September 2025] and a regional social partner organisation [30 July 2025].

[491] Ministero del Lavoro e delle Politiche Sociali (2025) *Protocollo quadro per l'adozione delle misure di contenimento dei rischi lavorativi legate alle emergenze climatiche negli ambienti di lavoro.* Available at: https://www.ansa.it/documents/1751443135165_protocolloclima.pdf.

translate climate-exacerbated weather risks (from floods to extreme heat) into concrete measures for inclusion in mandatory Risk Assessment Documents (DVR) and sectoral agreements.

The complementary Conference of Regions' guidelines *(Linee di indirizzo)* operationalise these principles for heat and solar radiation[492], providing recommendations[493] and standardised blueprints for risk assessments in high-exposure sectors like construction, agriculture, and logistics. Together, these instruments promote a workload-sensitive approach and make the otherwise broad duty in D.Lgs. 81/2008 operational and evidence-driven[494].

The two instruments offer much more detailed OSH strategies compared with other policies and commitments under the Ministry of Labour and its subordinate structures. The Ministry's larger priorities, outlined under Mission 5 "Inclusion and Cohesion" of the National Recovery and Resilience Plan, prioritise issues of unemployment and labour market access, support for vulnerable workers, and training[495], while its Integrated plan for occupational health and safety for 2025 (*Piano integrato per la salute e la sicurezza nei luoghi di lavoro,* DM 17 Dec 2024, n.195) mentions climate change and weather events among the emerging risks but not among its actionable priorities, which instead include occupational diseases, exploitation, and awareness campaigns around workplace accidents for sectors like agriculture and construction[496].

Similarly, the Triennial Prevention Plan 2025-2027 of the Italian National Institute for Insurance against Occupational Accidents (INAIL)[497], a cornerstone document outlining Italy's OSH objectives aligned with the EU Strategic Framework on Health and Safety at Work (2021-2027), centers on digitisation of the labour inspectorate; the technological, green, and demographic transitions; as well as OSH-focused educational program for school students. The plan treats climate change primarily as a topic for future training development rather than a core strategic pillar requiring immediate, integrated intervention.

Public health: integration of health, climate, and environment, OSH focus implicit

The health sector frames extreme weather as a public health challenge rather than a workplace-specific one, and treats extreme weather, especially extreme heat, as a major population health

[492] Conferenza Stato-Regioni (2025) *Linee di indirizzo per la protezione dei lavoratori dal calore e dalla radiazione solare*. Available at: https://www.eclavoro.it/wp-content/uploads/2025/06/linee_indirizzo_calore_conferenza_Stato_Regioni.pdf.

[493] Preventive measures include scheduling work to cooler hours, providing shaded/rest areas and drinking water, adapting clothing and PPE, monitoring environmental indices (including WBGT), and providing training and medical surveillance.

[494] The Protocol operates under the umbrella of Italy's broader heat-health warning systems (HHWS) and the National Plan for the Prevention of Heat Health Effects (*Piano Nazionale per la Prevenzione degli Effetti del Caldo sulla Salute*), coordinated by the Ministry of Health.

[495] Ministero del Lavoro e delle Politiche Sociali (2021) *Piano Nazionale di Ripresa e Resilienza*. Available at: https://www.italiadomani.gov.it/en/strumenti/documenti/archivio-documenti/national-recovery-and-reslieince-plan.html.

[496] Insic (2025) *Il Piano Integrato per la Salute e la Sicurezza sul Lavoro: cos'è e cosa prevede*. Available at: https://www.insic.it/sicurezza-sul-lavoro/piano-integrato-salute-sicurezza-lavoro.

[497] INAIL (2025) *Piano triennale per la Prevenzione 2025–2027*. Available at: https://www.inail.it/content/dam/prevenzione-e-sicurezza/documenti/2025/05/1_Copertina_Piano%20triennale%202025_2027_Completo.pdf.

issue. Italy does not have a unified National Health Plan[498]; its health policy is instead guided by several framework and instruments that centre on the "One Health" principle, which integrates human, animal, and environmental health. A key example is the 2020–2025 National Prevention Plan (PNP), an early adopter of this approach. Its foundation is the pillar of *ambiente, clima e salute* (en. environment, climate, and health), promoted through a Health-in-All-Policies vision that embeds health considerations across all governmental sectors. This strategy explicitly focuses on protecting vulnerable groups like the elderly and chronically ill[499].

Building on this foundation and lessons from the COVID-19 pandemic, Italy established the National System for Prevention of Health from Environmental and Climate Risks (*Sistema Nazionale di Prevenzione Salute dai rischi ambientali e climatici, SNPS*) in 2022 via Legislative Decree 36/2022, funded under the National Recovery and Resilience Plan (PNRR)[500]. The SNPS's primary raison d'être is to institutionalise and operationalise the "One Health" approach by creating a permanent, cross-institutional architecture for preventing health impacts from environmental and climate risks[501]. Its core added value lies in its mandated coordination mechanism: it formally designates the Ministry of Health as the national coordinator and establishes a Control Room (*Cabina di Regia*) to synchronise policy and data sharing between the National Health Service and the National Environmental Protection Agency System (SNPA), with the structure supported on the regional level through Regional Health Prevention Systems[502].

Neither the PNP nor the SNPS, however, explicitly focuses on occupational safety or sector-specific employer duties. Their mandate is overwhelmingly focused on population-level health through public health surveillance and civil protection. Consequently, while their cross-sectoral coordination architecture and environmental health data could provide valuable insights, occupational safety and health (OSH) and the protection of workers as a vulnerable group do not feature prominently within Italy's core public health strategic frameworks.

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498 Fondazione Bruno Visentini (2023) *Connecting the dots: toward a national plan of Health. 2nd Report 2023*. Available at: https://www.fondazioneries.it/wp-content/uploads/2025/01/Connecting-the-dots_-toward-a-national-plan-of-Health.-II-Report-2023.pdf.

499 Ministero della Salute (2019) *Piano Nazionale della Prevenzione 2020-2025*. Available at: https://www.salute.gov.it/imgs/C_17_notizie_5029_0_file.pdf.

500 Ministero della Salute (2021) *Piano Nazionale di Ripresa e Resilienza (PNRR): Salute, ambiente, biodiversità e clima (PNC).* Available at: https://www.pnrr.salute.gov.it/it/pnrr-pagina/salute-ambiente-biodiversita-e-clima-pnc/; Ministero della Salute (2023) *Definizione delle modalita' di interazione del Sistema nazionale prevenzione salute dai rischi ambientali e climatici (SNPS) con il Sistema nazionale protezione ambiente (SNPA) e istituzione della Cabina di regia. (23A02814)*. Available at: https://www.trovanorme.salute.gov.it/norme/dettaglioAtto?id=93780.

501 Ministero della Salute (2022) *Decreto Ministeriale 23 dicembre 2022*. Available at: https://www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=2022&codLeg=87626&parte=1%20&serie=null.

502 Ministero della Salute (2023) *I Conferenza nazionale del Sistema nazionale prevenzione salute dai rischi ambientali e climatici.* Available at: https://www.salute.gov.it/new/it/evento/i-conferenza-nazionale-del-sistema-nazionale-prevenzione-salute-dai-rischi-ambientali-e/.

Climate adaptation: considers workers' safety, identifies priority sectors

Italy's climate adaptation framework explicitly integrates health as one of the key adaptation sectors[503] and sets priority measures for occupational health protection against priority risks. Italy's National Climate Change Adaptation Plan (*Piano Nazionale di Adattamento ai Cambiamenti Climatici, PNACC*), adopted in December 2023 to implement the National Strategy for Adaptation to Climate Change (SNAC)[504], clearly identifies the threats extreme weather poses not only to the general population but also to the workforce. It highlights the physical and mental health impacts of high temperatures, specifically singling out outdoor workers in construction, agriculture, tourism, and transport as priority at-risk groups[505]. The PNACC outlines a range of actionable measures that both explicitly and implicitly target occupational safety. Among the explicit OSH measures are concrete plans to 'review and update regulations for the protection of workers professionally exposed to outdoor activities,' extend insurance to workers affected by climate risks,' and provide 'training for non-healthcare workers exposed to climate risks'[506]. Its broader public health and resilience measures, such as urban greening to reduce the urban heat island effect, enhanced early warning systems, and public awareness campaigns, also indirectly protect workers by creating a safer overall environment[507].

Regional adaptation plans follow the PNACC lead and normally only include OSH/extreme weather measures aiming to protect outdoor workers[508] as one of the vulnerable demographics exposed to heat impacts and generally refers to other actions like environmental impact assessments to include health aspects[509].

Sectoral frameworks: no OSH/extreme weather integration

Taken together, Italy's long-term sectoral frameworks prioritise broad resilience and decarbonisation but do not explicitly integrate adverse weather and climate change risks into

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[503] This was institutionalised through the national Working Group on "Impacts, vulnerability and adaptation to climate change", which included health among 13 sectors to define a suite of climate impact indicators under the National System for Environmental Protection (established by Law n. 132/2016).

[504] Ministero dell'Ambiente e della Sicurezza Energetica (2023) *Strategia Nazionale di Adattamento ai Cambiamenti Climatici*. Available at: https://www.mase.gov.it/portale/documents/d/guest/documento_snac-pdf.

[505] The sectors named in the PNACC are the very same ones targeted by the Framework Protocol (*Protocollo quadro*) and the regional ordinances that mandate work stoppages during extreme heat, which demonstrates strategic continuity.

[506] Ibid.pp. 121–140; see also: Ministero dell'Ambiente e della Sicurezza Energetica (2023) *Piano nazionale di adattamento ai cambiamenti climatici (PNACC)*. Available at: https://www.mase.gov.it/portale/web/guest/-/clima-approvato-il-piano-nazionale-di-adattamento-ai-cambiamenti-climatici.

[507] Ibid.

[508] Regione Marche (2025) *Deliberazione n. 84 approvata dall'Assemblea legislativa regionale nella seduta dell'11 febbraio 2025, n. 175: Piano regionale di adattamento al cambiamento climatico (PRACC) ai sensi dell'azione B.5.1 della deliberazione n. 25 del 13 dicembre 2021. Section 5.2.2, p. 73; Appendice D – Capacità di adattamento,* p. 30. Available at: https://www.regione.marche.it/portals/0/Sviluppo_Sostenibile/Documenti/0_DAAL_84-11-02-2025.pdf.

[509] Regione Autonoma della Sardegna (2024) *SRACC 2024 – Strategia regionale di adattamento ai cambiamenti climatici*. p. 33. Available at: https://portal.sardegnasira.it/documents/21213/201290/SRACC2024.pdf/88c09cce-a7fa-407a-8edb-aeb310f6a6a1; Regione Veneto (2024) *Strategia regionale di adattamento ai cambiamenti climatici*. pp. 127-128. Available at: https://sharing.regione.veneto.it/index.php/s/ASCZEfgCLyigQQj; Città di Torino (2019) *Verde e ambiente.* Available at: http://www.comune.torino.it/ambiente/bm~doc/resilienza-climatica_en.pdf.

occupational safety and health protocols. For instance, in the economic and development domain, the *Piano Nazionale di Ripresa e Resilienza* (PNRR) prioritises digitalisation, green transition, and infrastructure resilience, with initiatives that could indirectly improve working conditions[510] but lacking an explicit OSH/climate focus[511]. In the energy sector, Italy's National Energy and Climate Plan (PNIEC) focuses overwhelmingly on decarbonisation, supply security, and infrastructure resilience, with no meaningful integration of OSH-specific measures. In agriculture, the National Strategic Plan 2023–2027 (*Piano Strategico Nazionale della PAC)* supports climate adaptation measures (such as irrigation improvements and crop diversification) that may reduce environmental exposure for farm workers but does not spell out desired OSH outcomes or link these adaptations to workplace safety guidelines[512].

Labour inspectorates and enforcement

In Italy, the National Labor Inspectorate (*Ispettorato Nazionale del Lavoro, INL*) serves as the principal authority for enforcing workplace safety and health regulations, including those related to extreme weather conditions. The INL's inspection priorities are outlined in annual and rolling *programmazione della vigilanza* documents, which are informed both by accident data from the National Institute for Insurance against Accidents at Work (INAIL) and larger policy priorities[513]. The latest two annual programmes also specifically stress the inspectorate's consideration of heat risks and related prevention and control measures as a priority for the summer season[514].

In line with these priorities, in 2024 the INL initiated a special inspection campaign during August to address the risks associated with extreme heat[515]. This campaign targeted sectors most exposed to heat stress, including agriculture, floriculture, and construction, aiming to verify compliance with existing OSH regulations and presence of preventive measures against heat-

[510] Such as energy-efficient buildings mitigating indoor heat stress.

[511] INCIDE (2023) *Public Works: PNRR opportunities for the recovery of the Italian economy*. Available at: https://www.incide.it/en/public-works-pnrr-opportunities-for-the-recovery-of-the-italian-economy/.

[512] Rete Rurale Nazionale (2023). *Piano Strategico PAC 2023–2027*. Available at: https://www.reterurale.it/PAC_2023_27/PianoStrategicoNazionale.

[513] Thus, for example, the 2025 programme singles out agriculture and construction sectors due to high numbers of workplace accidents and also mentions using "Vision Zero" approach from the 2021-2027 *EU Strategic Framework on work-related mortality* as a guiding principle for inspections.

[514] In 2024 programme, the inspectorate focused on the combined risk of heat waves and the use of pesticides, exacerbating chemical exposure for farmers; in 2025, the programme mentioned general workplace preparedness for summer months. Ispettorato Nazionale del Lavoro (2025) *Programmazione delle attività di vigilanza.* p. 10. Available at: https://www.ispettorato.gov.it/attivita-studi-e-statistiche/attivita/programmazione-delle-attivita-di-vigilanza/.

[515] Ispettorato Nazionale del Lavoro (2024) *Direzione centrale vigilanza e sicurezza del lavoro, Nota INL 5752 del 25 luglio 2024*. Available at: https://ediltecnico.it/wp-content/uploads/2024/08/N_LAV_31072024_inl5752-pdf.pdf?_gl=1*d6sp2m*_up*MQ..*_ga*NDQ0MzUxMDU4LjE3NTc4Njc0Njg.*_ga_1GB4QMYSV6*czE3N; Ispettorato Nazionale del Lavoro (2024) *Circolare INL n. 5752/2024.* Available at: https://olympus.uniurb.it/index.php?Itemid=137&catid=6&id=32433%3Ainl5752-24&option=com_content&view=article.

related risks[516]. At the same time, flood-preparedness assessments are not mentioned in INL's communications, and inspections have historically been suspended in flood-affected areas[517].

It is not clear whether INL's inspectors receive training or use any dedicated protocols and checklists for assessing weather-related occupational risks[518]. The inspectorate, however, provides specialised guidance on various occupational risks related to extreme weather with recommended measures for employee protection[519].

Data collection and reporting

Italy records workplace accidents and occupational diseases through a national reporting and statistical system centred on INAIL, which publishes monthly and semestrial open data on accidents at work (*infortuni sul lavoro*) and occupational diseases (*malattie professionali*). The datasets register accident and disease cases respectively using a range of injury/disease-related indicators, such as the mode of injury, injured bodily part, fatality, outcome and others (summarised in the *Table 23* below), with more granular data available in semestrial datasets.

In addition to indicators capturing data characterising accidents and diseases, the datasets register a range of administrative and demographic data, such as geographic location (provincial level), worker characteristics (gender, place of birth, age), work sector / employer characteristics[520], which allow for sectoral, regional, longitudinal and demographic (including vulnerability) analysis of incidents. Neither dataset includes indicators that allow coding accidents by weather-related cause. Based on the available data, some epidemiological and modelling studies as well as operational observatories such as the Worklimate project used meteorological/WBGT forecasts with INAIL injury data, media reports, and emergency-room/mortality surveillance to estimate the fraction of injuries plausibly attributable to extreme temperatures[521].

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[516] Ibid.

[517] Governo della Repubblica Italiana (2023) *Decreto-Legge n. 61 del 1° giugno 2023.* Available at: https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato::2023;61.

[518] Ispettorato Nazionale del Lavoro (2023) *Principi per gli ispettori del lavoro.* Available at: https://www.ispettorato.gov.it/files/2023/03/PRINCIPI-PER-GLI-ISPETTORI-DEL-LAVORO.pdf.

[519] Ispettorato Nazionale del Lavoro (2023) *Nota n. 5056/2023: tutela dei lavoratori sul rischio legato ai danni da calore.* Available at: https://www.lavorosi.it/fileadmin/user_upload/PRASSI_2023/inl-nota-n-5056-2023-tutela-lavoratori-rischio-danni-da-calore.pdf.

[520] The dataset for occupational diseases uses INAIL classification to describe work sector (and subsector). The occupational accidents dataset includes a range of employer-level fields: an internal employer identifier, territorial insurance codes and the employer's ATECO sector plus broad insurance/ tariff groupings.

[521] Di Blasi C., Marinaccio A., Gariazzo .C, Taiano L., Bonafede M., Leva A., Morabito M., Michelozzi P., De' Donato F., On Behalf Of The Worklimate Collaborative Group (2023) Effects of Temperatures and Heatwaves on Occupational Injuries in the Agricultural Sector in Italy, *Internationa Journal of Environmental Research and Public Health*. 20(4), 2781. https://doi.org/10.3390/ijerph20042781; Gariazzo, C. Taiano, L., Bonafede, M., Leva, A., Morabito, M., Donato, F., Marinaccio, A. (2022) Association between extreme temperature exposure and occupational injuries among construction workers in Italy: An analysis of risk factors, *Environment International*, 171. https://doi.org/10.1016/j.envint.2022.107677; Worklimate (2024) *Climate change and occupational health and safety: risk of injuries, productivity loss and the co-benefits perspective.* Available at: https://www.worklimate.it/climate-change-and-occupational-health-and-safety-risk-of-injuries-productivity-loss-and-the-co-benefits-perspective/.

Table 23: Injury-/disease-related indicators used by INAIL in the occupational accident and occupational disease datasets (demographic and administrative indicators are not included)

Dataset	Indictor (what it describes)	Present in semestrial data?	Present in monthly data?
Occupational accidents (*infortunati sul lavoro*)	Nature of injury (*natura dell'infortunio / natura della lesione)*	Yes	Yes
	Mechanism / mode of injury (*modalità dell'infortunio / dinamica)*	Yes	Yes
	Body part injured (*parte del corpo*)	Yes	Yes
	Fatality flag / outcome (*esito mortale / decesso*)	Yes	Yes
	Days of temporary incapacity / lost days (*giorni indennizzati / giorni di prognosi*)	Yes	Excluded in many cases[522]
	Degree of permanent impairment (*grado di menomazione / grado di invalidità*)	Yes	-
	Administrative outcome / compensation type (*definizione amministrativa / indennizzo*)	Yes	-

[522] INAIL (2025) *Dati con cadenza mensile.* Available at: https://dati.inail.it/portale/it/dataset/infortuni-sul-lavoro/dati-con-cadenza-mensile.html.

Dataset	Indictor (what it describes)	Present in semestrial data?	Present in monthly data?
Occupational diseases (*malattie professionali*)	Classification (*type / ICD / diagnosi*)	Yes	ICD-10 only
	Causal agent / exposure agent (*agente causale / agente patogeno / agente chimico/fisico*), including separate coding for whether asbestos-related	Yes	Partly / Limited in monthly
	Degree of impairment of the worker's psychophysical integrity, including separate coding overall vs in relation to the disease / exposure	Yes	-
	Administrative outcome / compensation type (*definizione amministrativa / indennizzo*)	Yes	-
	Days of temporary incapacity / lost days (*giorni indennizzati*)	Yes	-

Source: Author's own elaboration.

Role of social partners

In Italy, a tripartite forum for consultation on OSH risks takes form of the Permanent Advisory Committee for Health and Safety at Work (*Commissione Consultiva Permanente per la salute e sicurezza sul lavoro*), established under Article 6 of Legislative Decree 81/2008 and chaired by the Ministry of Labour. It includes representatives from key ministries (e.g., Health, Economic Development), regional governments, trade unions, employer organisations, and technical

experts[523]. The Committee's effectiveness on climate-specific issues remains limited, as its focus has historically been on broader OSH regulations rather than targeted environmental risks[524].

Despite the recognition of social partners' key role in shaping policies for weather-related OSH risks, particularly extreme heat, in the 2025 National Framework Protocol (*Protocollo quadro*)[525], systematic consultation on extreme weather-related occupational risks is not yet fully established[526]. The most concrete and advanced measures emerge from territorial and sector-specific dialogue. Social partners like CGIL, CISL, UIL, and Confindustria (to name a few) are involved in drafting regional ordinances[527], sectoral agreements[528], and issuing booklets and information campaigns[529] on work in hot temperatures. Social partner action has led to effective and widely accepted measures in specific contexts. The pioneering 2016 ordinance in Nardò (Apulia), which banned agricultural work during the hottest hours on alert days, was a direct result of worker strikes and union advocacy, creating a model adopted by other municipalities and regions[530]. Similarly, in the port of Monfalcone, structured dialogue between social partners including CGIL, CISL, and UIL in 2022 led to a protocol introducing mandatory breaks and cooling measures during heatwaves[531].

Atypical workers, who are among the most vulnerable to heat stress (e.g., irregular migrants in agriculture and platform delivery riders), are largely excluded from formal consultation

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523 Vega Formazione (n.d.) *Il Glossaeio di Vega: terminologia technica a portata di mano. Commissione Consultiva Permanente*. Available at: https://www.vegaformazione.it/glossario/commissione-consultiva-permanente-g191.html.

524 Errico, A., and Di Nunzio, D. (2024) *Caldo estremo e salute e sicurezza sul lavoro: il ruolo del dialogo sociale. I risultati del progetto Adaptheat per il contesto italiano.* Fondazione Di Vittorio, n.5/2024. Available at: https://www.fondazionedivittorio.it/sites/default/files/content-attachment/ADAPTHEAT_FDV-WP-5-2024.pdf.

525 The Framework Protocol itself was drafted in cooperation with social partners, including CGIL, CISL, and UIL.

526 Interview with a representative from a regional social partner organisation [30 July 2025]. See also: Errico, A., and Di Nunzio, D. (2024) *Caldo estremo e salute e sicurezza sul lavoro: il ruolo del dialogo sociale. I risultati del progetto Adaptheat per il contesto italiano.* Fondazione Di Vittorio, n.5/2024. Available at: https://www.fondazionedivittorio.it/sites/default/files/content-attachment/ADAPTHEAT_FDV-WP-5-2024.pdf.

527 Business & Human Rights Resource Centre (2023) *Italy: Industrial hubs limit outdoor work during extreme heatwave following the death of a construction worker.* Available at: https://www.business-humanrights.org/en/latest-news/italy-industrial-hubs-limit-outdoor-work-during-extreme-heatwave-following-the-death-of-a-construction-worker/.

528 Interview with a representative from a regional social partner organisation [30 July 2025].

529 Fillea CGIL (2024) *Extreme heat: workers' protection – policy document.* Available at: https://www.filleacgil.net/images/A5_Fillea_CaldoEstremo_DEF_print_en_US--INGLESE.pdf.

530 Errico, A., and Di Nunzio, D. (2024) *Caldo estremo e salute e sicurezza sul lavoro: il ruolo del dialogo sociale. I risultati del progetto Adaptheat per il contesto italiano.* Fondazione Di Vittorio, n.5/2024. Available at: https://www.fondazionedivittorio.it/sites/default/files/content-attachment/ADAPTHEAT_FDV-WP-5-2024.pdf;
LeccePrima (2024) *Modello Nardò: lavoro e caldo estremo.* Available at: https://www.lecceprima.it/economia/modello-nardo-lavoro-caldo.html;
Comune di Nardò (2024) *Ordinanza anticaldo per la tutela dei braccianti.* Available at: https://old.comune.nardo.le.it/24-comunicati-stampa/2804-braccianti-torna-l-ordinanza-anticaldo-2.html.

531 Errico, A., and Di Nunzio, D. (2024) *Caldo estremo e salute e sicurezza sul lavoro: il ruolo del dialogo sociale. I risultati del progetto Adaptheat per il contesto italiano.* Fondazione Di Vittorio, n.5/2024. Available at: https://www.fondazionedivittorio.it/sites/default/files/content-attachment/ADAPTHEAT_FDV-WP-5-2024.pdf.

processes[532]. Their inclusion is primarily achieved through trade union outreach and grassroots mobilisation rather than institutionalised sectoral platforms.

Good practices and innovations

The Worklimate platform: INAIL's national WBGT-based forecasting and alert system is a leading example of a digital tool that translates complex climate data into actionable, colour-coded risk levels for employers. This enables evidence-based decisions on work scheduling and suspensions. Its scalable, geospatial WebGIS model is directly transferable to other national contexts.

The 2025 Framework Protocol: This national soft-law instrument provided an important standardised blueprint by specifically addressing heat and solar radiation, spelling out concrete recommendations and prescribing measures for risk assessments in high-exposure sectors, thereby making broad legal duties operational.

The transport and logistics collective agreement: The 2024-2027 national agreement (CCNL) is a pioneering example of social dialogue pre-empting broader legislation. It codifies existing obligations—like risk assessments and providing protective equipment—alongside recommendations for workload reductions during official alerts into a binding sectoral framework.

Localised social dialogue and wage support: Initiatives like the pioneering 2016 ordinance in Nardò (Apulia) and the heat protocol in the Port of Monfalcone demonstrate the effectiveness of place-based social dialogue. Furthermore, the national wage support mechanism (CIGO/CISOA) for weather-related work stoppages is a key enabler, making compliance with safety bans financially feasible.

The Glovo judicial precedent: The 2025 court order compelling Glovo to negotiate heat safeguards with unions sets a crucial benchmark. It illustrates the judiciary's role in catalysing protections for vulnerable gig economy workers, a transferable strategy for jurisdictions with robust legal systems.

[532] Ibid.

Lithuania

Main extreme weather events and associated OSH risks

Lithuania's evolving climate is intensifying two primary categories of extreme weather that pose significant occupational safety and health (OSH) risks: heatwaves and floods. These trends are generating increasingly severe hazards, including, on the one hand, heat stress, UV exposure, wildfires, and on the other slip-and-fall accidents, waterborne diseases, and mental distress. Outdoor workers and emergency responders in exposed environments face the greatest repercussions from these threats.

Heatwaves and droughts. Between 1990 and 2020, Lithuania's average temperature increased, particularly in January–April and July–August, accompanied by a 32% rise in the number of hot days and heat stress events[533]. Under RCP4.5 and RCP8.5 scenarios, the number of days meeting heatwave criteria (maximum air temperature exceeding 25°C for at least three consecutive days) is projected to increase by 1.6–1.7 times and more than three times[534], respectively. This could reach up to 5 days per year in 2011–2040 and between 5–10 days per year in 2041–2070 in southern Lithuania[535]. Urban areas such as Kaunas, Vilnius, Klaipėda, Panevėžys, and Šiauliai are particularly at risk due to the urban heat island effect. Coastal cities like Klaipėda and southeastern-central regions may experience exacerbated "tropical nights" (high temperatures combined with humidity), which heightens health risks[536]. These conditions increase occupational hazards such as prolonged UV exposure, heat stress, cognitive strain, and cardiovascular strain, especially for outdoor workers in agriculture, forestry, construction, transportation, and utility services[537]. Hotter, drier days also elevate forest fire risks (especially in Central and Northern Lithuania), endangering forestry workers, firefighters, and emergency responders who face physical hazards and potential post-traumatic stress[538].

Winter precipitation and floods. Although warming may reduce spring floods via decreased snowmelt, Lithuania is projected to experience more frequent winter floods due to sporadic

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533 Ramanauskas, E., Bukantis, A., Dringelis, L., Kaveckis, G. and Jonkutė-Vilkė, G. (2024) Climate Change and Cities of Lithuania: Threats, Problems and Prerequisites for Solution, *Urban Science,* 8(4), 186. Available at: https://doi.org/10.3390/urbansci8040186.

534 Ibid.

535 Lithuanian Hydrometeorological Service (2023) *Study on climate change risks by the middle of the 21st century*. Available at: https://www.lba.lt/uploads/documents/files/Report_2023_%20(EN)(1).pdf.

536 Lietuvos Respublikos aplinkos ministerija (2019) *Klimato kaitos prognozių sudarymo, nacionalinės studijos apie Lietuvos savivaldybių jautrumą ir pažeidžiamumą klimato kaitai bei jautriausios savivaldybės prisitaikymo prie klimato kaitos plano parengimas. II etapas: Lietuvos savivaldybių jautrumo ir pažeidžiamumo klimato kaitai tyrimas,* p. 24. Available at: https://klimatokaita.lt/media/17620/lietuvos-savivaldybiu-jautrumo-ir-pazeidziamumo-klimato-kaitai-tyrimas.pdf; Sokolova, I., Vaitkus, M., Maceika, E. and Skunčikienė, S. (2023) The Impact of Climate Change on the Building Sector in Lithuania: Challenges and Adaptation Measures, *Sustainability*, 15(19), 14281. Available at: https://doi.org/10.3390/su151914281.

537 State Labour Inspectorate of the Republic of Lithuania (n.d.) *Karščio poveikis darbe. Darbo vietų gairės.* Available at: https://www.vdi.lt/AtmUploads/heat.pdf; Written response from the VDI representative [7 July 2025].

538 UAB Infraplanas (2014) *Studijos, nustatančios klimato kaitos keliamos grėsmės žmonių sveikatai, parengimo ir rekomendacijų sukūrimo bei pateikimo paslaugos,* Final Report, p. 54. Available at: https://am.lrv.lt/uploads/am/documents/files/Klimato_kaita/ataskaita.pdf.

heavy precipitation and rain-on-snow events[539]. Extreme precipitation events are expected to increase across most regions, particularly during colder seasons (October–April), with the greatest intensification projected for the second half of the 21st century[540]. River basin cities, particularly those in the Nemunas basin (Kaunas, Panemunė, Rusnė, Smalininkai) and Danė basin (Klaipėda, Kretinga), face the highest flood-related risks[541]. Cities with a high share of impervious surfaces (Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys) will be more vulnerable to flash floods[542]. Klaipėda and Lithuania's Baltic Sea coast face the additional risk of rising sea levels. Beyond the increased risk of drowning, slippery conditions and waterborne pathogens pose particular risks to workers in storage, transportation, shipping, maintenance, emergency services, and agriculture[543].

Table 24: Summary of the main weather events and related OSH risks in Lithuania

Weather events	Occupational exposure	Key OSH risks	Key sectors / groups
Heatwaves, tropical nights, droughts, and wildfires	Increased UV exposure	Skin cancer	Outdoor workers, especially: Forestry and agriculture Construction
	Heat stress	Cognitive strain Dehydration Cardiovascular system strain	

[539] Lietuvos Respublikos aplinkos ministerija (2019) *Klimato kaitos prognozių sudarymo, nacionalinės studijos apie Lietuvos savivaldybių jautrumą ir pažeidžiamumą klimato kaitai bei jautriausios savivaldybės prisitaikymo prie klimato kaitos plano parengimas. II etapas: Lietuvos savivaldybių jautrumo ir pažeidžiamumo klimato kaitai tyrimas,* p. 69. Available at: https://klimatokaita.lt/media/17620/lietuvos-savivaldybiu-jautrumo-ir-pazeidziamumo-klimato-kaitai-tyrimas.pdf.

[540] Christensen, O., Kjellström, E., Dieterich, C., Gröger, M., Eberhard, H. and Meier, M. (2022) Atmospheric regional climate projections for the Baltic Sea region until 2100, *Climate Research,* 13(1), pp. 133–157. https://doi.org/10.5194/esd-13-133-2022; Kilpys, J., Pauša, K. and Jurkus, N. (2017) *Klimato kaitos švelninimo ir prisitaikymo prie klimato kaitos grėsmės savivaldybėms.* VŠĮ Kauno regiono energetikos agentūra. Available at: https://www.krea.lt/images/angle180/klimato-kaita-gaires-savivaldybems.pdf; Lietuvos Respublikos aplinkos ministerija (2019) *Klimato kaitos prognozių sudarymo, nacionalinės studijos apie Lietuvos savivaldybių jautrumą ir pažeidžiamumą klimato kaitai bei jautriausios savivaldybės prisitaikymo prie klimato kaitos plano parengimas. II etapas: Lietuvos savivaldybių jautrumo ir pažeidžiamumo klimato kaitai tyrimas,* pp. 29-30. Available at: https://klimatokaita.lt/media/17620/lietuvos-savivaldybiu-jautrumo-ir-pazeidziamumo-klimato-kaitai-tyrimas.pdf.

[541] See *Potvynių grėsmės ir rizikos žemėlapis* (n.d.). Available at: https://experience.arcgis.com/experience/7f2d4ca0c74c4857a0620967e530fa4d; Lithuanian Hydrometeorological Service (2023) *Study on climate change risks by the middle of the 21st century*. Available at: https://www.lba.lt/uploads/documents/files/Report_2023_%20(EN)(1).pdf; Ramanauskas, E., Bukantis, A., Dringelis, L., Kaveckis, G. and Jonkutė-Vilkė, G. (2024) Climate Change and Cities of Lithuania: Threats, Problems and Prerequisites for Solution, *Urban Science,* 8(4), 186. https://doi.org/10.3390/urbansci8040186.

[542] Lietuvos Respublikos aplinkos ministerija (2019) *Klimato kaitos prognozių sudarymo, nacionalinės studijos apie Lietuvos savivaldybių jautrumą ir pažeidžiamumą klimato kaitai bei jautriausios savivaldybės prisitaikymo prie klimato kaitos plano parengimas. II etapas: Lietuvos savivaldybių jautrumo ir pažeidžiamumo klimato kaitai tyrimas,* p. 70. Available at: https://klimatokaita.lt/media/17620/lietuvos-savivaldybiu-jautrumo-ir-pazeidziamumo-klimato-kaitai-tyrimas.pdf.

[543] Kilpys, J., Pauša, K. and Jurkus, N. (2017) *Klimato kaitos švelninimo ir prisitaikymo prie klimato kaitos grėsmės savivaldybėms.* VŠĮ Kauno regiono energetikos agentūra. Available at: https://www.krea.lt/images/angle180/klimato-kaita-gaires-savivaldybems.pdf; Interviews with representatives of Kaunas Chamber of Commerce [18 July 2025] and Solidarumas Trade Union [23 July 2025].

Weather events	Occupational exposure	Key OSH risks	Key sectors / groups
	Wildfire exposure	Respiratory issues and burns	Firefighters and emergency services
Heavy rainfall events and floods	Working near overflowing rivers, canals, or ditches Slippery or unstable surfaces Exposure to contaminated water	Drowning Road accidents Waterborne diseases Mental distress	Agriculture Transportation (including inland waterways) Utility services Emergency services

Source: Author's own elaboration.

Current OSH legislation

Lithuania's occupational safety and health (OSH) framework establishes a foundational duty for employers to ensure safe working conditions but offers only a fragmented set of protections against extreme weather. While specific regulations mandate thermal comfort for indoor work and provide break protocols for outdoor work in extreme cold, protections against heat are limited and no framework directly addresses other climate-related hazards like floods or wildfires. Consequently, the responsibility for managing these evolving risks falls disproportionately on individual employers, creating significant gaps in protection for vulnerable workers and those in small enterprises or precarious employment.

Lithuania's OSH framework is founded on the Labour Code and the Law on Safety and Health at Work (IX-1672, 2003), which impose a general, cross-sectoral duty on employers to ensure safe and healthy working conditions. While technical details set out in subordinate acts, hygiene norms and inspectorate guidance[544] offer a range of protections, they only implicitly include extreme weather and related hazards. The most concrete available measures address thermal conditions which, while not mandating temperature thresholds triggering work stoppages, impose certain obligations on employers. Thus, a hygiene standard for indoor thermal safety (HN 69:2003[545]) sets legal bounds for ambient air temperature and recommendations for relative humidity and air velocity for thermal comfort in (indoor) work spaces (see *Table 25*

[544] Lietuvos Respublikos socialinės apsaugos ir darbo ministerija (n.d.) *Safety and Health at Work.* Available at: https://socmin.lrv.lt/en/activities/labour-and-employment/safety-and-health-at-work/.

[545] Lietuvos Respublikos sveikatos apsaugos ministras (2003) *Įsakymas dėl Lietuvos higienos normos HN 69:2003 "Šiluminis komfortas ir pakankama šiluminė aplinka darbo patalpose. Parametrų norminės vertės ir matavimo reikalavimai" patvirtinimo*. Available at: https://www.e-tar.lt/portal/lt/legalAct/TAR.39061F53794A.

below), often referred to across official and sectoral recommendations[546]. For outdoor work, while there is no strict maximum or minimum temperature in Lithuanian law, the 2017 amendments to the Labour Code, adopted via Resolution No. 496, introduce mandatory breaks for those working in temperatures below -10°C or above +28°C, or in unheated spaces with temperatures below +4°C, amounting to no less than 40 minutes every one and a half hours per an eight-hour working day[547]. These rules also apply to workers performing work in conditions of occupational risk or involving heavy physical or mental strain[548]. The customs sector collective agreement (the only such agreement to include hot and cold work provisions) has similar specifications for the employees working outdoors, stipulating mandatory 10-minute hourly breaks at temperatures below –10°C or in unheated indoor areas below +4°C, as well as 10-minute hourly breaks or a shortened workday by 3 hours at temperatures above +25°C[549].

Table 25: Thermal thresholds for indoor work under the hygiene standard HN 69:2003

Period	Type of work	Air temperature, °C		Max. air humidity, %	Air movement speed, m/s
		Permanent workplaces	Temporary workplaces		
Cold	Easy - Ia	21–25	18–26	75	Not more than 0,1
	Easy - Ib	20–24	17–25	75	Not more than 0,2
	Moderate - IIa	17–23	15–24	75	Not more than 0,3
	Moderate - IIb	15–21	13–23	75	Not more than 0,4
	Severe - III	13–19	12–20	75	Not more than 0,5
Warm	Easy - Ia	22–28	20–30	55 (at 28 °C)	0,1–0,2
	Easy - Ib	21–28	19–30	60 (at 27 °C)	0,1–0,3
	Moderate - IIa	18–27	17–29	65 (at 26 °C)	0,2–0,4
		16–27	15–29	70 (at 25 °C)	0,2–0,5

[546] VDI (n.d.) *Karščio poveikis darbe. Darbo vietų gairės.* Available at: https://www.vdi.lt/AtmUploads/heat.pdf; Higienos institutas (2018) *Karščio poveikio prevencinės priemonės darbo vietoje uždaroje aplinkoje ir lauke.* Available at: https://www.hi.lt/uploads/Institutas/Profesines_sveikatos_centras/Metodines/Karscio_poveikio_prevencines_priemones%20(1).pdf;
VDI (2024) Darbdaviai privalo užtikrinti saugias darbo sąlygas per karščius. Available at: https://vdi.lrv.lt/lt/naujienos/darbdaviai-privalo-uztikrinti-saugias-darbo-salygas-per-karscius/.

[547] Lietuvos Respublikos Vyriausybė (2017) *Nutarimas dėl Lietuvos Respublikos darbo kodekso įgyvendinimo.* Available at: https://www.e-tar.lt/portal/lt/legalAct/76731a705b4711e79198ffdb108a3753/asr;
see also OECD (2024) *Feeling the Heat.* Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/08/feeling-the-heat_8bb7a6f7/e07ce0e6-en.pdf.

[548] Written response from the VDI representative [7 July 2025].

[549] Muitinės departamentas (2022) *Dėl kolektyvinės sutarties registravimo*. Available at: https://socmin.lrv.lt/uploads/socmin/documents/files/veikla/paslaugos/sutartys/kolektyvines/muitines%20sakos%20ks2022%2001%2028.pdf.

Period	Type of work	Air temperature, °C		Max. air humidity, %	Air movement speed, m/s
		Permanent workplaces	Temporary workplaces		
	Moderate – IIb Severe – III	15–26	13–28	75 (≤ 24 °C)	0,2–0,6

Source: Author's own elaboration based on provisions under HN 69:2003.

While these thresholds are used by health authorities when assessing compliance, they are static and not dynamically linked to contemporaneous weather conditions. For extreme weather events, employers must rely on their statutory risk assessment and take proportionate measures, including work reorganisation, additional breaks, personal protective equipment, hydration, job rotation, or temporary suspension of particular tasks.

Beyond the OSH framework, other legislative acts impose general disaster preparedness duties on companies but offer little specific guidance for extreme weather. Laws on Civil Safety and Crisis Management, for instance, require businesses to develop evacuation plans and ensure on-premises safety during emergencies like floods or fires[550]. Similarly, post-COVID-19 provisions focused preparedness on CBRN (Chemical, Biological, Radiological, and Nuclear) threats[551], but did not include climate-related emergencies[552]. This regulatory gap is compounded by an absence of tailored emergency action plans that specify employer obligations during extreme weather events. Furthermore, while Lithuania has established official indicators for extreme weather[553] and systems for public awareness[554], analyses point to a lack a harmonised surveillance system to actively monitor and mitigate the public health impacts of these events[555], while stakeholders report a critical absence of localised information

[550] *Lietuvos Respublikos krizių valdymo ir civilinės saugos įstatymas* (1998). Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.69957/asr.

[551] Lietuvos Respublikos aplinkos ministras (2021) *Įsakymas dėl sveikatos priežiūros sistemos subjektuose kaupiamų asmeninės apsaugos priemonių ir kitų veiklos vykdymui užtikrinti būtinų priemonių, skirtų pasirengti ekstremaliųjų situacijų, sukeltų cheminių, biologinių veiksnių, branduolinių ar radiologinių avarijų bei teroristinių išpuolių likvidavimui ir jų padarinių šalinimui, atsargų sąrašų ir šių priemonių minimalaus sukauptino kiekio (normatyvų) bei kaupimo terminų tvarkos aprašo patvirtinimo.* Available at: https://e-tar.lt/portal/lt/legalAct/599897c0251b11eca51399bc661f78e7.

[552] Ibid.

[553] Lietuvos Respublikos aplinkos ministras (2011) *Įsakymas dėl stichinių, katastrofinių meteorologinių ir hidrologinių reiškinių rodiklių patvirtinimo.* Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.412088/asr.

[554] The 2012 Seimas-approved *System for Informing the Public about Climate Change and the Threats it Causes to Human Health* designates agency responsibilities: the Health Emergency Centre and the Hydrometeorological Service for heatwaves; the Fire Protection and Rescue Department for floods, storms, and other natural disasters.

[555] European Environment Agency (2024*) Heat Mortality and Morbidity Surveillance in European Countries: Technical Report.* Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/heat-and-health/2024-heat-mortality-technical-background-document.pdf/@@download/file; see also European Environment Agency (2024) *Heat-health action plans.* Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/heat-health-action-planning-surveillance.

systems and action plans[556]. Consequently, the development of occupational safety protocols for extreme weather is left to the discretion of individual employers and the ad-hoc experience of their employees[557].

Because of this lack of formal regulations or uniform guidelines on mitigating and responding to extreme weather-related risks, vulnerable groups (e.g., individuals with preexisting physical or mental conditions and migrant workers) and workers in precarious work arrangements (such as atypical workers, including platform, self-employed, and temporary workers), are often at mercy of employment relationship and contractual conditions, despite being entitled to the same levels of occupational safety and health protection[558]. The level of protection also depends on the type of employer, with small and medium-sized enterprises often lacking the resources to proactively implement protective measures such as providing additional protective equipment or monitoring weather-related workplace conditions like temperature and humidity[559].

National policy frameworks and climate adaptation plans

Occupational hazards related to extreme weather are rarely mentioned in Lithuania's national or sectoral policies, and when they appear, it is generally conceptual or illustrative rather than part of a coherent programme or action plan. There is no systematic integration of occupational safety into climate adaptation or public health policies, with worker protection from extreme weather events considered sufficiently incorporated into existing legislation[560].

Low visibility: all key frameworks in energy, economy, labour, and public health

At the highest strategic level, Lithuania's development vision Lithuania 2030 frames climate change and public health as separate action areas, focusing primarily on economic and environmental objectives (such as energy independence, green innovation, and modernising healthcare), rather than the intersection of climate and occupational risks. Its companion National Progress Plan 2021–2030[561] mentions working conditions briefly under Strategic Goal 2 but frames them in the context of socio-economic disparities rather than climate-sensitive occupational health. Similarly, floods and "natural phenomena" are referenced under Strategic Goal 6 as challenges to economic and urban resilience, not as occupational hazards.

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556 Interview with representative of Kaunas Chamber of Commerce [18 July 2025].

557 Interview with representative of Kaunas Chamber of Commerce [18 July 2025].

558 Written response from the VDI representative [7 July 2025].

559 This is acknowledged by the State Labour Inspectorate (VDI) representative [7 July 2025 and reflected in occupational injury statistics, which show a higher incidence in enterprises with up to 49 employees (see, for example: VDI, 2023, Report on the State of Employees' Safety).

560 Interview with representative of a Lithuanian national institution [18 August 2025].

561 Lietuvos Respublikos Vyriausybė (2020) *Nutarimas dėl 2021-2030 metų Nacionalinės pažangos plano patvirtinimo*. Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/c1259440f7dd11eab72ddb4a109da1b5?jfwid=-whxwii77y.

The absence of dedicated focus on the intersection between extreme weather and occupational safety on strategic level is reflected in sectoral policies, which largely prioritise adaptation measures supporting green and digital transition, as well as broader public health. For example, the National Energy and Climate Action Plan, adopted in 2019[562], focuses overwhelmingly on driving energy sustainability, independence, and efficiency, with no linkage made between the energy transition or climate impacts and the safety of workers in these sectors. This pattern is repeated in other key sectors: the National Forestry Sector Strategy 2022–2040 emphasises sustainable management and climate mitigation through carbon sequestration, while the National Agriculture Strategy 2021–2030 focuses on competitiveness and green transition. Neither of the documents addresses the significant occupational risks their workforce faces from increasing heatwaves, wildfires, or other extreme weather events.

Public Health and Labour sectors have similar partial treatment of occupational health and weather. The Lithuanian Health Strategy (2014–2025)[563], the main high-level strategic document of the Ministry of Health, establishes a broad framework for improving the population's health and the healthcare system's effectiveness. Its focus on occupational safety is general, emphasising governance, research, and the availability of services without mentioning emerging climate-amplified threats like extreme weather events or specifying related occupational risks. Similarly, the Action Plan for Safety and Health at Work 2022–2027[564], overseen by the Ministry of Social Security and Labour, is predominantly focused on digital, green, and demographic transitions and does not mention extreme weather events or incorporate them into its risk assessment and prevention priorities[565].

Partial acknowledgement of broader health risks: National Climate Adaptation Plan

Lithuania's climate adaptation plans use strong language promoting an inter-sectoral and integrated approach, but still mostly address public and environmental health when it comes to climate risks, without addressing occupational safety directly. Following initial acknowledgements of the lacking dedicated public health management programme for climate change-related risks and dedicated efforts to understand said risks by Lithuania's Ministry of Environment[566], the Lithuanian government included several concrete adaptation goals for the

[562] Lietuvos Respublikos Vyriausybė (2024) *Nutarimas dėl Nacionalinės energetikos ir klimato srities veiksmų plano 2021-2030 m. patvirtinimo*. Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/b7ff6bd1b7b811efbb3fe9794b4a33e2?jfwid.

[563] Lietuvos Respublikos Seimas (2014) *Nutarimas dėl Lietuvos sveikatos 2014-2025 metų strategijos patvirtinimo*. Available at: https://www.e-tar.lt/portal/lt/legalAct/85dc93d000df11e4bfca9cc6968de163/asr.

[564] Lietuvos Respublikos socialinės apsaugos ir darbo ministras ir Lietuvos Respublikos sveikatos apsaugos ministras (2022) *Įsakymas dėl 2022-2027 m. Darbuotojų saugos ir sveikatos veiksmų plano patvirtinimo*. Available at: https://www.e-tar.lt/portal/lt/legalAct/c79da150b4a611ec8d9390588bf2de65.

[565] Interview with representative of a Lithuanian national institution [18 August 2025].

[566] This gap was previously identified in: (1) the National Climate Change Management Policy Strategy (2012), Point 96; and (2) a 2019 assessment of climate change hazards and vulnerabilities for public health, commissioned by the Ministry of Environment, which informed the 2021 National Climate Change Management Agenda.

public health sector in its 2021 National Climate Change Management Agenda[567]. This core policy document, which consists of the National Strategy for Climate Change Management for 2021–2030 and National Climate Change Adaptation Plan, explicitly identifies public health as a highly vulnerable sector. Its focus, however, remains exclusively on population-level risks – such as morbidity from air pollution and threats to vulnerable groups in energy-inefficient housing during heatwaves. This focus informs the subsequent targets and actions (listed in *Table 26* below), which similarly span broader envisioned improvements in public information systems, disease prevention measures, climate-resilient infrastructure, hygiene standards, epidemiological surveillance, and heatwave management systems. There is no mention of occupational risks or actions aimed at protecting workers from extreme weather conditions.

Table 26: Selected examples of public health-related risks and action areas in Lithuania's 2012 National Climate Change Management Policy Strategy and the 2021 National Climate Change Management Agenda

Policy document and reference			Public health risk acknowledged	Population-level actions prescribed
2012 Policy Strategy	Point 96		General absence of a dedicated program for climate change-related health risks	No actions listed
2021 Agenda	National Strategy for Climate Change Management	Art. 35.1	Morbidity from air pollution Risks to vulnerable groups during heatwaves	Improve public information systems Devise prevention measures Design resilient infrastructure Devise hygiene standards
	National Adaptation Plan	Action 2.4.1.1	Heatwaves and extreme weather conditions	Implement monitoring, warning, and public mitigation systems.
		Action 2.4.1.1	Climate change impact on health	Implement epidemiological surveillance system
		Action 2.4.1.3	Vulnerability during extreme weather	Implement measures to protect vulnerable population groups

[567] Seimas of the Republic of Lithuania Resolution 'Approving the National Climate Change Management Agenda' (2021). Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/219a2632a6b311ecaf79c2120caf5094?jfwid=-56ckr0gcc.

Policy document and reference			Public health risk acknowledged	Population-level actions prescribed
		Action 2.4.1.4	Public knowledge of climate-related health threats	Disseminate public awareness and prevention information

Source: Author's own elaboration based on the 2012 National Climate Change Management Policy Strategy and 2021 National Climate Change Management Agenda.

Expectedly, since extreme weather-related occupational hazards do not feature as a national policy priority, there is no formalised inter-institutional mechanism in Lithuania to address this particular issue area. The national-level gap is mirrored by a comparable absence of dedicated coordination or targeted action at sub-national and cross-border levels. Despite being a frontrunner as the only municipality with a dedicated climate adaptation strategy, the city of Klaipėda makes no mention of occupational risks from extreme weather in this document[568]. On the international level, the cross-border "Safe Response Project (2024–2026)" with Latvia focuses on broad municipal resilience and population safety during floods and fires[569], and its public documentation does not mention any activities or objectives pertaining to occupational safety of the first responders and civil protection units involved.

Labour inspectorates and enforcement

The State Labour Inspectorate (VDI) is Lithuania's primary authority responsible for enforcing OSH norms. It does so through inspections and public advisories to ensure employers comply with statutory protective measures when thresholds are exceeded.

There are no stand-alone inspection protocols or formal checklists specifically for climate-related OSH risks[570]. Nor are such risks explicitly included in the General Provisions on Occupational Risk Assessment[571], which explicitly require employers to assess only physical, ergonomic, psychosocial, biological, and chemical factors. Likewise, current inspection rules do not mandate additional inspections during periods of extreme weather[572], and inspectors receive no systematic training specifically on identifying or addressing extreme weather-related occupational hazards.

[568] Lietuvos Respublikos aplinkos ministerija (2023) *Klimato kaitos prognozių sudarymo, nacionalinės studijos apie Lietuvos savivaldybių jautrumą ir pažeidžiamumą klimato kaitai bei jautriausios savivaldybės prisitaikymo prie klimato kaitos plano parengimas. III etapas: Prisitaikymo prie klimato kaitos plano Klaipėdos miesto savivaldybei parengimas, galutinė ataskaita*. Available at: https://klimatokaita.lt/media/17883/galutine-ataskaita-23062023.pdf.

[569] Interreg Latvia–Lithuania Programme (n.d.) *Safe Response.* Available at: https://latlit.eu/theprojects/safe-response/.

[570] Written response from the VDI representative [7 July 2025].

[571] Lietuvos Respublikos socialinės apsaugos ir darbo ministras ir Lietuvos Respublikos sveikatos apsaugos ministras (2012) *Įsakymas dėl profesinės rizikos vertinimo bendrųjų nuostatų patvirtinimo.* Available at: https://www.e-tar.lt/portal/lt/legalAct/TAR.5B121E9A63FD/asr.

[572] VDI (2020) *Rules for inspections of economic operators' activities approved by the State Labour Inspectorate of the Republic of Lithuania*. Available at: https://vdi.lrv.lt/media/viesa/saugykla/2023/12/IEtJSfRLJTY.pdf.

VDI disseminates advisory information through media channels, such as guidance on heat stress prevention published on its website and via national outlets[573], and provides individual advice to employers, employees and their representatives, and social partners[574].

Data collection and reporting

In Lithuania, two separate institutions are responsible for collecting and reporting data on occupational injuries and diseases: the State Labour Inspectorate and the Institute of Hygiene, which operates under the Ministry of Health. The former includes statistics on reported accidents at or en route to work (*darbų nelaimingi atsitikimai*), while the latter is a national register of occupational diseases caused by long-term exposure to workplace risk factors (*profesinės ligos*).

VDI classifies accidents by injury mechanism (e.g., falls from height, being struck, transport events, loss of control of machinery) and severity (fatal/serious/minor), further breaking it down by industry, company size, worker demographics, tenure, and other factors or contributing conditions. The Institute of Hygiene offers data on occupational diseases, which is coded by types of disease (e.g., musculoskeletal, skin, respiratory, etc.) and hazard factors (physical, ergonomic/biomechanical, chemical, biological, and psychosocial), and broken down, similarly to VDI, by employee's demographics, employment-related criteria (sector, occupation), and geography (municipality and county). *Table 27* below presents different dimensions of classifications used by the two authorities. While these indicators allow to capture physical conditions of working environments and immediate types of causes of incidents and diseases, there are no dedicated indicators for monitoring and appraising extreme weather-induced occupational risks.

Table 27: Classification dimensions used by Lithuanian authorities for OSH incidents and occupational diseases

Dimension of classification	Typical subcategories or examples	
	VDI	Institute of Hygiene
Type of disease	-	ICD-10-AM classification (A – Infectious diseases; G – Diseases of the nervous system, etc.)
Injury mechanism vs. factors	Mechanisms: Falls from height; Struck by/against	Factors: Chemical; Physical; Biological; Biomechanical

[573] 15min (2023) *VDI: Employers must ensure safe working conditions during heat*. Available at: https://www.15min.lt/verslas/naujiena/finansai/vdi-darbdaviai-privalo-uztikrinti-saugias-darbo-salygas-per-karscius-662-2260316; VDI (n.d.) *Darbai karštyje.* Available at: https://www.vdi.lt/AtmUploads/DarbaiKarstyje.pdf.

[574] Written response from the VDI representative [7 July 2025].

Dimension of classification	Typical subcategories or examples	
	VDI	Institute of Hygiene
	objects; Transport/vehicle events; Loss of control of machinery/tools; Slips/trips; Electricity; Explosion; Drowning; Animal-related; Other	(ergonomic); Psychosocial; Industrial
Agent / equipment involved	Work equipment and machinery; Vehicles; Lifting equipment; Pressurised equipment; Hand tools; PPE	-
Severity of accident	Fatal; Serious (severe); Minor (light injury)	-
Economic activity (NACE / EVR)	Aggregated by sector (e.g., A – Agriculture, forestry and fishing, B – Mining and quarrying, C – Manufacturing, etc.)	
Company size	Micro (<10), Small (10–49), Medium (50–249), Large (250+)	-
Worker demographics	Gender (Male, Female)	
	Age group (<19, 20–24, … 65+)	Age group (30–34, 35–39, … 69+)
Employment tenure (length of service)	<1 month; 1–6 months; 6–12 months; 1–3 years; 3–5 years; 5–10 years; 10+	-
Job characteristics	ISCO-08/LPK (1 – Managers, 2 – Professionals, 3 – Technicians and associate professionals, 4 – Clerical support workers, etc.)	
	Employment relation (employee, agency worker, etc.)	-
Temporal breakdown	Month, Quarter; Working day/shift	-

Dimension of classification	Typical subcategories or examples	
	VDI	Institute of Hygiene
Location type	Incident location: Worksite; Road/traffic; Other premises; Commuting (where included)	Geography: municipality; country
Violations / non-compliance	Types of broken legal requirements; direct & indirect causes identified by inspectors	-
Contributing conditions	Intoxication (alcohol/other); PPE use; Safety management shortcomings	-

Source: Author's own elaboration based on annual reports by VDI and HI.

Role of social partners

Trade unions and employer organisations in Lithuania contribute to OSH policy through local tripartite councils and the national Tripartite Council, mandated by Article 185 of the Labour Code, which brings together government, trade union, and employer representatives to deliberate on labour-related issues[575]. Due to its legally-mandated nature, social partners are formally consulted via the national Tripartite Council as well as the Tripartite Commission on Employee Safety and Health[576] during the drafting of OSH legislation and inspection protocols, which allows for structured dialogue and inclusion of the major stakeholders. Atypical and platform workers, however, are often excluded from these processes, with only limited union representation[577].

While the format has previously yielded positive changes for wage-setting in Lithuania[578], there is no record of extreme weather-related OSH provisions being discussed at tripartite level.

[575] Ministry of Social Security and Labour of the Republic of Lithuania (2024) *Social Partnership*. Available at: https://socmin.lrv.lt/en/activities/labour-and-employment/labour-law/social-partnership/.

[576] *Lietuvos Respublikos darbuotojų saugos ir sveikatos įstatymas.* Available at: https://www.e-tar.lt/portal/lt/legalAct/TAR.95C79D036AA4/asr; Blažienė, I., and Gruževskis, B. (2005) *Tripartite partnership institutions examined*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/tripartite-partnership-institutions-examined.

[577] Current representation for these workers includes associations (e.g., the Courier Association). The ongoing transposition of the EU Directive on improving working conditions on digital platforms, while not mandating their inclusion in formal consultations, may enhance their recognition and rights (Council of Europe, 2024, p. 38).

[578] Lietuvos Respublikos socialinės apsaugos ir darbo ministerija (2024) *Trišalės tarybos posėdžiai.* Available at: https://socmin.lrv.lt/lt/administracine-informacija/tarybos-ir-komisijos/trisale-taryba/trisales-tarybos-posedziai; noted in Council of Europe (2024) *European Social Charter: Reply to proposed questions from the European Committee of Social Rights for the next statutory report Group 1 submitted by The Government of the Republic of Lithuania,* p. 33. Available at: https://rm.coe.int/ltu-nr-group1-2024/1680b3cfc3.

Among the individual organisations, including some comprising current Tripartite Council membership[579], only the following have explicitly addressed weather-related OSH risks:

- Lithuanian Federation of Industrial Trade Unions (LPPSF), which acknowledged increasing risks of working in hot temperatures and pointed to collective agreements as the promising instruments for negotiating sector-sensitive hot work provisions[580].
- Lithuanian Trade Union Confederation (LPSK), which offers its own guidelines for working in hot weather[581].
- Lithuanian Trade Union of Firefighters (LTPF), which has publicly acknowledged the growing impact of climate change-induced extreme weather events on its workers, calling for more protections and compensation for firefighters facing increasing climate-driven risks[582].

Despite these instances, the overall low level of centralised collective bargaining in Lithuania means that collective protections in the private sector generally remain weak[583]. Consequently, extreme weather-related good practices (discussed in the following section), while present, often face information and outreach bottlenecks and tend to rely on employer-driven initiatives or the experience and initiative of individual employees[584].

Good practices and innovations

Collective bargaining: the customs' sector collective agreement. As mentioned earlier, the customs sector's collective agreement includes bespoke provisions addressing hot and cold work conditions. These provisions are, in fact, more protective than the 2017 Labour Code amendments when it comes to hot work, mandating breaks or a shortened workday at temperatures exceeding +25°C.

Employer-driven initiatives: night shifts. Road maintenance workers employed by Grinda, a municipal enterprise, have implemented night shifts during summer months to avoid the

[579] Ibid., p. 32.

[580] LPKS (2022) *D. Jakutavičė: susitarimai – tiesiausias kelias siekiant išvengti nelaimių darbe karštu oru.* Available at: https://www.lpsk.lt/2022/07/20/d-jakutavice-susitarimai-tiesiausias-kelias-siekiant-isvengti-nelaimiu-darbe-karstu-oru/.

[581] LPKS (2022) *Darbdaviai privalo užtikrinti saugias darbo sąlygas per karščius*. Available at: https://www.lpsk.lt/2024/06/18/darbdaviai-privalo-uztikrinti-saugias-darbo-salygas-per-karscius-2.

[582] Lietuvos teisėsaugos pareigūnų federacija (2023) *Europos ugniagesiai nusipelno geresnės apsaugos ir daugiau investicijų*. Available at: https://www.ltpf.lt/aktualijos/europos-ugniagesiai-nusipelno-geresnes-apsaugos-ir-daugiau-investiciju/.

[583] Council of Europe (2024) *European Social Charter: Reply to proposed questions from the European Committee of Social Rights for the next statutory report Group 1 submitted by The Government of the Republic of Lithuania*, p. 37. Available at: https://rm.coe.int/ltu-nr-group1-2024/1680b3cfc3; Blaziene, I. and Jasiuniene, J. (2023) *Collective bargaining and inequality in Lithuania (Deliverable 3.1 National report for Lithuania).* Leuven: BFORE project VS/2021/0209. p. 7. Available at: https://hiva.kuleuven.be/sites/bfore/docs/d3-1-national-report-for-lithuania/@@download/file/WP3%20Lithuania%20-%20web%20v2.pdf.

[584] Interview with representative of Solidarumas' Trade Union [23 July 2025].

scorching daytime temperatures, mitigate heat stress and enhance worker productivity and safety[585].

Use of autonomous drones for road inspections. In 2022, Lithuania launched the GreenBee system, which uses autonomous drones equipped with high-resolution cameras and multi-sensor detectors, along with an AI-driven data analysis tool, to automate the typically manual road inspection process[586]. According to its official EU funding page, the project's implementation phase is scheduled for 2024, with completion planned for 2027[587]. While the stated objectives primarily focus on cost savings, CO_2 emission reduction, and minimisation of human error, the initiative could also benefit occupational safety by reducing workers' exposure to extreme weather conditions, such as high temperatures. The full occupational safety outcomes, however, will only be measurable upon the project's completion.

[585] Interview with representative of Solidarumas' Trade Union [23 July 2025].

[586] AGMIS (2023) *GreenBee: Agmis, Thrust, and Kelių Priežiūra Launch AI-Powered Drone System for Smarter, Greener Road Inspection*. Available at: https://agmis.com/ai-uavs-to-monitor-road-infrastructure/.

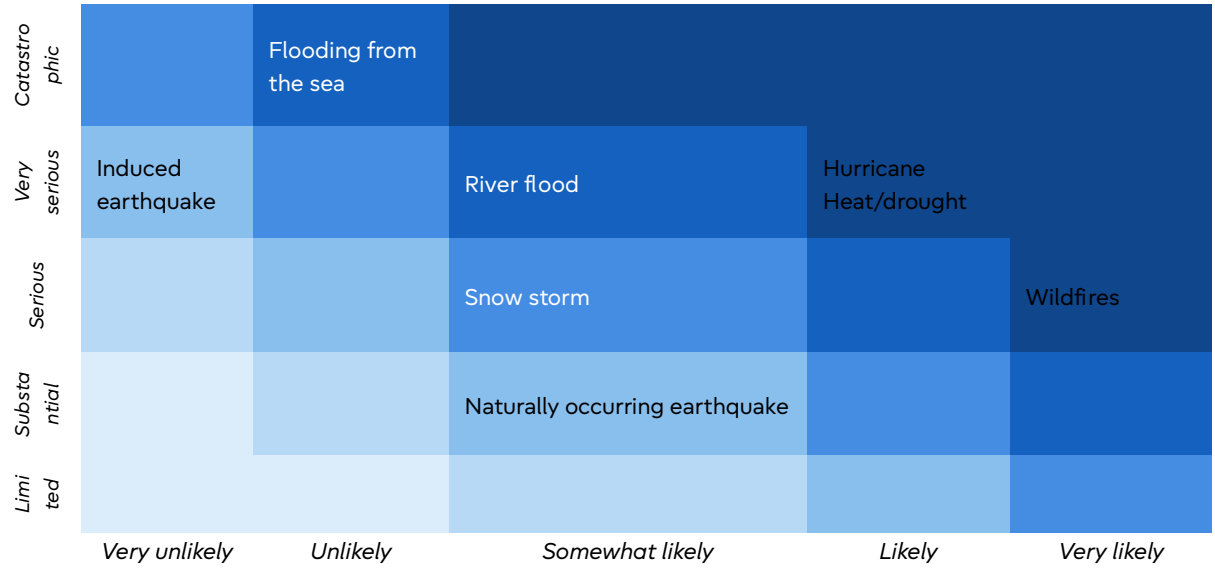
[587] ES Investicijos (2022) *GreenBee – BEPILOČIO ORLAIVIO IR DIRBTINIO INTELEKTO SISTEMOS, PAKEISIANČIOS ATMOSFERĄ TERŠIANČIUS SRAIGTASPARNIUS ELEKTROS TINKLŲ INSPEKCIJOSE, BANDOMOSIOS PARTIJOS GAMYBA*. Available at: https://esinvesticijos.lt/sutartys/greenbee-bepilocio-orlaivio-ir-dirbtinio-intelekto-sistemos-pakeisiancios-atmosfera-tersiancius-sraigtasparnius-elektros-tinklu-inspekcijose-bandomosios-partijos-gamyba.

The Netherlands

Main extreme weather events and associated OSH risks

The Netherlands' 2022 National Risk Assessment[588] identifies heatwaves, droughts, and wildfires, as well as floods and severe storms, among the extreme weather events with both higher likelihood and higher potential impact. *Figure 37* below illustrates all the extreme weather events mapped in the aforementioned Risk Assessment along the likelihood-impact axes.

Figure 37: Risk matrix of climate and natural disasters in the Netherlands, plotted by likelihood and impact



Source: Author's own elaboration based on the National Risk Assessment 2022, p. 21.

Heatwaves, droughts, and wildfires. As a moderate climate country, the Kingdom of the Netherlands faces the growing challenge of prolonged and hotter heat waves in the summer, as well as the ensuing wildfires and droughts. The average temperature in the Netherlands has risen by about 2 degrees Celsius since 1900[589]. However, the maximum temperatures have risen twice as much[590]. Even under a low-emissions pathway, projections show roughly 40 hot days (≥25°C) per year by mid-century, up from ~28 days currently. In a high-emissions scenario, this rises to around 50 hot days by 2050 and nearly 90 hot days by 2100 (about triple the current

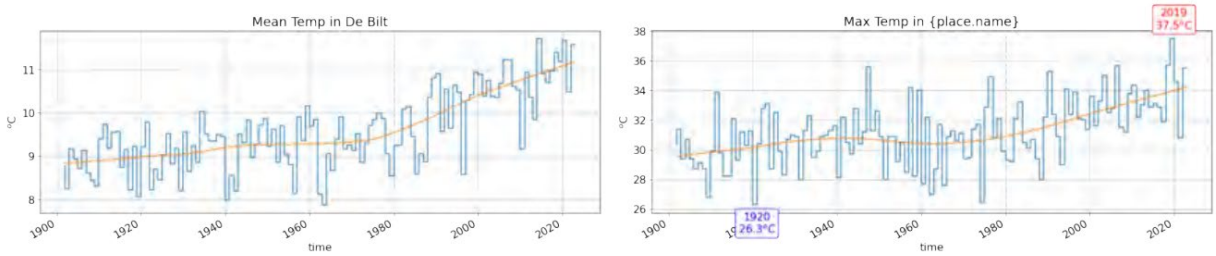
[588] National Network of Safety and Security Analysts (2022) *National Risk Assessment of the Kingdom of the Netherlands 2022.* Available at: https://www.rivm.nl/en/documenten/national-risk-assessment-of-kingdom-of-netherlands-2022.

[589] Environmental Health Atlas (n.d.) *Heat*. Available at: https://www.atlasleefomgeving.nl/en/node/17921.

[590] van Dorland, R., Beersma, J., Bessembinder, J., Bloemendaal, N., van den Brink, H., Brotons Blanes, M., Drijfhout, S., Groenland, R., Haarsma, R., Homan, C., Keizer, I., Krikken, F., Le Bars, D., Lenderink, G., van Meijgaard, E., Meirink, J.F., Overbeek, B., Reerink, T., Selten, F., Severijns, C., Siegmund, P., Sterl, A., de Valk, C., van Velthoven, P., de Vries, H., van Weele, M., Wichers Schreur, B., and van der Viel, K. (2023) *KNMI National Climate Scenarios 2023 for the Netherlands*. KNMI Report. https://cdn.knmi.nl/system/data_center_publications/files/000/071/902/original/KNMI23_climate_scenarios_scientific_report_WR23-02.pdf.

number)[591]. This means that both heatwaves and subsequent droughts will increase in frequency and intensity.

Figure 38: Temperature change in the Netherlands (De Bilt station)



Source: KNMI National Climate Scenarios 2023 for the Netherlands, p. 112. Left – annual mean temperature, right – annual-maximum temperature (higher daily maximu, TXx). Data from: KNMI (2022) *Daggegevens van het weer in Nederland*. Available at: https://www.knmi.nl/nederland-nu/klimatologie/daggegevens. *Note*: annual values in blue, trend line in orange.

The associated health risks are exacerbated by the historically lesser focus on heat stress in the spatial planning and governance in the health and social sector[592]. Thus, when it comes to occupational safety, heat stress is expected to affect not only outdoor workers (especially in construction, agriculture, forestry and fisheries[593], public road transport, mail and couriers, emergency and rescue services, security, and law enforcement), but also indoor employees, who often have to work in buildings not equipped with sufficient air ventilation[594].

Floods, storms, and hurricanes. The Netherlands sits at the delta of major rivers and has an extended coastline as well as 26% of its territory below sea level, which all collectively results in around 56% of its territory being exposed to flood risks. Although the long history of dealing with excessive volumes of water means the Netherlands has advanced drainage and water management infrastructure, risk assessments acknowledge the increased risks from the faster pace of climate change and more unpredictable rises and fall in water levels. Thus, storms and strong winds in colder months remain a hazard, especially for the transportation sector workers. While risk assessments consider major river floods and flooding from the sea less likely in the

[591] DutchNews (2023) *40° summer days will be more common in NL as climate changes*. Available at: https://www.dutchnews.nl/2023/10/40-summer-days-will-be-more-common-in-nl-as-climate-changes.

[592] Baack, F., Halman, J., Vinke-de Kruijf, J., Özerol, G., and Kuks, S. (2024) Dutch municipalities tackling climate change adaptation to heat stress through mainstreaming across sectors, *Environmental Science & Policy*, 160, 103845. Available at: https://doi.org/10.1016/j.envsci.2024.103845.

[593] Siegmann, K.A., Ivošević, P., and Visser, O. (2024) Working like Machines: Technological Upgrading and Labour in the Dutch Agri-food Chain, *British Sociological Association*, 39(1), 202-225. https://doi.org/10.1177/09500170241244718.

[594] See TNO (2025) *Beroepsmatige blootstelling aan hitte in Nederland.* https://publications.tno.nl/publication/34644381/YyXwsYlP/TNO-2025-hittestress.pdf; SZW (2022) *Arbeidsomstandighedenrapport*, pp. 102, 104; *Werkenning Hittestress* (2024) Available at: https://www.nlarbeidsinspectie.nl/publicaties/publicaties/2024/05/22/verkenning-hittestress, p.5; PBL (2025) *Hittestress in Nederlandse gebouwen*, p. 70; Interviews with representatives of FNV [16 July 2025] and VNO-NCW and MKB-Nederland [2 September 2025].

immediate five-year-frame[595], intensified and unpredictable precipitation, especially in winter, increases water discharge risks in the major catchment basins such as Rhine and Meuse rivers[596]. Longer-term change in sea levels, projected to rise by up to 1.2 metres by 2100[597], poses additional challenges, especially to the Caribbean part of the Kingdom. The latter, including Aruba, Curaçao, Sint Maarten, Bonaire, Sint Eustatius and Saba (BES), in addition to temperature rises, face the risks of more frequent cyclones and hurricanes[598], with acknowledged implications for the critical infrastructure (such as ports[599], roads, electricity), healthcare and educational facilities, and the hospitality sector, and, by extension, the occupational health and safety of workers in these industries[600].

Table 28: Summary of the main weather events and related OSH risks in the Netherlands

Weather events	Occupational exposure	Key OSH risks	Key sectors
Increased precipitation and flooding	Slippery road surfaces Falling trees Gusts of wind	Traffic accidents	Transportation and telecommunications
	Displacement and spilling of hazardous substances by	Exposure to hazardous substances	Seveso establishments

595 The National Risk Assessment maps both the risks that are likely to occur within the five years (from 2022) as well as over the longer 10-20 year time frame – see ANV (2022).

596 Southern Limburg province is highly vulnerable to cross-border flooding from Germany and Belgium, as seen in July 2021 when storm "Bernd" caused extreme rainfall upstream, leading to severe riverine floods in the Geul and Meuse basins; see *NOS* (2021) *Waternood treft Duitsland, België en Limburg in juli 2021*. Available at: https://nos.nl/video/2411046; World Weather Attribution (2021) *Heavy rainfall which led to severe flooding in Western Europe made more likely by climate change*. Available at: https://www.worldweatherattribution.org/heavy-rainfall-which-led-to-severe-flooding-in-western-europe-made-more-likely-by-climate-change/.

597 According to The Royal Meteorological Institute of the Netherlands's (KNMI) estimates using the standard SSP1-2.6, SSP2-4.5, and SSP5-8.5 emission scenarios. However, the low-likelihood high-impact scenarios cannot be ruled out, which could lead to increases of 2.5 metres in 2100 and 17.5 meters in 2300 (see section 4.3.4 of van Dorland, R., et al. (2023) *KNMI National Climate Scenarios 2023 for the Netherlands*. KNMI Report. Available at: https://cdn.knmi.nl/system/data_center_publications/files/000/071/902/original/KNMI23_climate_scenarios_scientific_report_WR23-02.pdf).

598 IMF (2023) *Kingdom of the Netherlands-Curaçao and Sint Maarten: 2023 Article IV Consultation Discussions-Press Release; and Staff Report*. https://www.elibrary.imf.org/configurable/content/journals$002f002$002f2023$002f285$002farticle-A001-en.xml?t%3Aac=journals%24002f002%24002f2023%24002f285%24002farticle-A001-en.xml.

598 Izaguirre, C., Losada, I.J., Camus, P., Vigh, J.L., and Stenek, V. (2020) Climate change risk to global port operations, *Nature Climate Change*, 11, 14-20. https://doi.org/10.1038/s41558-020-00937-z.

599 Ibid.

600 *Climate Adaptation Platform Netherlands* (2023) *Island Voices: interview with Ryan R. Peterson from Aruba*. Available at: https://klimaatadaptatienederland.nl/en/caribbean/island-voices/interview-ryan-peterson-from-aruba/; Kennisportaal Klimaatadaptatie (n.d.) *Vitale en Kwetsbare functies.* https://klimaatadaptatienederland.nl/kennisdossiers/vitale-kwetsbare-functies/.

Weather events	Occupational exposure	Key OSH risks	Key sectors
	floodwater / power failure etc.		
Heatwaves, droughts, and wildfires	Increased and prolonged exposure to UV radiation and heat	Heat stress and heatstroke Mental and cognitive impact, psychological discomfort) Skin cancer	Outdoor: construction, agriculture, forestry and fisheries, public road transport, mail and couriers, emergency and rescue services, security, law enforcement, tourism Indoor: manufacturing, bakers, miners, steel and glass workers, railway (station) workers
	Dusty conditions	Inhalation of dust	Agriculture Construction
	Forest and wildfires	Smoke inhalation, air quality hazards	Firefighting services Emergency & rescue services
Hurricanes and tropical storms (especially in the Caribbean)	Sudden rain, flooding Infrastructure damage	Injury from flying debris, falling trees, or collapsing structures Drowning Electrocution	Construction, infrastructure maintenance (roads, ports, utilities) Emergency services Healthcare Transportation / logistics Tourism and hospitality

Source: Author's own elaboration.

Current OSH legislation

The Dutch Working Conditions Act (*Arbowet*) establishes the legal framework for occupational safety and health in the country and defines employers' core obligations for ensuring safe working conditions. The more detailed Working Conditions Decree (*Arbosluit*) mandates conducting risk inventory and assessments (RI&E) for all companies, and, together with the Working Conditions Regulation (*Arboregeling*), operationalises these principles with technical standards, such as PPE and workplace design requirements, exposure limits for hazardous substances, physical strain, and others[601].

The *Arbowet* deliberately avoids prescriptive rules[602], instead emphasising employer-led risk prevention and delegating sector-specific implementation to social partners, such as employers' associations and trade unions. These parties negotiate measures in industry-tailored *Arbocatalogi* (OSH Catalogues), endorsed by the Labour Inspectorate (*Inspectie SZW*)[603]. While not legally binding, *Arbocatalogi* serve as the primary reference for regulatory compliance. Courts and inspectors may use them to assess whether employers met their due diligence obligations under the *Arbowet*. The Explanatory Memorandum to the Arbowet (*Kamerstuk 32397-3*)[604] explicitly references *Arbocatalogi* as a practical compliance tool, reflecting the Dutch model of self-regulation under state oversight. Employers who deviate from *Arbocatalogi* must demonstrate equivalent protection measures to avoid penalties.

While the *Arbowet*'s risk assessment framework theoretically covers employer's responsibility to ensure safe working temperatures, the Dutch OSH legislation does not pin down binding thresholds. Instead, in addition to sector-specific recommendations in the OSH catalogues[605], authorities offer broad guidelines on reduced work and protective equipment based on international and EU standards[606]. Some assessments, however, consider these to be

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601 Wetten.nl (2024) *Arbeidsomstandighedenbesluit*. Available at: https://wetten.overheid.nl/BWBR0008498/2024-08-01; Wetten.nl (2025) *Arbeidsomstandighedenregeling*. Available at: https://wetten.overheid.nl/BWBR0008587/2025-02-01/.

602 Especially since the 2007 amendments to the Working Relations Act, adopted to align national legislation with the EU Framework Directive 89/391/EE, which further strengthened employers' duty of care and outlined employee participation in workplace OSH-related decisions. See: ILO NatLex Database (2007) *Netherlands: Working Relations Act amendments*. Available at: https://natlex.ilo.org/dyn/natlex2/r/natlex/fe/details?p3_isn=78361&cs=1t2j0o-izKIRRAd710jkeXUsZh_C8EV-78MfAq7uwFaIQBiH_743WF3PF20mJcC0kLRiZB5usp_F3A4iYorHJOw.

603 Arboportaal (n.d.) *Arbocatalogi*. Available at: https://www.arboportaal.nl/onderwerpen/arbobeleid/arbocatalogi.

604 Rijksoverheid (2010) *Kamerstuk 32397-3*. Available at: https://zoek.officielebekendmakingen.nl/kst-32397-3.html.

605 Some OSH catalogues have detailed climate-related guidance, such as the rail sector catalogue, which lists recommended temperature thresholds and ventilation suggestions, points to regulations and legal obligations, and recommends other resources: Arbocatalogus voor de Railinfra (n.d.) *Klimaat*. Available at: https://arbo.railalert.nl/risicos/klimaat/werkomgeving-binnen; Arboportaal (n.d.) *Papier en karton*. Available at: https://www.arboportaal.nl/externe-bronnen/arbocatalogi/papier--karton--en-golfkartonproducerende-en--verwerkende-industrie; Stigas (n.d.) *Bos- en natuur: Klimaat en weersomstandigheden*. Available at: https://www.stigas.nl/agroarbo/bos-en-natuur/klimaat-en-weersomstandigheden/.

606 Verbond PK (n.d.) *Werken in warmte*. Available at: https://www.verbondpk.nl/arbocatalogus/werken-in-warmte/; RIVM (n.d.) *Information materials heat*. Available at: https://www.rivm.nl/en/heat/information-materials.

insufficient and point to the need among the employers for more manageable and clear guidance elaborating state-of-the-art measures and sector-specific information[607].

Binding thresholds appear solely in negotiated agreements and tend to vary. Only 35 collective agreements include heat-related measures, some of them listed under separate "unworkable weather" clauses. *Table 29* below offers some examples of extreme weather-related clauses in collective agreements.

Table 29: Selected examples of extreme weather-related OSH provisions in collective agreements in the Netherlands

Sector	Heat measures	Cold measures
Construction and Infrastructure (*Bouw & Infra*)	No threshold	Unworkable Weather agreement[608]: Temperature < -6°C → Generally: Right to stop work if no winter PPE For scaffolding: max. four periods of 1.5 hours / day, with at least 15-minute breaks between periods Frost + Hazards → Right to stop work if no PPE
Logistics (*TLN*)	No threshold Follows hot work protocol for livestock transportation[609] *Arbocatalogi* recommends adjustments in high/low temperatures, wind, and rain[610] (for removal transportation)	Collective Agreement[611]: Freezing weather, sleet or snowfall (from 1 November to 31 March), excessive rainfall (for > 300 minutes between 7:00A M and 7:00 PM) → Stop if impossible to perform work

[607] Nederlandse Arbeidsinspectie (2024) *Verkenning hittestress*. Available at: https://www.nlarbeidsinspectie.nl/publicaties/publicaties/2024/05/22/verkenning-hittestress; Interview with FNV representative [16 July 2025].

[608] FNV (2024) *CAO Onwerkbaar weer Bouw & Infra 2024–2026*. Available at: https://www.fnv.nl/getmedia/d0f1aff8-ea10-4d5b-9789-70bdc5343985/488-bouw-en-infra-onwerkbaar-weer-2024-2026-v12022024.pdf.

[609] Transport en Logistiek Nederland and Saveetra (2025). *Protocol Veetransport onder extreme temperaturen*. Available at: https://cms.tln.nl/storage/media/Protocol-veetransport-bij-extreme-temperaturen-2025.pdf.

[610] STL (n.d.) *Arbocatalogus Verhuisvervoer – Weersinvloeden*. Available at: https://www.stl.nl/arbocatalogus/verhuisvervoer/weersinvloeden/.

[611] FNV (2024) *CAO Beroepsgoederenvervoer TLN 2024–2025*. Available at: https://www.fnv.nl/cao-sector/vervoer/transport-logistiek/cao-beroepsgoederenvervoer-tln.

Sector	Heat measures	Cold measures
Forestry / Nature (*Bos en Natuur*)	Collective Agreement[612]: "Exceptional circumstances" (e.g., heatwaves) → Stop work	"Exceptional circumstances" (e.g., storms, floods) → Stop work Temperature < -3°C → Stop if the ground is inaccessible due to frost/snow
Green, Soil, and Infrastructure (*Groen, Grond en Infrastructuur*)	Collective Agreement[613]: Temperature >= 35°C or 5 consecutive days with a daytime temperature of 27°C or 3 consecutive days with night temperature >18°C + day temperature > 30°C → Requirement to adjust nature of work or working hours Drought → Grounds for alternative work or unpaid leave if the drought prevents crop growth/harvest	Exceptional circumstances: Flooding (rivers, ditches, etc., but also regular/heavy rainfall) making the work object inaccessible, Wind force >= 8 Beaufort scale Freezing weather, sleet or snowfall (from 1 November to 31 March), excessive rainfall (for > 300 minutes between 7:00A M and 7:00 PM) → Employer can decide to stop work with consultation Temperature < -6°C → Right to stop work if no PPE / not passable or accessible walkways
Bituminous and Plastic Roofing Companies (*BIKUDAK*)	Collective Agreement[614]: Outside temperature => 25°C → employer can implement a "tropical schedule" (normal working hours begin at 5:30 a.m)	Unworkable Weather agreement: Temperature < -6°C → Right to stop work Snow/ice hazards, slippery working surfaces → Right to stop work

[612] FNV (2024) *Raam-cao bos en natuur 2024–2026.* Available at: https://www.fnv.nl/getmedia/653a9d64-c0b3-4a47-ac2a-894f11aaf299/748-bos-en-natuur-cao-01-07-2024-tm-30-06-2026-v20042025.pdf.

[613] CNV Vakmensen (2025). *CAO Groothandel en Industrie 2025–2026*. CNV Vakmensen. Available at: https://cnvstorageprd.blob.core.windows.net/media/documents/Cao_GGI_2025-2026.pdf.

[614] Staatscourant (2025). *Algemeen verbindend verklaring cao Onwerkbaar weer*. Staatscourant, 23803. Available at: https://zoek.officielebekendmakingen.nl/stcrt-2025-23803.html.

Sector	Heat measures	Cold measures
	Unworkable Weather agreement[615]: Outside temperature => 40°C → Right to stop work	Exceptional circumstances (stormy winds, a storm, a heavy storm, a very heavy storm, or a hurricane) → Right to stop/not commence work

Source: Author's elaboration based on sources in the Table.

When it comes to floods and heatwaves, neither hazard is formally embedded in Dutch OSH preparedness rules, though flooding has, in recent years, been integrated into Seveso-site safety planning. Under the 2024 Environment and Planning Act, which incorporates Seveso requirements[616], operators of high-risk sites must have safety management systems, safety reports, and internal emergency plans to prevent major industrial accidents[617]. Since 2020, Dutch Seveso practice has also required flood scenarios to be assessed in safety reports and corresponding protective or evacuation measures built into emergency plans, with worker input. Heat stress, by contrast, has no equivalent obligations: the RIVM National Heat Plan, despite activating at sustained 30°C temperatures[618], is purely advisory and has no meteorological criteria for issuing a code red warning in case of heatwaves[619].

Despite the broad scope of the *Arbowet*, several groups of workers remain insufficiently protected. Self-employed workers, who fall outside the current law's scope, enjoy the weakest protections, as there is no reporting requirement for accidents involving this group. Workers in flexible or subcontracted arrangements (particularly in transport, agriculture, and manufacturing) also face heightened risks: between 2015 and 2020, nearly a quarter of all accidents investigated by the Labour Authority involved temporary workers, even though they accounted for only 5–7% of the working population[620]. In such arrangements, long chains of clients and subcontractors often create unclear lines of responsibility, leaving workers exposed

615 CAO BIKUDAK (2025) *Zwaarwerkregeling cao BIKUDAK verlengd en verbeterd*. Available at: https://caobikudak.nl/sites/caobikudak.nl/files/documenten/CAO_Onwerkbaar%20weer_BIKUDAK%202025-2026_0.pdf.

616 Wettenbank (2015) *Besluit risico's zware ongevallen 2015*. Available at: https://wetten.overheid.nl/BWBR0036791/2015-07-08.

617 Wettenbank (2025) *Besluit activiteiten leefomgeving (Bal)*. Available at: https://wetten.overheid.nl/BWBR0041330/2025-07-01#Hoofdstuk4; Article 4.4 of the subordinate Besluit activiteiten leefomgeving (Bal) regulation also reiterates responsibilities to ensure safe working conditions, but these refer to work with hazardous substances with no mention of extreme weather events.

618 RIVM (n.d.) *National Heatwave Plan*. Available at: https://www.rivm.nl/en/heat/national-heatwave-plan.

619 Atach Community (n.d.) *National Heatwave Plan to reduce heat health risks in the Netherlands*. Available at: https://www.atachcommunity.com/our-impact/case-studies/national-heatwave-plan-to-reduce-heat-health-risks-in-the-netherlands.

620 Nederlandse Arbeidsinspectie (2022) *Monitor Arbeidsongevallen 2021*, p. 13. Available at: https://www.nlarbeidsinspectie.nl/publicaties/rapporten/2022/09/05/monitor-arbeidsongevallen-2021.

to OSH risks[621]. Platform workers, such as food delivery and gig logistics workers, typically fall into these same categories and are therefore likewise excluded from consistent OSH protections. Migrant workers and those with low socioeconomic status are also vulnerable, owing to a combination of high-risk assignments, language barriers, lower literacy, and reduced safety awareness. Finally, employees of micro-enterprises (<10 employees) face higher rates of serious accidents while their employers showing much lower compliance with the obligation to have a risk inventory at 41% compared to 93% of large enterprises (100+ employees)[622].

National policy frameworks and climate adaptation plans

Key national frameworks in the Netherlands show very low recognition of extreme-weather-related occupational safety risks in the economy, agriculture, energy, and labour sectors, while public health and climate adaptation plans acknowledge such risks only partially, often in advisory form and without clear follow-up actions or sector-specific measures for workers. Overall, extreme-weather OSH considerations remain largely absent from strategic planning, with attention mostly limited to system-level adaptation and general health guidance.

Economy, agriculture, energy, and labour market policies: low visibility

Key national frameworks and programmes in the economy, agriculture, energy and labour domains show the lowest level of recognition of extreme-weather-related occupational safety risks. In the economic domain, such risks are absent from both the National Growth Strategy 2023, which outlines long-term objectives for innovation, productivity, and economic resilience, and the National Circular Economy Programme 2023–2030, which sets out measures for resource efficiency, waste reduction, and sustainable production. While the latter includes general ambitions for safe and healthy working conditions in circular processes, these are framed in relation to fair employment in globalised value chains and are not linked to extreme-weather risks or climate adaptation[623].

Similar focus on economic efficiency and environmental sustainability is also visible in the key frameworks in agriculture and energy domains. For instance, the National Strategic Plan for the Common Agricultural Policy 2023–2027 frames adaptation measures around environmental and production objectives, setting priorities for sustainable agriculture, biodiversity, and climate mitigation and adaptation. It contains no references to occupational health and safety or to the potential impact of extreme weather events on workers. Within the energy domain, key frameworks recognise climate change as a driver for energy transition but do not link extreme-

[621] Ministrie van Sociale Zaken en Werkgelegenheid (n.d.) *Arbovisie 2040*. Available at: https://www.arboportaal.nl/campagnes/arbovisie-2040.

[622] Ibid. p. 11.

[623] Government of the Netherlands (2023) *National Circular Economy Programme 2023–2030*. Available at: https://www.government.nl/documents/reports/2023/09/27/national-circular-economy-programme-2023-2030; Ministry of Infrastructure and Water Management (2023) *National Circular Economy Programme 2023–2030: Summary*. Available at: https://hollandcircularhotspot.nl/wp-content/uploads/2023/02/NationalCircularEconomyProgramme2023-2030Summary.pdf.

weather-related hazards to occupational safety and health. The Integrated National Energy and Climate Plan (NECP) 2023–2030, which focuses on decarbonisation, renewable energy deployment, and grid modernisation, addresses climate adaptation only in terms of energy system resilience and security of supply[624]. It does not consider the implications of extreme weather for worker safety in energy production, distribution, or infrastructure maintenance. Similarly, the 2019 Climate Agreement *(Klimaatakkoord*) sets out mitigation pathways across electricity, industry, built environment, mobility, and agriculture/land use, with attention to economic, technological, and environmental dimensions. While it recognises the increasing occurrence of heatwaves, storms, and floods as a context for adaptation[625], these are framed in terms of system-level risk management rather than workplace safety. No measures or guidelines are proposed to address OSH risks for workers in energy generation, offshore wind operations, or grid maintenance under extreme weather conditions.

In the labour domain, overseen by the Ministry of Social Affairs and Employment (SZW), the two main vision frameworks, the Labour Market Strategy 2025 and *Arbovisie 2040*, likewise make no reference to OSH in the context of extreme weather or climate change. Both focus on barriers to employment participation, such as skills development, technological change, and demographic shifts. *Arbovisie 2040* only briefly acknowledges the UV exposure risks for workers[626], but does not mention extreme weather-related occupational safety objectives in its action plan, instead focusing more on occupational disease prevention.

Public health and national climate adaptation plans: partial visibility

Within the public health sector, overseen by the Ministry of Health, Welfare and Sport (VWS), there is a degree of broader recognition of the health impacts of climate change, including from extreme weather events and for the working population. Most of this conversation, however, remains somewhat fragmented and at the initial stage of risk mapping and research, with only expectations of the next steps and actions to be taken by the Ministries.

OSH impacts from extreme weather conditions have been acknowledged in some government-commissioned research, recommended action plans, and local and national projects focused on health and climate adaptation. Among the former, two recent reports (co-)authored by VWS's specialised agency, the Dutch National Institute for Public Health and the Environment (RIVM), map OSH risks such as increased UV radiation during heat waves, exposure to dust among

[624] Ministry of Economic Affairs and Climate Policy (2024) *Update of the National Energy and Climate Plan 2021-2030*. Available at: https://cdn.climatepolicyradar.org/navigator/NLD/2024/netherlands-updated-final-national-energy-and-climate-plan-necp-2021-2030_3144ee52a800cc44e50ce8923afb1da4.pdf.

[625] Government of the Netherlands (2019) *Climate Agreement (Klimaatakkoord),* Chapter 5, pp. 214–218. Available at: https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/klimaatakkoord.

[626] Ministrie van Sociale Zaken en Werkgelegenheid (n.d.) *Arbovisie 2040*. Available at: https://www.arboportaal.nl/campagnes/arbovisie-2040.

agricultural workers during droughts, and cold spells[627]. Several programmes – including the LIFE-IP Climate Adaptation programme[628], the Dutch Research Agenda programme Climate adaptation and health[629] and the Climate-Proof Together platform in the Utrecht province, – recognise workers as a distinct group at risk of climate-change-induced extreme weather events. Some offer initial recommendations and best practices for risk mitigation[630].

These, however, remain advisory in nature and not clearly linked to the follow-up steps. Thus, RIVM points to a dedicated Climate Change and Health Impact Research Programme as the next step for adding health-related actions to the National Adaptation Strategy's inventory, but stresses that the Ministry must ultimately call for such action[631]. This "awaiting" stance is echoed by experts and practitioners consulted on the future of occupational safety, who highlight the lack of clarity on whether the government intends to lead on specific measures or delegate decisions to other stakeholders such as employers, labour unions, or employees[632].

Reflecting similar patterns to Public Health, the overarching climate adaptation frameworks – the National Climate Adaptation Strategy[633] and the National Climate Adaptation Implementation Programme[634] – acknowledge that extreme weather events pose OSH risks and identify some action areas but do so selectively. Alongside other climate adaptation plans, these frameworks are closely tied to the Delta Programme (*Deltaprogramma*), the country's cornerstone national water management and climate adaptation initiative active since 2012, which relies on structured, periodic reviews of solutions for flood prevention, freshwater security, and climate-resilient spatial planning. Despite its central role in Dutch adaptation

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627 van der Ree, J., Betgen, C., Boomsma, C., van Dijk, A., Hall, L., Houweling, D., Limaheluw, J., and Rijs, K. (2022) *Plan van aanpak onderzoeksprogramma Klimaatverandering en gezondheidseffecten.* RIVM, pp. 31, 57. Available at: https://www.rivm.nl/publicaties/plan-van-aanpak-onderzoeksprogramma-klimaatverandering-en-gezondheidseffecten.

628 *Eighteen projects* (no date). Available at: https://klimaatadaptatienederland.nl/en/policy-programmes/other-programmes-networks/life-ip-climate-adaptation/projects; Ministerie van Infrastructuur en Waterstaat (2025) *LIFE-IP NAS, implementing climate adaptation measures*. Available at: https://www.rijkswaterstaat.nl/en/projects/international-projects/life-ip-nas-implementing-climate-adaptation-measures.

629 *Climate adaptation and health | NWO* (2020). Available at: https://www.nwo.nl/en/researchprogrammes/dutch-research-agenda-nwa/thematic-programming/climate-adaptation-and-health.

630 For example, several municipalities have collectively devised guidelines on health risk mitigation, including OSH-related measures such as integrating UV protection into risk assessments, promoting protective equipment, and planning work based on expected UV intensity (see: AWGL (n.d.) *Klimaatadaptatie en gezondheid*. Available at: https://www.awgl.nl/projecten/klimaatadaptatie-en-gezondheid).

631 van der Ree, J. et al. (2022) *Plan van aanpak onderzoeksprogramma klimaatverandering en gezondheidseffecten*, p. 57. Available at: https://www.rivm.nl/publicaties/plan-van-aanpak-onderzoeksprogramma-klimaatverandering-en-gezondheidseffecten; RIVM (2022) *Insufficient knowledge to protect health of Dutch population from climate change*. Available at: https://www.rivm.nl/en/news/insufficient-knowledge-to-protect-health-of-dutch-population-from-climate-change.

632 Pompa, J. (2024) *Hittestress en sociale dialoog in Nederland: Nederlandse landenstudie voor het ADAPTHEAT-project*. Vrije Universiteit Amsterdam. Available at: https://research.vu.nl/ws/portalfiles/portal/340866987/ADAPTHEAT_Eindrapport_NL.pdf.

633 Climate Adaptation Platform Netherlands (n.d.) *National Climate Adaptation Strategy (NAS).* Available at: https://klimaatadaptatienederland.nl/en/policy-programmes/national-strategy/nas/.

634 Dutch Ministry of Infrastructure and Water Management (2023) *National Climate Adaptation Implementation Programme: Smarter, more systemic, for all and by all.* Available at: https://unfccc.int/sites/default/files/resource/2025_NAP_Netherlands.pdf.

policy and its influence across sectors, the Delta Programme makes no reference to OSH implications of the extreme weather events it tackles.

This strong focus on the spatial element is also evident in the National Climate Adaptation Implementation Programme's mentions of occupational safety, which appear under three adaptation goals: (1) green and healthy work landscapes, (2) heat-resilient cities, and (3) disaster-resilient Seveso (hazardous) industries.

- Under the 'Green and Healthy Work Landscapes' goal, the programme identifies office spaces vulnerable to extreme heat as a challenge to tackle[635]. It both suggests a range of tentative, potential measures for businesses to explore to support worker well-being[636], and outlines formal actions with designated responsible parties. The latter include the 2019–2025 Climate-Proof Together project, which serves as a platform to explore heat protection measures for employees; and the 2023–2031 Work Landscapes of the Future programme, which envisages using sustainability vouchers to support climate-resilient transformations of commercial sites. The programme also notes the possibility of using company emergency plans but does not frame this as a definitive objective.
- Under the Heat-Resilient Cities goal, the programme specifically acknowledges the impact of UV exposure on workers and highlights the absence of employer-targeted awareness campaigns[637]. It also emphasises the need for research into future health risks associated with climate change but does not establish it as concrete objective with responsible parties or a timeline.
- Finally, for Seveso establishments, the programme identifies a range of hazards, including potential power failures from flooding, peak rainfall, and lightning; fires from cooling-water shortages during droughts; and heat stress affecting cognitive capacity and concentration[638]. Measures on this front include additional flood safety assessment obligations that came into force in 2019, while the programme also highlights the need for enhanced knowledge exchange.

On the subnational level, provincial adaptation strategies similarly frame heat and flooding through the lens of spatial planning and public health. Only a few supporting documents explicitly acknowledge heat risks for workers, including *Gelderland's* workbook[639] and *Overijssel's* report[640] mentioning outdoor workers. Beyond these brief acknowledgements,

[635] Ibid. pp. 97–101.

[636] Including greening work environments, building smart thermoregulating office spaces, providing additional cooling, and modifying working hours during heatwaves.

[637] Ibid. pp. 67–73.

[638] Ibid. pp. 63–66.

[639] *Gelderland* (2019) GELDERS WERKBOEK DOORONTWIKKELING LOKALE HITTEPLANNEN. Available at: https://klimaatadaptatienederland.nl/publish/pages/158099/1749795982710-1-.pdf.

[640] Terpstra, T., Huizinga, J., Hurkmans, R., and Jacobs, C. (2019) *Hitte en droogte in de kleine kernen en het landelijk gebied van Overijssel*. Available at: https://klimaatadaptatienederland.nl/publish/pages/166797/pr3936_10_synthese_20190528_def.pdf

however, there are no specific mentions of extreme weather-related and OSH-focused strategies.

Labour inspectorates and enforcement

While there are no dedicated trainings, checklists, or materials related to extreme weather-related occupational safety for inspectors[641], the Labour Authority (*Nederlandse Arbeidsinspectie*), which is responsible for monitoring employers' compliance with the Working Conditions Act, indicates awareness of the extreme weather challenges for workplace safety (particularly heat)[642]. For example, it reports that it has received 775 reports and complaints related specifically to heat stress due to climate conditions between 2018 and 2022, with peaks in submissions corresponding to the 2018 and 2019 heatwaves[643]. In 2024, the Authority carried out an exploratory study on heat stress in the workplace, focusing on sectors where workers are more exposed to high (outdoor and indoor) temperatures. The study found that although most employers had "heat plans" or protocols for working in hot conditions, there was also a significant variation in employers' awareness of less obvious factors, such as the interaction between high temperatures and air humidity, physical exertion, pollution, and radiation, or the links between heat, mental strain, and workplace accidents[644]. The findings, supported by expert insights[645], point to the need for more harmonised and explicit guidance on heat measurement procedures and measures to avert heat stress-related incidents across workplaces[646].

A similar picture emerges regarding flood risks at Seveso establishments, which are the only workplaces explicitly required to conduct risk assessments for extreme weather events such as flooding. In 2019, after an assessment showed that many such companies had not systematically considered flood consequences[647], the Program Office under the Ministry of Infrastructure and Water Management issued a qualitative flood risk analysis guide, published as Appendix L of the Hazardous Substances (PGS-6) series[648]. In 2021, RIVM pointed to the need for more centralised guidance on risk assessment and possible measures for flood risks, peak rainfall,

641 Interview with a representative of VNO-NCW and MKB-Nederland [2 September 2025]; Nederlandse Arbeidsinspectie (2024) *Verkenning hittestress*. Available at: https://www.nlarbeidsinspectie.nl/publicaties/publicaties/2024/05/22/verkenning-hittestress.

642 Written response received from The Netherlands Labour Authority [1 October 2025].

643 Nederlandse Arbeidsinspectie (2024) *Verkenning hittestress*. Available at: https://www.nlarbeidsinspectie.nl/publicaties/publicaties/2024/05/22/verkenning-hittestress.

644 Ibid., pp. 1–2.

645 Interview with a FNV representative [16 July 2025].

646 Ibid.

647 Pompe, C.E., Pijnenburg, H., and Uijt de Haag, P.A.M. (2019) *Voorbereiding van Brzo-bedrijven op klimaatverandering*. RIVM. Available at: https://www.rivm.nl/publicaties/voorbereiding-van-brzo-bedrijven-op-klimaatverandering.

648 Publicatiereeks Gevaarlijke Stoffen (2016) *PGS 6: Aanwijzingen voor de implementatie van het Brzo 2015*. Available at: https://content.publicatiereeksgevaarlijkestoffen.nl/documents/PGS6/PGS_6_2016_versie_1.0_november%202016.pdf.

drought, and heat stress in hazardous industries, such as standardised precipitation reference values and centralised coordination centres for issuing risk alerts[649].

The Authority conducts inspections according to a risk-based approach, prioritising sectors and situations with higher exposure to hazards. However, there is no evidence of a formal system of increased inspection frequency during extreme weather seasons or alerts. Likewise, while tools such as self-inspection checklists (*zelfinspectie*) and thematic campaigns exist, there do not appear to be inspection protocols or campaigns dedicated solely to extreme weather-related occupational risks.

Data collection and reporting

At present, the Netherlands does not appear to maintain a dedicated system for tracking occupational accidents, illnesses, or fatalities specifically tied to extreme weather events. Since 2018, the Netherlands Labour Authority has used the Accident Learning Monitor (MLvO), which inspectors complete in Survalyzer questionnaire software to record all serious occupational accidents reported to the Labour Inspectorate by employers or employees. Notifications are typically submitted via more open-ended forms and later classified by inspectors[650]. The MLvO uses the same typology of accidents as Storybuilder, the tool developed in 2003 by RIVM analysts and used until 2014 to analyse trends in occupational accidents based on the Inspectorate's data[651]. With both main categories and subcategories, the MLvO questionnaire, modelled after Storybuilder, contains a total of 36 accident types[652], summarised in *Table 30*.

Table 30: Classification of accidents in the MLvO questionnaire and Storybuilder database

Main category	Subcategories
1. Victim has fallen	From ladders, stairs, scaffolding, roofs, holes, vehicles, etc.
2. Victim was hit by something	Falling objects, swinging loads, flying debris, rolling objects, etc.
3. Victim contacted a tool / object	Moving machine parts, trapped between objects, hand tools, hot surfaces, etc.

649 Pompe, C.E., Pijnenburg, H., and Uijt de Haag, P.A.M. (2019) *Voorbereiding van Brzo-bedrijven op klimaatverandering*. RIVM. Available at: https://www.rivm.nl/publicaties/voorbereiding-van-brzo-bedrijven-op-klimaatverandering.

650 Nederlandse Arbeidsinspectie (n.d.) *Arbeidsongeval melden*. Available at: https://www.nlarbeidsinspectie.nl/onderwerpen/melden/arbeidsongeval-melden

651 Rijksinstituut voor Volksgezondheid (n.d.) *Verschillende typenongevallen*. Available at: https://lerenvoorveiligheid.nl/ongevalsinformatie/typen-ongevallen;
van Kampen, J., and Lammers, M. (2012) *Learning from serious occupational accidents in the Netherlands: Developing a new monitoring instrument.* RIVM 2021-0122. Available at: https://www.rivm.nl/publicaties/learning-from-serious-occupational-accidents-in-netherlands-developing-new-monitoring.

652 Ibid.

Main category	Subcategories
4. Accident with vehicle / moving equipment	Pedestrian hit by vehicle, driver lost control, etc.
5. Buried / drowning / decompression	Buried under material, drowning, rapid decompression (e.g., diving).
6. Contact with harmful substance / atmosphere	Chemical exposure, leaks, confined space hazards, breathing apparatus issues.
7. Fire / explosion / electricity	Uncontrolled fire, explosions, electric shock, arc flashes.
8. Extreme physical strain	Overexertion when lifting / moving objects.
9. Contact with aggressive person / animal	Attacks by humans or animals, physical altercations.

Source: Author's own elaboration based on Lammers, M., and J. van Kampen (2021).

Separately, the Authority publishes an annual Work-related Accident Monitor (*Monitor Arbeidsongevallen*), documenting all workplace accidents it investigates. These reports aggregate the data into broader categories, with publicly available statistics showing total numbers of investigated accidents broken down by industry[653], percentage of accidents by type/category, percentage of accidents by severity/outcome, as well as employees' gender and age group[654]. In 2023, the Labour Authority also published separate data on accidents among the labour migrant population (non-residents), which, in addition to the sector, accident type, and severity, specified migrant workers' nationality and type of employment[655].

None of the above-described systems has a dedicated "extreme weather" cause or attribute that would let inspectors directly flag an incident as climate- or weather-related. Extreme-weather-related OSH incidents can only be captured indirectly, usually as part of the "extreme physical conditions" category in MLvO or as a descriptive note. Some other OSH data sources, such as the TNO/CBS National Working Conditions Survey (NEA), include broader categories like "contact with electricity, heat, cold, hazardous substances, or noise"[656], but even here, these are not parsed by cause.

653 Rijksinstituut voor Volksgezondheid (n.d.) *Ongevallen per sector*. Available at: https://lerenvoorveiligheid.nl/ongevalsinformatie/ongevalllen-sectoren.

654 Nederlandse Arbeidsinspectie (2024) *Monitor Arbeidsongevallen 2023.* Available at: https://www.nlarbeidsinspectie.nl/publicaties/rapporten/2024/08/26/monitor-arbeidsongevallen-2023.

655 Ibid.

656 TNO (n.d.) *Arbeidsongeval*. Available at: https://monitorarbeid.tno.nl/surveys/werknemers/werknemers-veiligheid/werknemers-veiligheid-arbeidsongeval/werknemers-veiligheid-arbeidsongeval-letsel/?question_id=415.

Role of social partners

The Netherlands' consensus-based "polder model" puts social partners at the centre of OSH rulemaking, and that remains true for weather-related risks: they are consulted via national advisory bodies[657], co-create sectoral OSH catalogues, and negotiate CAOs that increasingly include heat and severe-weather clauses. Atypical workers are still only weakly represented in the consultation process despite being identified as a priority for inclusion[658].

Consultation on weather-related OSH issues, while existing[659], is not yet systematic, with most concrete rules adopted via sector agreements and company protocols rather than national legislation or inspectorate checklists. For example, in addition to the weather-related provisions in collective agreements mentioned earlier in the section *Current OSH legislation* trade unions[660], employer organisations[661], and sector federations[662] also offer their own public-facing guidance and protocols on working in hot temperatures, including in the form of mobile applications[663]. The Social and Economic Council (SER), which serves as an advisory body to the Dutch cabinet composed of social partners, publishes case studies of employers proactively adopting progressive OSH measures in response to extreme weather phenomena and changing climate[664].

Strengths of the Dutch approach are co-creation, sector tailoring, and the inspectorate's recognition of *Arbocatalogi*, which makes negotiated measures actionable at shop-floor level. Weaknesses are gaps and fragmentation: only a minority of CAOs currently set clear heat thresholds, SMEs struggle with the risk assessment uptake, and inspection capacity is limited, leaving many workers without a uniform baseline during heatwaves or storms[665].

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657 Such as the Social and Economic Council (SER) and the Labour Foundation (STAR).

658 Ministrie van Sociale Zaken en Werkgelegenheid (n.d.) *Arbovisie 2040*. Available at: https://www.arboportaal.nl/campagnes/arbovisie-2040.

659 According to an interview with a representative of VNO-NCW and MKB-Nederland [2 September 2025], extreme weather events have been discussed within the Social and Economic Council (Sociaal-Economische Raad, SER), the advisory body to the Dutch cabinet composed of social partners.

660 FNV (n.d.) *Werken in de hitte.* Available at: https://www.fnv.nl/werk-inkomen/veilig-gezond-werken/werken-in-de-hitte; CNV (2024) *Protocol 'Veilig werken in de warmte en hitte', overzicht maatregelen*. Available at: https://cnvstorageprd.blob.core.windows.net/media/documents/20240708_Overzicht_maatregelen_Veilig_werken_in_de_warmte_en_hitte_versie_1.2.pdf.

661 AWVN (n.d.) *Werken onder zomerse omstandigheden.* Available at: https://www.awvn.nl/arbeidsvoorwaarden/publicaties/werken-onder-zomerse-omstandigheden/.

662 Techniek Nederland (2024) *Warm weer op komst: Hitteprotocol voor de installatiebranche.* Available at: https://www.techniekNederland.nl/nieuws/warm-weer-op-komst-bereid-je-goed-voor-met-het-hitteprotocol-voor-de-installatiebranche.

663 FNV and CNV also circulate dedicated apps, *Werkklimaat* and *Weerverlet*, offering real-time temperature-related guidance for employers and employees. *Werkklimaat*, for example, uses WBGT to give real-time guidance based on the work type, clothing, and temperature. It provides a traffic-light style recommendation: green (safe), orange (caution), or red (stop work).

664 SER (n.d.) *Voorbeelden goed arbobeleid en maatregelen bij hitte*. Available at: https://www.ser.nl/nl/thema/arbeidsomstandigheden/dossiers/cases-werken-bij-hitte.

665 Interview with a FNV representative [16 July 2025]; Ministrie van Sociale Zaken en Werkgelegenheid (n.d.) *Arbovisie 2040*. Available at: https://www.arboportaal.nl/campagnes/arbovisie-2040.

Good practices and innovations

Collective agreement provisions on work in extreme weather, such as those adopted by the Agricultural Green sector (*Groen, Grond en Infrastructuur*) and Bituminous and Plastic Roofing Companies (*BIKUDAK*), provide a notable example of social dialogue in practice, establishing mutually agreed, enforceable obligations with specific temperature thresholds and employee protection measures.

The co-production model of OSH catalogues offers Labour Authority-approved, sector-specific guidelines that could serve as a foundation for embedding weather- and temperature-related provisions, supporting employers, employees, and inspectors alike.

Digital tools, including the union-developed *Werkklimaat* and *Weerverlet* apps, have been praised for translating WBGT and meteorological data into traffic-light style recommendations, enabling supervisors to take timely, evidence-based action.

Extreme weather adaptation in major-hazard oversight, as seen in Seveso establishments' obligations to develop flood scenarios as part of safety cases and emergency planning, could be further extended to cover heatwaves and other extreme weather risks.

Proactive corporate adoption of progressive OSH practices, as highlighted by the The Social and Economic Council of the Netherlands (SER) in the cases of Heijmans[666], BAM[667], and Berner Logistics[668]. The companies adopt measures such as establishing clear heat protocols with work adjustment measures and protective equipment, multilingual information campaigns, active tracking and use of the KNMI's heat index in work planning, tailoring measures to individual project circumstances, and using heat-resistant buildings.

[666] SER (2024) *Veilig en gezond werken bij hitte: hoe pakt Heijmans dat aan*? Available at: https://www.ser.nl/nl/Publicaties/werken-bij-hitte-heijmans.

[667] Ibid.

[668] SER (2024) *Veilig en gezond werken bij hitte: hoe pakt Berner Logistics Kerkrade dat aan?* Available at: https://www.ser.nl/nl/publicaties/werken-bij-hitte-bender.

Poland

Main extreme weather events and associated OSH risks

Due to its considerable size and position as a transitional zone between maritime and continental climatic influences, Poland experiences a diversity of extreme weather events, with risks distributed unevenly across its regions. As the average temperatures become higher, forecasts indicate longer and more intense heatwaves and hot–dry periods. At the same time, rainfall is concentrating into fewer but heavier downpours, raising flood risks. The greatest pressures fall on southern regions, where river-basin flooding coincides with rising temperatures, and in large cities, where the urban heat island effect amplifies heat exposure. Outdoor workers in construction, agriculture, forestry, transport, and emergency services are on the front line of these hazards, whilst indoor staff in manufacturing, utilities, food processing, and services face growing heat stress in poorly ventilated spaces. *Table 31* summarises the main extreme weather events and their associated OSH risks across key sectors.

High variability in extreme precipitation events. Although total annual precipitation levels in Poland are not projected to change substantially, variability is anticipated to increase[669]. The country has already seen an increase in the number of days with heavy rainfall over the past several decades[670], with southern and southwestern parts of the country[671] experiencing on average more frequent occurrence of extreme precipitation events[672]. Despite these assessments highlighting specific provinces as facing higher levels of risk, many areas across Poland are vulnerable to floods due to a combination of natural and anthropogenic factors, with the portion of Poland's population living in flood-prone areas projected to increase (see *Figure 39*)[673]. Occupational groups at risk include transport and road maintenance workers (flooded and slippery surfaces, erosion), utility and emergency workers (flood response and

[669] Sadowski, M., Olecka, A., Romańczak, A., Siwiec, E., Porębska, G., Bebkiewicz, K., Chłopek, Z., Kanafa, M., Kargulewicz, I., Rutkowski, J., Skośkiewicz, J., Waśniewska, S., Zimakowska-Laskowska, M., and Żaczek, M. (2017) *Seventh National Communication and Third Biennial Report under the UNFCCC.* Ministry of the Environment. Available at: https://unfccc.int/sites/default/files/resource/8193245_Poland-BR3-NC7-1-NC7-BR3%20Poland.pdf.

[670] With daily precipitation levels >30 mm increasing by more than 3 days per decade, and >50 mm – by 2 days per decade (see Ibid., p. 17).

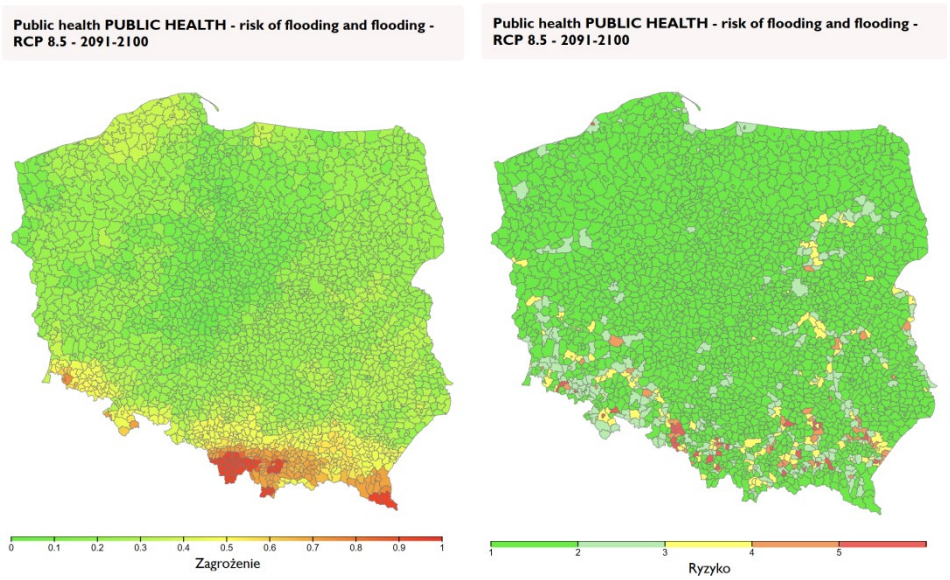
[671] The eastern part of the Silesian Lowland, the Silesian Upland, and the western parts of the Oświęcim Basin; the eastern part of The Carpathians and the Sandomierz Basin, the Lublin Upland, the Poleska Lowland, the central and eastern part of the Masovia Lowland, and the southern part of the Podlaska Lowland.

[672] IMGW-PIB (2021) *Climate of Poland 2020*. Available at: https://www.imgw.pl/sites/default/files/2021-04/imgw-pib-klimat-polski-2020-opracowanie-final-eng-rozkladowki-min.pdf; Ministerstwo Środowiska (2013) *Strategiczny plan adaptacji dla sektorów i obszarów wrażliwych na zmiany klimatu do roku 2020 z perspektywą do roku 2030*. p. 20. Available at: https://bip.mos.gov.pl/fileadmin/user_upload/bip/strategie_plany_programy/Strategiczny_plan_adaptacji_2020.pdf.

[673] For example, in September 2024 flooding struck Lower Silesian, Opole, Silesian, and Lesser Poland voivodeships (ReliefWeb 2024), while in 2010 floods hit 14 of Poland's 16 regions (ReliefWeb 2010); Health and Environment Alliance (2024) *Floods in Poland: The Need for Urgent Action for Health and Climate Protection.* Available at: https://www.env-health.org/floods-in-poland-the-need-for-urgent-action-for-health-and-climate-protection/.

contaminated water exposure), and forestry workers, for whom slips and falls are a leading cause of injury[674].

Figure 39: Visualisation of (respectively) the level of threat and risk of floods for public health, RCP8.5 scenario, 2091–2100



Source: KLIMADA 2.0. Available at: https://klimada2.ios.gov.pl/wizualizacje-ryzyka-dla-polski/.

Extended heatwaves. Poland is expected to continue warming up faster than the world average[675] with steep projected increases in the number of days with temperature exceeding 25°C, culminating in a manifold increase by the end of the century[676]. Eastern and Southeastern Poland is expected to most likely experience extended periods of dry and hot weather in summer months[677]. In addition to the shown link between prolonged daily maxima above 26–

[674] Grzywiński W., Sawa L., Nowik A., Nowicki G. (2013) Struktura wypadków przy pracy w Regionalnej Dyrekcji Lasów Państwowych w Szczecinku w latach 1990–2009, *Sylwan* 157(6), 403–411. Available at: https://agro.icm.edu.pl/agro/element/bwmeta1.element.agro-540f0678-e0b7-40a2-9838-e49fe63e4359/c/2013_06_403au.pdf.

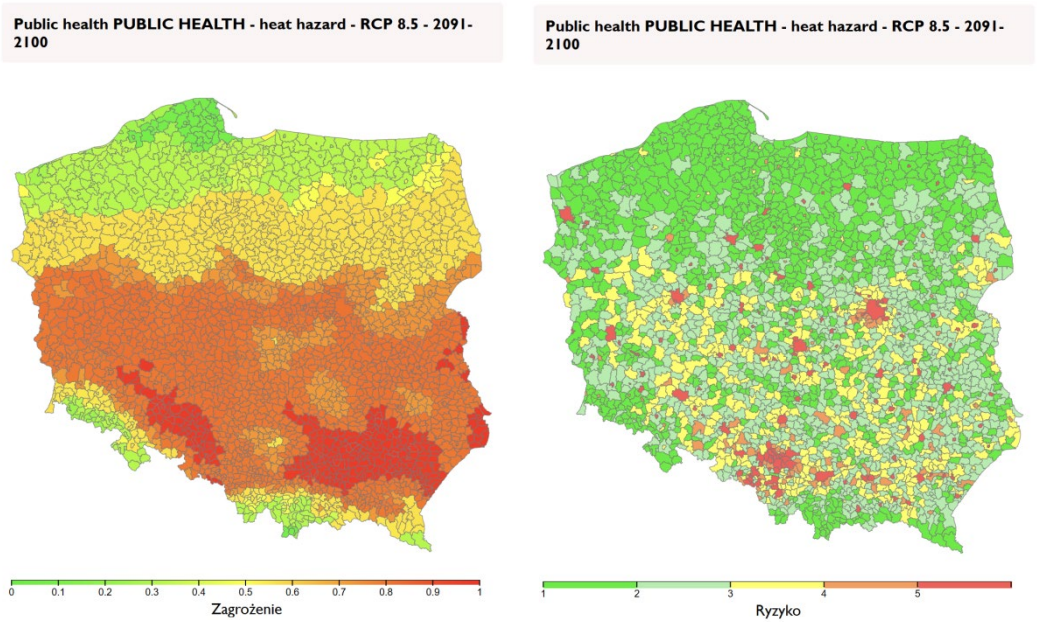
[675] Ibid.; IMGW-PIB (2021) *Climate of Poland 2020*. Available at: https://www.imgw.pl/sites/default/files/2021-04/imgw-pib-klimat-polski-2020-opracowanie-final-eng-rozkladowki-min.pdf; Sadowski, M., Olecka, A., Romańczak, A., Siwiec, E., Porębska, G., Bebkiewicz, K., Chłopek, Z., Kanafa, M., Kargulewicz, I., Rutkowski, J., Skośkiewicz, J., Waśniewska, S., Zimakowska-Laskowska, M., and Żaczek, M. (2017) *Seventh National Communication and Third Biennial Report under the UNFCCC*. Ministry of the Environment. Available at: https://unfccc.int/sites/default/files/resource/8193245_Poland-BR3-NC7-1-NC7-BR3%20Poland.pdf.

[676] Kuchcik (2013) uses the DMI-HIRHAM5-ARPEGE model to estimate a 370% increase in the number of 3-day heat waves (≥30°C) after 2040, and a 460% increase after 2070; Poland's Seventh National Communication and Third Biennial Report under the UNFCCC (2017) projects an increase from 29 hot days (>25°C) per year in 2001–2010 to 52 days in 2071–2090 (based on the A1B model, used by IPCC prior to 2014 under the SRES framework). See: Kuchcik, M. (2013) The attempt to validate the applicability of two climate models for the evaluation of heat wave related mortality in Warsaw in the 21st century. *Geographia Polonica*, 86(3). Available at: https://doi.org/10.7163/GPOL.2013.25.

[677] Ministerstwo Środowiska (2013) *Strategiczny plan adaptacji dla sektorów i obszarów wrażliwych na zmiany klimatu do roku 2020 z perspektywą do roku 2030*. Available at: https://bip.mos.gov.pl/fileadmin/user_upload/bip/strategie_plany_programy/Strategiczny_plan_adaptacji_2020.pdf; Ministerstwo Zdrowia and NPZ (2020) *Raport końcowy zawierający trendy i prognozy umieralności i chorobowości z powodu chorób klimatozależnych, a także wnioski i rekomendacje dla jednostek systemu ochrony zdrowia w zakresie adaptacji do*

28°C and increased cardiovascular mortality[678], heatwaves create acute risks of dehydration, cognitive strain, and cardiovascular stress, with outdoor workers (construction, maintenance, waste collection, agriculture, forestry, mining, transport, emergency response) most at risk[679]. Indoor workers in high-temperature environments (animal husbandry, horticulture, utilities, manufacturing, catering, laundries, and warehouses) also face intensifying heat stress[680]. Major Polish cities face additional amplification of heat risks due to urban heat island effects, with *Figure 40* showing projected heat stress levels under a high-emission scenario by the end of the century.

Figure 40: Visualisation of (respectively) the level of threat and risk of heat for public health, RCP8.5 scenario, 2091–2100



Source: KLIMADA 2.0. Available at: https://klimada2.ios.gov.pl/wizualizacje-ryzyka-dla-polski/.

zmian klimatu. p. 17. Available at: https://www.pzh.gov.pl/wp-content/uploads/2021/02/Raport-koncowy_dzialanie-7_2020-12-31.pdf.

[678] Graczyk, D., Kundzewicz, Z.W., Choryński, A., Førland, E.J., Pińskwar, I. and Szwed, M. (2019) Heat-related mortality during hot summers in Polish cities, *Theoretical and Applied Climatology,* 136, 1259–1273. https://doi.org/10.1007/s00704-018-2554-x.

[679] Szer, I., Lipecki, T., Szer, J., and Czarnocki, K. (2022) Using meteorological data to estimate heat stress of construction workers on scaffolds for improved safety standards, *Automation in Construction*, 134, 104079. Available at: https://doi.org/10.1016/j.autcon.2021.104079; Szer, I., Szer, J., Kaszubska, M., Miszczak, J., Hoła, B., Błazik-Borowa, E., and Jabłoński, M. (2021) Influence of the seasons on construction site accidents, *Archives of Civil Engineering*, LXVII(3). https://ace.il.pw.edu.pl/pdf-134083-106081?filename=Influence%20of%20the%20seasons.pdf; Graczyk, D., Pińskwar, I., and Choryński, A. (2022) Heat-Related Mortality in Two Regions of Poland: Focus on Urban and Rural Areas during the Most Severe and Long-Lasting Heatwaves, *Atmosphere*, 13(3), 390. https://doi.org/10.3390/atmos13030390; Pecyna, A., Buczaj, A., Goździewska, M., Lachowski, S., and Galińska, E.M. (2019) Occupational hazards in opinions of forestry employees in Poland, *Annals of Agricultural and Environmental Medicine,* 26(2), 242–248. pp. 244–245. doi: 10.26444/aaem/106246.

[680] Młynarczyk, M. (2024) *Zmiany klimatu i ich skutki na obciążenie cieplne pracownika*. Komitet Naukowo-Techniczny FSNT-NOT Ergonomii, Ochrony Pracy oraz Techniki w Medycynie. CIOP-PIB. Available at: https://m.ciop.pl/CIOPPortalWAR/file/99872/3_ZS_13_Referat_KNT_NOT_Zmiany_klimatu_i_ich_skutki_na_obciazenia_cieplne_pracownika_2024.pdf.

Table 31: Summary of the main weather events and related OSH risks in Poland

Weather events	Occupational exposure	Key OSH risks	Key sectors
Heatwaves, droughts	Increased UV exposure Wildfire exposure	Burns Skin cancer Respiratory issues and burns	Outdoor: Forestry and agriculture Construction, mining, and quarrying Public spaces, road repair and maintenance Emergency and healthcare services Transportation Waste collection
	Heat stress	Cognitive strain and decrease in psycho-motor performance Dehydration Cardiovascular system strain	Indoor: Animal husbandry and horticulture Electricity, gas, and water supply Manufacturing sector Laundries, cleaning services Catering and bakeries Warehouses
	Exposure to contaminated waters and vector-borne diseases	Exposure to Legionella, Vibrio bacteria[681] Exposure to ticks	Forestry and agriculture

[681] Ministerstwo Zdrowia and NPZ (2020) *Raport końcowy zawierający trendy i prognozy umieralności i chorobowości z powodu chorób klimatozależnych, a także wnioski i rekomendacje dla jednostek systemu ochrony zdrowia w zakresie adaptacji do zmian klimatu.* p. 21–22. Available at: https://www.pzh.gov.pl/wp-content/uploads/2021/02/Raport-koncowy_dzialanie-7_2020-12-31.pdf.

Weather events	Occupational exposure	Key OSH risks	Key sectors
Heavy rainfall events and floods	Flooding of land adjacent to roads, insufficient drainage	Road accidents Exposure to contaminated waters Mental distress	Transportation Utility services Emergency services

Source: Author's own elaboration.

Current OSH legislation

Poland's OSH framework establishes legally binding obligations for employers to ensure safe working conditions, including minimum workplace temperatures and, for underage and pregnant employees, explicit prohibitions on exposure to excessive heat or cold. While maximum temperature thresholds for adult workers are still under development, current guidance expects protective measures during heatwaves. Special regulations can be activated to protect employees affected by floods. Coverage is, however, uneven for some groups, with workers with disabilities and atypical workers, including platform economy employees, largely reliant on non-binding recommendations and discretionary employer action.

Poland's constitutional right to safe working conditions is implemented through the Labour Code and related regulations, which require employers to assess risks, provide training and protective equipment, and organise work safely. These general duties underpin more specific measures for extreme-weather hazards, including temperature limits, flood protections, and sector- or group-specific obligations. Current Polish legislation specifies minimum acceptable temperature thresholds for workplaces, as well as forbidden or restricted thermal conditions for adolescent employees. General regulations require employers to ensure workplace temperature to be not lower than 14°C for general work (287 K[682]), and not lower than 18°C for light work and offices (291 K)[683]. For underage employees, the 2004 Regulation of the Council of Ministers defines prohibited work in extreme thermal environments, including heat above 30°C with high humidity or direct radiation exposure, and cold below 14°C with persistent high humidity[684].

[682] Temperatures may be expressed in Celsius (°C) or Kelvin (K).

[683] Republic of Poland (1997) *Regulation of the Council of Ministers of 26 September 1997 on general occupational safety and health provisions. Dz.U. 1997 nr 129 poz. 844, §30*. Available at: https://natlex.ilo.org/dyn/natlex2/r/natlex/fe/details?p3_isn=48194.

[684] See Points 11-13 under the Regulation's Annex No. 2, which prohibit adolescent work in extreme thermal environments. This includes work in excessive heat exceeding 30°C and 65% humidity, or with direct radiation exposure, such as in metal and glass smelting, furnace repair, asphalt cooking, or baking oven service. It also prohibits work in excessive cold below 14°C or with persistent high humidity above 65%, including in cold stores, with water or brine, or in wet earthworks where clothing becomes permanently damp. The provisions also bar work where microclimate parameters fluctuate drastically, specifically where sudden temperature shifts exceed 15°C without the opportunity for a 15-minute adaptation period in a temperate area.

While legally binding maximum temperature thresholds for adult employees are not yet in place, government guidance and inspectorate's recommendations already expect employers to adopt protective measures during heatwaves, such as extra breaks, shortened hours, access to cool rooms and fluids[685]. The Ministry of Labour is also in the process of developing formal regulations to introduce maximum temperature thresholds and mandatory employer actions[686], with draft proposals suggesting trigger points such as 28°C (or 25°C for physically demanding work) for certain interventions or ceilings of 32°C (for work in open spaces involving physical exertion) or 35°C (in workrooms) that would incur mandatory work stoppage[687] . Until those measures are adopted (expected by 2027), mandatory actions are implemented case-by-case under general OSH obligations and guiding European and international standards (see *Table 32*).

Table 32: Permissible WBGT Index Values (modelled after EN ISO 7243 and EN ISO 8996 standards)

Workload Severity	Metabolic Rate Value (W/m^2)	Permissible WBGT Reference Values (°C) for a Person Acclimatised to Heat	Permissible WBGT Reference Values (°C) for a Person Not Acclimatised to Heat
Rest	M ≤ 65	33	32
Light work	65 < M ≤ 130	30	29
Moderate work	130 < M ≤ 200	28	26

[685] According to the Council of Ministers' Regulation on Preventive Meals and Drinks (DzU nr 60, poz. 279 from 28 May 1996), at workplaces where the temperature caused by the work process or atmospheric conditions (e.g., sunlight in the room) exceeds 28 °C, the employer is required to provide employees with free drinks. Under the Regulation of the Minister of Labour and Social Policy of 26 September 1997, the employer is obliged to provide air-conditioned rest rooms for employees who work in rooms where the temperature due to technological processes is constantly higher than 30 °C. See: National Labour Inspectorate (PIP) (2024) *"Working at elevated temperatures" ["Praca w warunkach podwyższonej temperatury"].* Available at: https://www.pip.gov.pl/pl/porady-bhp-i-prawo-pracy/warunki-srodowiska-pracy/91249,Praca-w-warunkach-podwyzszonej-temperatury.html; Ministry of Family and Social Policy (2024) *"Working in the heat – this is worth knowing" ["Praca w upale – to warto wiedzieć"].* Available at: https://www.gov.pl/web/rodzina/praca-w-upale-to-warto-wiedziec; Republic of Poland (1996) *Regulation of the Council of Ministers of 28 May 1996 on preventive meals and drinks. Dz.U. 1996 nr 60 poz. 279*. Available at: https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU19960600279/O/D19960279.pdf; Republic of Poland (1997) *Regulation of the Council of Ministers of 26 September 1997 on general occupational safety and health provisions. Dz.U. 1997 nr 129 poz. 844*. Available at: https://natlex.ilo.org/dyn/natlex2/r/natlex/fe/details?p3_isn=48194.

[686] Ministry of Family and Social Policy (2024) "By joining forces we can provide greater safety and better health for workers during hot weather", assured Agnieszka Dziemianowicz-Bąk, the Minister of Labour. Available at: https://www.gov.pl/web/family/by-joining-forces-we-can-provide-greater-safety-and-better-health-for-workers-during-hot-weather-assured-agnieszka-dziemianowicz-bak-the-minister-of-labour.

[687] Lexology (2024) Poland: Maximum Permissible Temperatures in the Workplace – Draft Regulation. Available at: https://www.lexology.com/library/detail.aspx?g=50499346-b364-4773-8320-63fa0057691c.

Workload Severity	Metabolic Rate Value (W/m^2)	Permissible WBGT Reference Values (°C) for a Person Acclimatised to Heat		Permissible WBGT Reference Values (°C) for a Person Not Acclimatised to Heat	
Heavy work	200 < M ≤ 260	Air Movement – Not Perceptible	Air Movement – Perceptible	Air Movement – Not Perceptible	Air Movement – Perceptible
		25	26	22	23
Very heavy work	M > 260	23	25	18	20

Source: Author's own elaboration based on CIOP-PIB (n.d.) *Projektowanie obiektow, pomieszczen oraz przystosowanie stanowisk pracy dla osob niepelnosprawnych o specyficznych potrzebach*. Available at: https://www.ciop.pl/CIOPPortalWAR/file/75823/Ramowe-wytyczne-2014-Rozdzial-8-Mikroklimat.pdf.

Additional regulations address employees affected by floods, most notably the Act of 16 September 2011 on Special Arrangements Related to Flood Recovery Efforts. These measures, activated via Council of Ministers regulations in affected areas for limited periods[688], grant rights such as reduced working time, paid exemption from work, and prohibitions on overtime or posting outside the regular workplace[689].

Beyond the general obligations outlined in the Labour Code and subordinate Acts, sector-specific coverage for weather-related OSH risks remains limited. Collective agreement coverage among non-public employers is low, and where such agreements exist, they typically lack preventive measures for work during extreme heat, cold, or other weather events[690], even in highly exposed sectors like agriculture[691].

When it comes to atypical workers and vulnerable groups, the level of protection from occupational risks related to extreme weather is uneven. For example, underage employees, as mentioned above, are covered by legally binding provisions on permissible temperature thresholds. Pregnant workers are also legally protected, including prohibitions on exposure to

[688] As was done via the Act, adopted in response to storm Boris and was applicable to the Lower Silesian and Lubuskie Voivodeships from 5 October 2024 to 31 December 2024.

[689] Ministry of Family and Social Policy (2024) *Special arrangements related to flood recovery efforts.* Available at: https://www.gov.pl/web/family/special-arrangements-related-to-flood-recovery-efforts.

[690] Czarzasty, J. (2019) Collective bargaining in Poland: a near-death experience. In: *Collective bargaining in Europe: towards an endgame*. European Trade Union Institute, pp. 465-481. Available at: https://www.etui.org/sites/default/files/CB%20Vol%20II%20Chapter%2022.pdf.

[691] For example, while scientific studies confirmed elevated risks for farmers working with pesticides at higher levels of temperature and humidity, especially in greenhouses, there are no sector-specific, legally binding safety standards to address these hazards (see Kilar, J., Szeliga, M., and Kilar, M. (2025). Work safety on farms in Poland – Legal, social and technological condition. *Politics & Security,* 12(2), 15–31. https://politics-security.net/index.php/ojsdata/article/view/278/265).

excessive heat or cold at work[692]. By contrast, workers with disabilities, while entitled to protections under the Act on Vocational and Social Rehabilitation and Employment of Disabled Persons, are not explicitly covered by temperature-related limits. Their exposure to thermal stress is primarily addressed through non-binding recommendations. Existing guidance identifies groups particularly affected by heat or cold (such as those with thermoregulatory disorders, musculoskeletal conditions, sensory impairments, or neurological disorders) but leaves implementation to employers' discretion[693]. Similarly, atypical workers, particularly in the platform economy[694], despite being entitled to the same OSH provisions under the Labour Code (Article 304), do not consistently benefit from their enforcement due to unclear responsibility regarding the designated "employer". As a result, essential protections such as breaks, fluids, or shielding from extreme weather for this group are often treated as "good practice"[695] rather than mandatory requirements.

National policy frameworks and climate adaptation plans

Extreme weather-related occupational safety and health risks are recognised unevenly across Poland's various policy domains. Climate adaptation and environmental strategies place extreme weather at the centre of their framing but rarely connect it to workplace safety. OSH-specific programmes do acknowledge thermal stress and climate change impacts, but only as background risk factors. Meanwhile, economic, rural development, energy, and labour policies address both climate and OSH only indirectly, with little or no explicit linkage between them.

Environmental and climate adaptation policies: extreme weather central, OSH implied through occasional discussion of public health impacts

Environmental and climate adaptation frameworks give the most direct attention to extreme weather but frame it primarily as a risk factor for infrastructure resilience, natural ecosystems, and broad public health rather than worker safety. The 2030 National Environmental Policy[696], for instance, dedicates a full intervention direction to climate adaptation and disaster risk management[697], but its measures address public health and issues such as the urban heat island

[692] ISAP (2017) *Rozporządzenie Rady Ministrów z dnia 3 kwietnia 2017 r. w sprawie wykazu prac uciążliwych, niebezpiecznych lub szkodliwych dla zdrowia kobiet w ciąży i kobiet karmiących dziecko piersią*. Available at: https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20170000796.

[693] Zawieska, W.M. (ed.) (2014) *Projektowanie obiektów, pomieszczeń oraz przystosowanie stanowisk pracy dla osób niepełnosprawnych o specyficznych potrzebach – Ramowe wytyczne*. CIP-PIB. pp. 234-238. Available at: https://m.ciop.pl/CIOPPortalWAR/appmanager/ciop/mobi?_nfpb=true&_pageLabel=P426014131914980446668 96.

[694] Whose number in Poland exceeds 3 million, according to European Commission's 2021 estimates.

[695] CIOP-PIB (2024) *Bezpieczne stosowanie materialnych zasobów niezbędnych do wykonywania pracy*. Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P61600242891649766745310&html_tresc_root_id=300013330&html_tresc_id=300013322&html_klucz=7654321&html_klucz_spis.

[696] *UCHWAŁA Nr 67 RADY MINISTRÓW z dnia 16 lipca 2019 r. w sprawie przyjęcia „Polityki ekologicznej państwa 2030 – strategii rozwoju w obszarze środowiska i gospodarki wodnej"* (2019). Available at: https://monitorpolski.gov.pl/M2019000079401.pdf.

[697] Direction of Intervention 11: "Adaptation to climate change and management of the risk of natural disasters" ("Adaptacja do zmian klimatu i zarządzanie ryzykiem klęsk żywiołowych"), under Strategic Objective III: "Environment and climate. Mitigation of climate change and adaptation to it, and management of the risk of natural disasters" ("Środowisko i klimat. Łagodzenie zmian klimatu i adaptacja do nich oraz zarządzanie ryzykiem klęsk żywiołowych").

effect and sewer system capacity rather than occupational risks[698]. The Strategic Adaptation Plan until 2020 with a perspective to 2030 (SAP2020)[699] similarly treats extreme weather phenomena (heavy rains, floods, landslides, heat waves, droughts, hurricanes) as significant threats, yet measures them largely in economic loss terms, with its only health-related mandate given to voivodeships (regions) limited to general strengthening of health services for heatwave response[700]. The National Urban Policy until 2030 also integrates extreme weather concerns indirectly, with the greening of urban spaces presented as a protective measure during heatwaves[701].

Municipal climate adaptation strategies, which include localised assessments of climate change vulnerabilities (both in terms of infrastructure and population), tend to mention extreme weather-related occupational risks much more clearly and acknowledge them as part of the broader risks for the general population. Most adaptation plans acknowledge risks to workers (mostly offering examples from the public sector) and adopt extreme weather mitigation/adaptation measures that, while not directly targeting workplace safety, have positive spillover effects for many workers[702]. In a stark example of addressing both OSH and extreme weather concerns, the plan for the city of Czeladz listed among its implementation action points introducing flexible working hours at public utilities facilities in case of extreme meteorological events[703,704].

OSH and public health frameworks: workplace safety central, extreme weather risks peripheral

OSH-specific and national health programmes recognise certain dimensions of extreme weather in working environments but do not centre any measures or focus areas on these risks, instead treating them as background factors that exacerbate traditional physical hazards in workplace microclimates. The main national programme in the field of occupational safety, the Government Programme for Improving Safety and Working Conditions (phase VI, 2023–2025)[705], acknowledges workers' exposure to thermal load and explicitly connects this to

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698 Ibid. pp. 20, 31.

699 Ministerstwo Środowiska (2013) *Strategiczny plan adaptacji dla sektorów i obszarów wrażliwych na zmiany klimatu do roku 2020 z perspektywą do roku 2030*. Available at: https://bip.mos.gov.pl/fileadmin/user_upload/bip/strategie_plany_programy/Strategiczny_plan_adaptacji_2020.pdf.

700 Ibid. p. 49.

701 Ministry of Development Funds and Regional Policy (2023) National Urban Policy. Available at: https://www.gov.pl/web/funds-regional-policy/national-urban-policy.

702 Such as equipping educational, healthcare, and public transportation facilities with air conditioning systems; improving sewage systems; or training and equipment needs of emergency services, all of which which will benefit both the general public and employees. Seen in adaptation plans for Wroclaw, Czeladz, Katowice, Krakow, Bydgoszcz, Gdynia.

703 Which included two actions: informing employees about the possibility of introducing flexible working hours; and introducing flexible working hours in case of heat waves – both time-bound by 2022.

704 City of Czeladź (2021) *Plan adaptacji do zmian klimatu dla miasta Czeladź do roku 2030*. p. 37. Available at: https://bip.czeladz.pl/zalaczniki/Plan_adaptacji_-_TEKST.pdf.

705 Implemented under the supervision of the Ministry of Family and coordination of the Social Policy and the Central Institute for Labour Protection National Research Institute. Ministerstwo Rodziny, Pracy i Polityki Społecznej (2023) *Projekt uchwały Rady Ministrów w sprawie ustanowienia programu wieloletniego pn. Rządowy Program Poprawy Bezpieczeństwa i Warunków Pracy*

climate change, particularly for outdoor workers and those using protective equipment[706]. Under the programme's action areas, however, these challenges are not tackled directly. The only explicit objective related to thermal exposure is to develop recommendations for safe working time limits for workers with heightened occupational exposure to hot microclimates[707], without specific reference to extreme weather scenarios. Weather impacts on occupational safety are further examined through CIOP-led research studies, which, for example, investigate mental health impacts of extreme weather on vessel workers[708] and explore the need to develop new personal protective equipment for hotter environments[709]. These, however, remain isolated initiatives, not consolidated into a comprehensive action agenda nor based on publicly available information, explicitly used to inform policy measures under phase VI[710].

Likewise, the National Health Programme 2021–2025 (*Narodowy Program Zdrowia*)[711], while dedicating an entire operational goal to workplace health[712], focuses on improving hazard identification, monitoring, and awareness in relation to remote work, emerging technologies, infectious diseases (such as COVID), and other conventional physical, biological, and chemical risk factors. The Programme makes no reference to extreme weather in its OSH priorities.

Economic, energy, and rural development: OSH and extreme weather risks only indirectly addressed

In broader strategic frameworks, both OSH and extreme weather are backgrounded, appearing only indirectly and outshined by economic modernisation and security priorities. In the economic domain, the Strategy for Responsible Development until 2020 (with a 2030 outlook)[713], or SOR (sometimes abbreviated SRD in English-language sources), centres on economic modernisation and energy efficiency that is compliant with EU's environmental

- *VI etap, okres realizacji lata 2023-2025*. Available at: https://www.gov.pl/web/rodzina/projekt-uchwaly-rady-ministrow-w-sprawie-ustanowienia-programu-wieloletniego-pn-rzadowy-program-poprawy-bezpieczenstwa-i-warunkow-pracy---vi-etap-okres-realizacji-lata-2023-2025.

706 Ibid.

707 Which constituted around 6% of all persons employed in conditions of risk in enterprises with 10+ employees in 2019, according to the Central Statistical Office (see Annex I to the phase VI programme, p. 6).

708 Pleban, D. (2024) Subjective assessment of working conditions on vessels. *Ecology & Safety: 33rd International Conference, 12-15 August 2024, Burgas, Bulgaria.* CIOP-PIB. Available at: https://www.ciop.pl/CIOPPortalWAR/file/99779/III_PN_13_Referat_Subjective_assessment_of_working_conditions_on_vessels_2024.pdf.

709 Bugajska, J., Walusiak-Skorupa, J., and Młynarczyk, M. (2024) Ochrona zdrowia pracowników przed negatywnymi skutkami upałów w świetle zmian klimatycznych. Discussion Panel at CIOP-PIB. Available at: https://www.ciop.pl/CIOPPortalWAR/file/99721/III_PN_08_Referat_Ochrona_zdrowia_pracownikow_przed_negatywnymi_skutkami_upalow_w_swietle_zmian_klimatycznych_2024.pdf.

710 CIOP-PIB (2023) *Wykazy zadań i projektów VI Etapu Programu Wieloletniego (2023-2025).* Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P268003855914086963996 67&html_tresc_root_id=21639&html_tresc_id=300014238&html_klucz=21639&html_klucz_spis=.

711 Ministerstwo Zdrowia (2021) *Narodowy Program Zdrowia 2021-2025*. Available at: https://www.gov.pl/web/zdrowie/narodowy-program-zdrowia-2021-2025.

712 Operational Goal 4: "Environmental health and infectious diseases – strengthen the health potential of working people".

713 Ministerstwo Funduszy i Polityki Regionalnej (2017) *Informacje o strategii na rzecz odpowiedzialnego rozwoju*. Available at: https://www.gov.pl/web/fundusze-regiony/informacje-o-strategii-na-rzecz-odpowiedzialnego-rozwoju.

frameworks, noting health protection from poor environmental conditions[714] but without reference to extreme weather phenomena or workplace safety. Since all the sectoral strategies are designed with reference to SOR, they show similar focus on economic development.

For example, Poland's framework for the energy sector – the National Energy Policy (EPP2040)[715] – along with its subordinate National Raw Materials Policy (PSP2050)[716] are both directly informed by and operationalise SOR's energy objectives[717], and only touch on extreme weather risks in passing, framing them mainly in terms of emissions reduction targets and general disaster risk management[718]. Specifically, EPP2040 only briefly mentions reducing negative air pollution effects on the health of the population among the energy transition goals, while PSP2050 does not mention public health at all. In the agriculture and fisheries sector, the Strategy for the Sustainable Development of Rural Areas, Agriculture and Fisheries 2030[719] addresses climate mainly through the lens of renewable energy in agricultural production and ecosystem protection[720]. The Strategy does not mention extreme weather or occupational risks for workers in agricultural and fisheries sectors.

In the labour strategy domain, the Human Capital Development Strategy 2030[721] outlines human capital development and social cohesion objectives, which are intended to increase labour market participation and worker productivity in support of the broader development goals. The strategy, however, does not mention occupational safety, only addressing public health objectives such as improved nutrition, physical fitness, reduced cancer incidence, increased spending on public healthcare, and improved access to healthcare services[722]. Even the National Plan for Rebuilding and Increasing Resilience (KPO), introduced in 2022 to rebuild Poland's socio-economic resilience post-COVID-19 pandemic, does not have either OSH- or extreme weather-dedicated resilience-building initiatives[723].

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[714] Ministerstwo Funduszy i Polityki Regionalnej (2017) *Informacje o Strategii na rzecz Odpowiedzialnego Rozwoju*. p. 19. Available at: https://www.gov.pl/web/fundusze-regiony/informacje-o-strategii-na-rzecz-odpowiedzialnego-rozwoju.

[715] Ministerstwo Klimatu i Środowiska (2021) *Polityka energetyczna Polski do 2040 r*. Available at: https://www.gov.pl/web/klimat/polityka-energetyczna-polski.

[716] Ministry of Climate and Environment (2022) *National Raw Materials Policy* p. 13. Available at: https://www.gov.pl/web/climate/national-raw-materials-policy.

[717] Ibid.

[718] A look at the complementary National Energy and Climate Plan (2021-2030), which serves as a reporting and alignment instrument between Poland's domestic energy policy and EU's energy and environment objectives, shows that extreme weather events are mostly considered from the viewpoint of infrastructure resilience (e.g. the impact of snow and floods on energy distribution systems).

[719] Ministerstwo Rolnictwa i Rozwoju Wsi (2019) *Dokumenty, analizy SZRWRIR 2030*. Available at: https://www.gov.pl/web/rolnictwo/dokumenty-analizy-szrwrir-2030.

[720] Mostly articulated under the Strategy's Direction of intervention II.5 "Climate change adaptation and mitigation" (pp. 75–77).

[721] Ministerstwo Rodziny, Pracy i Polityki Społecznej (2023) *Strategia Rozwoju Kapitału Ludzkiego 2030*. Available at: https://www.gov.pl/web/rodzina/strategia-rozwoju-kapitalu-ludzkiego-2031.

[722] Ibid. pp. 30–37.

[723] Krajowy Plan Odbudowy (2022) *Efektywność, dostępność i jakość systemu ochrony zdrowia*. Available at: https://www.kpo.gov.pl/strony/o-kpo/o-kpo/efektywnosc-dostepnosc-i-jakosc-systemu-ochrony-zdrowia.

Labour inspectorates and enforcement

The State Labour Inspectorate (PIP) is Poland's main OSH enforcement body. Its rolling action plans do not prioritise extreme weather, and its tools and checklists lack dedicated modules for weather-related risks. However, it conducts seasonal awareness campaigns and provides ad-hoc support, like helplines during floods, based on existing OSH obligations.

Under the 2007 Act on the State Labour Inspection, the State Labour Inspectorate (PIP) is the main body enforcing workplace safety, labour law, and legal employment, with an added role in education. Structurally, it consists of the Chief Labour Inspectorate (GIP), 16 regional inspectorates, and field offices, as well as a training centre. Inspectors act both on inquiries/accident reports and on their own initiative, but their self-initiated work follows priorities set in rolling three-year action plans. Extreme weather, however, does not appear among the priorities for recent or upcoming years[724].

There are no dedicated checklists for weather-related risks in PIP's information materials for industries[725] or in its interactive risk-assessment tools[726]. Weather is only briefly captured in the agriculture sector's self-assessment questionnaire, where factors such as unpredictable/bad weather, high/low temperature, and solar radiation are listed as "environmental burdens" and rated by their intensity and impact on the worker[727].

During extreme weather events, PIP's involvement includes consultations and public appeals to adjust workplace practices. In the past, for example, inspectorates provided support to flood-affected employees and employers during the September 2024 floods[728], notably via its Counselling Centre, which operated a temporary helpline for employers and employees and published frequently asked questions online[729]. During heatwaves, central and some regional inspectorates carry out seasonal summer campaigns on social media, which include work

[724] Each three-year programme mentions three priority areas. E.g., the 2025–2027 programme sets "Vision Zero"; protecting workers exposed to carcinogenic, mutagenic or reprotoxic factors as well as asbestos dust; and monitoring entities and investments designated as being under special supervision to prevent illegal employment. PIP (2023) *Program Działania Państwowej Inspekcji Pracy na lata 2022–2024. Rok 2024*. Available at: https://www.pip.gov.pl/files/238/Misja-i-Program-PIP/982/Program-dziaania-PIP-2024.pdf.

[725] PIP (2024) *Program Zdobądź Dyplom PIP*. Available at: https://www.pip.gov.pl/nasza-oferta/dla-pracodawcow/program-zdobadz-dyplom-pip.

[726] CIOP-PIB (n.d.) *Bezpieczniej.* Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P62002986134017789831 1; CIOP-PIB (n.d.) *IRYS: System interaktywnej oceny ryzyka zawodowego*. Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P110003934713422640600 84; CIOP-PIB (n.d.) *SINDBAD: Komputerowy System Integracji Dowolnych Baz Danych*. Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P110001934713422639314 30.

[727] CIOP-PIB (n.d.) *Kwestionariusz Psychofizycznych i Organizacyjnych Warunków Pracy w Rolnictwie (POWR).* Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P126001481113427986061 93&html_tresc_root_id=300001869&html_tresc_id=300001898&html_klucz=1356&html_klucz_spis=.

[728] in line with the aforementioned Act on Special Arrangements Related to Flood Recovery Efforts, which was activated until December 2024 for the affected areas. PIP (2024) *Państwowa Inspekcja Pracy na pomoc powodzianom*. Available at: https://www.pip.gov.pl/aktualnosci/panstwowa-inspekcja-pracy-na-pomoc-powodzianom.

[729] PIP (2024) *400 porad dla pracowników i pracodawców z terenów objętych powodzią*. Available at: https://www.pip.gov.pl/aktualnosci/400-porad-dla-pracownikow-i-pracodawcow-z-terenow-objetych-powodzia.

adjustment recommendations that reference provisions within the OSH laws and best practices[730]. During the premise visits, inspectors enforce existing regulations obliging employers to provide hydration and cooling breaks for outdoor workers when temperatures exceed 25°C and 28°C, respectively[731].

Separately, the Government Security Centre (*Rządowe Centrum Bezpieczeństwa,* or *RCB*) activates a countrywide SMS alert system during life-threatening events like storms, floods, and heatwaves[732], frequently supplementing these alerts with public service announcements on television and radio[733]. These, however, function purely as general public safety messages and are not linked to OSH obligations or rights to workplace absence[734]. PIP does not actively reference or promote RCB alerts in its public campaigns, and there is no evidence that employers incorporate them in formal OSH measures.

Data collection and reporting

Poland's main data collection efforts pertaining to workplace accidents and occupational diseases are carried out by three institutions: Statistics Poland (GUS), Nofer Institute of Occupational Medicine (IMP Łódź), and the State Labour Inspection (PIP). GUS and PIP's statistics are used to set inspection priorities and prevention programmes. Among the three, only GUS's framework theoretically allows for capturing extreme weather events as material factors causing accidents; however, in practice, this is not consistently reported beyond raw microdata.

Poland's accidents-at-work statistics are compiled by GUS using the EU ESAW methodology via the statutory "statistical accident card", which is mandatory for employers to submit[735]. In addition to demographic, occupational, temporal and geographic data, the methodology allows to capture a range of accident-related variables, including type and severity of injury, phase of activity performed, deviation events, and material agents, to name a few. Under the material factors being the source of injury, employers can record physical phenomena and elements of the natural environment (category 20), which include options such as:

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730 PIP Olsztyn (2024) *Chrońmy zdrowie pracowników podczas upałów*. Available at: https://olsztyn.pip.gov.pl/aktualnosci/chronmy-zdrowie-pracownikow-podczas-upalow; PIP Rzeszów (2024) *Apel Okręgowego Inspektora Pracy - uwaga na upały*. Available at: https://rzeszow.pip.gov.pl/aktualnosci/apel-okregowego-inspektora-pracy-uwaga-na-upaly.

731 Interviews with CIOP-PIB [11 August 2024] and other Polish institutional representatives [21 August 2025].

732 Government Security Centre (RCB) (2024) *RCB Alert - Key Questions and Answers.* Available at: https://www.gov.pl/web/rcb-en/rcb-alert--faq.

733 Portal Polskiego Radia SA (2024) *Storms batter Poland, Central Europe.* Available at: https://www.polskieradio.pl/395/7784/artykul/3548077,storms-batter-poland-central-europe.

734 INFORLEX (2022) *Czy można usprawiedliwić nieobecność w pracy powołując się na alert RCB?* Serwis Prawno-Pracowniczy / Niezbędnik Kadrowo-Płacowy. Available at: https://www.inforlex.pl/dok/tresc%2CFOB00000000000005529057%2CCzy-mozna-usprawiedliwic-nieobecnosc-w-pracy-powolujac-sie-na-alert-RCB.html.

735 CIOP-PIB (n.d.) *Wytyczne sporządzania statystycznej karty wypadku*. Available at: https://www.ciop.pl/CIOPPortalWAR/appmanager/ciop/pl?_nfpb=true&_pageLabel=P13000148913428737323 32&html_kluc z=1197&html_tresc_id=1200&html_tresc_root_id=1197.

- **20.01:** physical phenomena – noise, radiation, pressure
- **20.02:** elements of the natural environment and atmospheric phenomena (including water, earth, rain, hail, snow, ice, etc.)
- **20.03**: Factors resulting from the action of natural forces (e.g. lava, flood wave, fire)
- **20.99**: Other, unlisted or unspecified factor in this group

However, such granular data remains invisible in GUS's annual reports "Accidents at work" (*Wypadki przy pracy*)[736], which publishes broader breakdowns of the accidents by NACE/PKD section, ownership sector, voivodeship (region), subregion and county, occupation groups, sex and age.

In addition to GUS's reports, there are two other relevant sources: the Central Register of Occupational Diseases, maintained by the Nofer Institute of Occupational Medicine[737], and reporting on specific investigations by the State Labour Inspection[738]. Within Nofer Institute's register, cases are coded by the legally defined Polish list of occupational diseases (and medically by ICD-10 in IMP's reporting). That list focuses on chronic exposures (e.g., noise, vibration, chemicals, biological agents, musculoskeletal disorders) and does not touch on extreme weather. The State Labour Inspection (PIP) investigates serious/fatal accidents and reports them annually, but its public reporting mostly focuses on sectors, accident causes and responsibility for legal non-compliance. Finally, the agricultural insurer KRUS collects some data on more atypical agriculture work and reports data on compensated farm accidents to GUS (only partially incorporating ESAW categories, without extreme weather information).

Table 33 below comparatively summarises the types of indicators used by the three institutions.

Table 33: Classification dimensions used by Polish authorities for OSH incidents and occupational diseases

Classification dimension	GUS (Accidents at Work via ESAW / national card)	IMP Łódź (Central Register of Occupational Diseases)	PIP (Inspectorate reports)
Economic activity / sector (PKD/NACE)	NACE/PKD coded for employer activity	NACE sector included	Sector included in report breakdowns (e.g., construction, vehicle repair)

[736] GUS (2024) *Warunki pracy, wypadki przy pracy*. Available at: https://stat.gov.pl/obszary-tematyczne/rynek-pracy/warunki-pracy-wypadki-przy-pracy/.

[737] Instytut Medycyny Pracy im. prof. J. Nofera w Łodzi (n.d.) *Choroby zawodowe w Polsce*. Available at: https://www.imp.lodz.pl/choroby-zawodowe-w-polsce.

[738] PIP (n.d.) *Sprawozdania*. Available at: https://www.pip.gov.pl/o-nas/sprawozdania.

Classification dimension	GUS (Accidents at Work via ESAW / national card)	IMP Łódź (Central Register of Occupational Diseases)	PIP (Inspectorate reports)
Type of enterprise / ownership	Size of enterprise or local unit optionally coded	–	Often broken down by public/private sector in inspections
Demographics (age, sex, citizenship)	Age and sex mandatory; nationality optional	Gender, age	Occasionally registered via individual investigation records (not systematically)
Employment status / profession / tenure	Employment status (employee / self-employed) mandatory; profession & tenure part of detailed data	Implicit in register (occupation); details on tenure less clear	Categorised by employment type
Type of injury / consequence (severity)	Type of injury; bodily part affected; fatal / serious / minor (severity via days lost)	Type of disease, incidence rate, severity in disease registry	Reporting specifies accident outcomes and legal fault
Location of accident (geography, place)	Region, subregion, county, exact site (e.g., workplace, commute)	Geographic region (voivodeship)	Location, including workplace type
Event / deviation / contact	Phase of the activity performed; deviation event, contact event and material factor of the event	–	PIP investigation includes task phase and context details
Agent / material factor	Material agent of injury, causal categories ("extreme weather" may be coded	Causative agents / factors listed per disease (e.g., biological, chemical)	Causes and contributing factors captured in reports

Classification dimension	GUS (Accidents at Work via ESAW / national card)	IMP Łódź (Central Register of Occupational Diseases)	PIP (Inspectorate reports)
	using options under category 20)		
Temporal factors (date, time, loss)	Exact date, optional time; days lost as severity measure	Year; exposure duration	Date and timeline tracked during investigations

Source: Author's own elaboration.

Role of social partners

Social dialogue on OSH occurs through the Social Dialogue Council, but extreme weather is not a distinct priority. While trade unions have advocated for heat regulations, their input on the ongoing development of maximum temperature rules has been limited, and atypical workers are largely excluded from these formal consultation processes.

Social dialogue on occupational safety and health in Poland is institutionalised through the Social Dialogue Council (*Rada Dialogu Społecznego, RDS*) and sectoral councils, which bring together government, trade unions, and employer organisations[739]. While RDS, which replaced its predecessor Tripartite Commission for Social and Economic Affairs in 2015, is assessed to be a more effective platform for including social partners in the effective dialogue on general OSH legislation[740], consultation on extreme weather-related OSH risks remains underdeveloped and not a distinct priority in formal tripartite discussions[741].

While trade unions like Self-governing Trade Union Solidarity (*NSZZ Solidarność*) and All-Poland Alliance of Trade Unions (OPZZ) have called on the government to regulate working conditions during periods of extremely high temperatures[742], social partners generally had little visible input during the early stages of the initiative to establish maximum allowable

[739] ISAP (2015) *Ustawa z dnia 24 lipca 2015 r. o Radzie Dialogu Społecznego i innych instytucjach dialogu społecznego*]. Available at: https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20150001240.

[740] Czarzasty, J. (2019) Collective bargaining in Poland: a near-death experience. In: *Collective bargaining in Europe: towards an endgame.* European Trade Union Institute, pp. 465-481. Available at: https://www.etui.org/sites/default/files/CB%20Vol%20II%20Chapter%2022.pdf.

[741] Interview with CIOP-PIB representative 11 August 2025].

[742] Tilles, D. (2023) Polish left and unions call for rules limiting working hours during extreme heat. *Notes from Poland.* Available at: https://notesfrompoland.com/2023/07/17/polish-left-and-unions-call-for-rules-limiting-working-hours-during-extreme-heat/; Malacalza, P. (2024) *Extreme weather events: Policy measures to cushion effects on workers and businesses*. Eurofound. Available at: https://www.eurofound.europa.eu/en/publications/all/extreme-weather-events-policy-measures-cushion-effects-workers-businesses#overview.

temperatures for indoor and outdoor work, which is currently being developed by the Ministry of Family and Social Policy with technical input from CIOP-PIB[743].

Atypical workers, such as those engaged in platform work[744], self-employed, and SME employees[745], especially those with migrant background, are largely excluded from the formal consultation processes, and trade unions have limited reach among these groups[746].

Good practices and innovations

Pioneering the development of maximum temperature regulations. The ongoing initiative led by the Ministry of Family and Social Policy, with technical expertise from CIOP-PIB, to establish legally binding maximum temperature thresholds for both indoor and outdoor work is an example of proactive push from the government to regulate work in hot temperatures.

Multichannel awareness-raising and educational campaigns. CIOP-PIB and the Ministry produced national campaigns via broadcast TV and radio programmes, particularly targeting vulnerable groups like the elderly, with advice on hydration and heat protection[747].

[743] Interview with Polish institutional representatives [21 August 2025].

[744] Pawłowska, Z., Ordysiński, S., Pęciłło, M., and Galwas-Grzeszkiewicz, M. (2025) A Study of Working Conditions in Platform Work, *Sustainability*, *17*(14), 6536. https://doi.org/10.3390/su17146536.

[745] Męcina, J. P. (2017) *Social Dialogue in Face of Changes on the Labour Market in Poland: From Crisis to Breakthrough*. International Labour Organisation, p. 215. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@europe/@ro-geneva/@sro-budapest/documents/publication/wcms_619585.pdf.

[746] Kowalik, Z., Lewandowski, P. and Kaczmarczyk, P. (2023) Job Quality Gaps between Migrant and Native Gig Workers: Evidence from Poland, *IZA Discussion Paper No. 16216*, p. 8. Available at: https://www.iza.org/publications/dp/16216/job-quality-gaps-between-migrant-and-native-gig-workers-evidence-from-poland.

[747] Interview with Polish institutional representative [21 August 2025].

Spain

Main extreme weather events and associated OSH risks

Spain's geography, combined with its demographic and socio-economic characteristics, makes the country particularly vulnerable to climate change–induced extreme weather phenomena. The main occupational safety and health risks are linked to increasingly frequent and intense heatwaves, droughts and forest fires, and catastrophic floods caused by sudden heavy rainfall and storms. These events affect both outdoor sectors such as agriculture, construction, transport, and forestry, and indoor workers in poorly ventilated or heat-exposed environments, from kitchens and warehouses to care facilities and schools. *Table 34* below summarises these phenomena, related occupational hazards, and affected sectors in Spain.

Heatwaves, droughts, and forest fires. Meteorological data show that the Spanish summer has lengthened by around nine days per decade[748] and heat waves in peninsular Spain have doubled in number and become more intense since 1984, with the number of hot nights (≥25°C) increasing tenfold in major Spanish cities over the same period[749]. Climate scenarios indicate that this trend will continue throughout the 21st century, with more pronounced changes expected in eastern regions such as Murcia, the Balearic Islands, and also the Canary Islands[750] (see *Figure 41*). Heatwaves pose health stress risks to both outdoor workers (in agriculture, construction, hospitality, maintenance) and indoor workers in high-temperature environments such as kitchens, logistics warehouses, care, and education services[751]. Recent research has linked heatwaves to between 9% and 17% of work accidents in Spain[752]. Summer heatwaves are also accompanied by droughts and forest fires. For example, during summer 2025, several large-scale wildfires devastated forested and agricultural areas, threatening forestry and field workers. In addition to direct fire hazards, these events increase the risks of heat stress, smoke

[748] AEMET (2019) *El calor como nueva normalidad.* Available at: http://www.aemet.es/es/noticias/2019/12/Rueda_prensa_invierno_2019.

[749] Ministry for the Ecological Transition and the Demographic Challenge (MITECO) (2024) *National Climate Change Adaptation Plan 2021-2030*. Available at: https://unfccc.int/sites/default/files/resource/2024-NAP-Spain-English.pdf; De Rivera, L. G. (2024) Eventos climáticos extremos en España: adónde vamos y de dónde venimos. *Agencia SINC.* Available at: https://www.agenciasinc.es/Reportajes/Eventos-climaticos-extremos-en-Espana-adonde-vamos-y-de-donde-venimos.

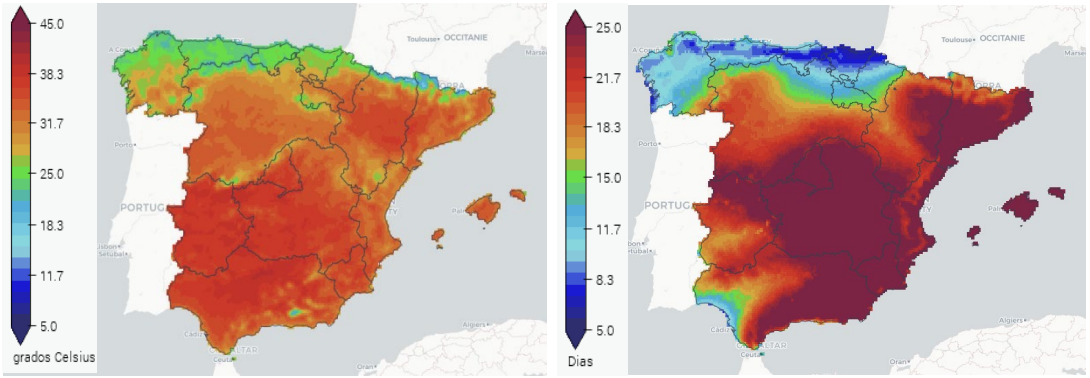
[750] Ministry for the Ecological Transition and the Demographic Challenge (MITECO) (2024) *National Climate Change Adaptation Plan 2021-2030*. Available at: https://unfccc.int/sites/default/files/resource/2024-NAP-Spain-English.pdf.

[751] Ibid., p. 101; ISTAS (2019) *Guía para la evaluación y prevención del riesgo de estrés térmico por exposición a calor.* Available at: https://istas.net/sites/default/files/2019-04/Guia%20EstresTermico%20por%20exposicion%20a%20calor_0.pdf; García-Heras, F., Rodríguez-Medina, J., Castañeda, A., León-Guereño, P. and Gutiérrez-Arroyo, J. (2024) Occupational Injuries of Spanish Wildland Firefighters: A Descriptive Analysis, *Healthcare*, 12(16), 1615. https://doi.org/10.3390/healthcare12161615; Interviews with ITSS [16 September 2025] and EFBWW [8 July 2025] representatives.

[752] INSST (2024) *El INSST alerta de que los accidentes laborales aumentan un 17% durante las olas de calor.* Available at: https://www.insst.es/noticias-insst/el-insst-alerta-de-que-los-accidentes-laborales-aumentan-un-17-durante-las-olas-de-calor; Martínez-Solanas, E. et al. (2018) Evaluation of the Impact of Ambient Temperatures on Occupational Injuries in Spain, *Environmental Health Perspectives*, 126(6). https://doi.org/10.1289/EHP2590.

inhalation, as well as longer-term respiratory illness and mental health issues among exposed workers[753].

Figure 41: Maximum summer temperature (°C) (left) and maximum duration of summer heatwaves (days) (right) in Spain by mid-21st century under SS5-8.5 scenario



Source: *Visor de Escenarios de Cambio Climático* (n.d.). Available at: https://escenarios.adaptecca.es/#&model=CMIP6-spain.average&variable=tasmax&scenario=ssp585&temporalFilter=year&layers=AREAS&period=MEDIUM_FUTURE&anomaly=RAW_VALUE.

Mediterranean storms and floods. Climate projections suggest that mean annual precipitation will decrease overall, while episodes of torrential rainfall will become more frequent and intense[754], increasing the risk of pluvial and fluvial floods. For example, the devastating floods in eastern Spain in October 2024, which killed over 200 people, were estimated to have been made more intense by climate change[755]. As a Mediterranean country, Spain has also faced an increase in catastrophic flash floods, often linked to 'DANA' (*Depresión Aislada en Niveles Altos*) storms, with the major flood events in 2021 and 2023 formally declared a serious and imminent risk (*riesgo grave e inminente*). Sudden storms and floods pose a range of

[753] FIRE-RES (2024) *Health risks in wildfires: Fire-RES partner IDAEA-CSIC investigates particle exposure for firefighters in Catalonia.* Available at: https://fire-res.eu/health-risks-in-wildfires-fire-res-partner-idaea-csic-investigates-particle-exposure-for-firefighters-in-catalonia; Alari, A., Ballester, J., Milà, C., Benmarhnia, T., Sofiev, M., Uppstu, A., Hänninen, R., and Tonne, C. (2025) Quantifying the short-term mortality effects of wildfire smoke in Europe: a multicountry epidemiological study in 654 contiguous regions, *The Lancet Planetary Health,* 9(8), 101296. https://doi.org/10.1016/j.lanplh.2025.101296; Caamano-Isorna, F., Figueiras, A., Sastre, I., Montes-Martínez, A., Taracido, M. and Piñeiro-Lamas, M. (2011) Respiratory and mental health effects of wildfires: an ecological study in Galician municipalities (north-west Spain), *Environmental Health,* 10, 48. https://doi.org/10.1186/1476-069X-10-48.

[754] MITECO (2018) *Incorporación del cambio climático en la evaluación preliminar del riesgo de inundación (EPRI) en el segundo ciclo de aplicación de la Directiva de Inundaciones (2007/60/CE).* Metodología general. Available at: https://www.miteco.gob.es/es/agua/temas/gestion-de-los-riesgos-de-inundacion/cambio-climatico-en-la-epri-metodologia-general_tcm30-485704.pdf;
Ministry for the Ecological Transition and the Demographic Challenge (MITECO) (2024) *National Climate Change Adaptation Plan 2021-2030*, p. 26. Available at: https://unfccc.int/sites/default/files/resource/2024-NAP-Spain-English.pdf.

[755] World Weather Attribution (2024) *Extreme downpours increasing in southern Spain as fossil fuel emissions heat the climate*. Available at: https://www.worldweatherattribution.org/extreme-downpours-increasing-in-southern-spain-as-fossil-fuel-emissions-heat-the-climate/; World Meteorological Organisation (2024) *Devastating rainfall hits Spain – yet another flood-related disaster*. Available at: https://wmo.int/media/news/devastating-rainfall-hits-spain-yet-another-flood-related-disaster.

occupational risks: high waters and debris flows endanger workers in agriculture, construction, transport, and infrastructure, while indoor workers are affected by power outages, water damage, and unsafe building conditions[756]. Post-flood environments also increase exposure to infectious agents, adding another risk factor for outdoor workers.

Table 34: Summary of the main weather events and related OSH risks in Spain

Weather events	Occupational exposure	Key OSH risks	Key sectors
Heatwaves, droughts, and wildfires	Exposure to sunlight / UV radiation Work in poorly ventilated areas Exposure to endemic agents and diseases	Burns Heat strokes Dehydration Skin cancer Diseases	Construction Agriculture Forestry Transportation and logistics Manufacturing Mining and quarrying Tourism and hospitality Education and care services Laundries and dry cleaners
	Wildfire exposure	Respiratory issues and burns	Forestry Emergency services
Storms, heavy rainfall events and floods	Flooding of urban areas Flooding of areas adjacent to roads, insufficient drainage	Road accidents Exposure to contaminated waters Mental distress	Transportation Construction Manufacturing Maintenance Emergency services

Source: Author's own elaboration.

Current OSH legislation

Spain's legal framework for occupational safety and health has evolved significantly to address climate-related extremes, moving from a general duty of care to specific mandates for adverse weather events. Building on the foundational Prevention of Occupational Risks Act (LPRL)

[756] CCOO de Madrid (2025) *CCOO logra que la Inspección de Trabajo exija a la Comunidad de Madrid medidas urgentes de climatización en los centros educativos*. Available at: https://feccoo-madrid.org/noticia:735943--CCOO_logra_que_la_Inspeccion_de_Trabajo_exija_a_la_Comunidad_de_Madrid_medidas_urgentes_de_climatizacion_en_los_centros_educativos&opc_id=9f666eca08d47ba26c6a09927d7abbbb.

recent urgent decrees added climate-specific provisions through RDL 4/2023 (work suspension or adaptation during official heat alerts, extended protections to previously excluded groups like the self-employed) and RDL 8/2024 (weather-related prevention measures to be negotiated through collective bargaining). This is supported by technical guidance on heat stress, regional heat plans, and pioneering provisions for paid climate leave, creating a multi-layered system that combines general duties with specialised and increasingly worker-centric regulations.

General OSH framework and legal basis

Spain's foundational legal basis for occupational safety is the Prevention of Occupational Risks Act (Law 31/1995, *Prevención de Riesgos Laborales*, LPRL), which obliges employers to ensure a safe work environment at all times. This includes occupational hazards caused by natural phenomena, such as heat stroke or lightning, which are explicitly included in the definition of a "work accident" under Article 156 of the Working Conditions Act[757], preventing employers from dismissing them as force majeure.

Employers' obligations under the LPRL include risk assessments that must consider not only workplace conditions but also worker-specific factors, such as chronic health conditions that could be aggravated by external conditions, such as extreme heat[758]. Article 21 of the LPRL establishes that if workers face a "serious and imminent risk," they have a right to interrupt work and leave immediately[759]. Employers who prevent them from exercising this right face sanctions under the Law on Infractions and Sanctions in the Social Order[760].

However, despite the centrality of the LPRL, Article 21 does not apply universally: self-employed persons, domestic workers, and public service staff such as police or military are excluded. To address this gap, the government adopted urgent decree RDL 4/2023, which introduced an explicit mandate to include "adverse weather events, including extreme temperatures" in risk assessments. Employers must now suspend or adapt work during official orange/red alerts if safety is compromised[761]. This provision explicitly extends coverage to previously uncovered categories, including the self-employed, home-care workers, and temporary site workers. Adding to this, RDL 8/2024 further required that companies create

[757] Ministerio de Empleo y Seguridad Social (2015) *Real Decreto Legislativo 8/2015, de 30 de octubre, por el que se aprueba el texto refundido de la Ley General de la Seguridad Social.* Boletín Oficial del Estado, núm. 261. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-2015-11724&p=20250129&tn=1#a156.

[758] Interview with ITSS representatives [26 August 2025].

[759] Jefatura del Estado (1995) *Ley 31/1995, de 8 de noviembre, de Prevención de Riesgos Laborales.* Boletín Oficial del Estado, núm. 269, sec. I, p. 32590. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-1995-24292#a21.

[760] Europreven (2024) *¿Están obligados a trabajar los ciudadanos de las zonas afectadas por la lluvia?* Available at: https://www.europreven.es/noticia/690-estan-obligados-trabajar-los-ciudadanos-las-zonas-afectadas-por-lluvia-.

[761] Jefatura del Estado (2023) *Real Decreto-ley 4/2023, de 11 de mayo, por el que se adoptan medidas urgentes en materia agraria y de aguas en respuesta a la sequía y al agravamiento de las condiciones del sector primario derivado del conflicto bélico en Ucrania y de las condiciones climatológicas, así como de promoción del uso del transporte público colectivo terrestre por parte de los jóvenes y prevención de riesgos laborales en episodios de elevadas temperaturas*. Boletín Oficial del Estado. Available at: https://www.boe.es/eli/es/rdl/2023/05/11/4/con.

climate threat protocols, and that disaster- and weather-related prevention measures be agreed through collective bargaining[762], with further implementing regulations to be put forward by the Ministry of Labour and Social Economy in the near future[763].

Temperature-related provisions

While Spain has no fixed statutory upper or lower temperature limits, it relies on technical prevention notes issued by the National Institute for Safety and Health at Work (INSST), as the specialised technical body for OSH matters in Spain. These stipulate recommended comfort ranges (17–27°C)[764], thresholds for cold stress assessments (<10 °C)[765], and methodologies for heat stress assessment based on the WBGT Index[766]. Additional obligations derive from Royal Decrees such as RD 486/1997, which sets minimum requirements for workplace temperature, ventilation, and access to drinking water[767], and RD 1561/1995, which allows reduced working hours on exceptionally hot days without loss of pay[768].

On a seasonal basis, the National Plan of Preventive Actions on the Effects of Excessive Temperatures on Health adds an additional layer of protection. Between May and September, it activates territorial "health impact thresholds," based on local mortality–temperature

[762] The decree-law included amendment to Article 85.1 of the Workers' Statute Law, see also: ITSS (2025) *Guía de actuación inspectora Fenómenos meteorológicos adversos*. Available at: https://oeitss.gob.es/content/dam/oeitss/documentos/4-0-información-y-normativa/4-1-b-documentación-prl/15-FMA-web.pdf; Jefatura del Estado (2024) *Real Decreto-ley 8/2024, de 28 de noviembre, por el que se adoptan medidas urgentes complementarias en el marco del Plan de respuesta inmediata, reconstrucción y relanzamiento frente a los daños causados por la Depresión Aislada en Niveles Altos (DANA) en diferentes municipios entre el 28 de octubre y el 4 de noviembre de 2024*. Boletín Oficial del Estado, núm. 288. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-2024-24840.

[763] USO (2024) *Permiso climático y otras medidas de PRL*. Available at: https://www.uso.es/permiso-climatico-y-otras-medidas-de-prl; see also the interview with ITSS representatives [26 August 2025].

[764] INSST (1999) *NTP 501: Ambiente térmico: inconfort térmico local.* Available at: https://www.insst.es/documentacion/colecciones-tecnicas/ntp-notas-tecnicas-de-prevencion/14-serie-ntp-numeros-471-a-505-ano-1999/ntp-501-ambiente-termico-inconfort-termico-local.

[765] INSST (1998) *NTP 462: Estrés por frío: evaluación de las exposiciones laborales*. Available at: https://www.insst.es/documentacion/colecciones-tecnicas/ntp-notas-tecnicas-de-prevencion/13-serie-ntp-numeros-436-a-470-ano-1998/ntp-462-estres-por-frio-evaluacion-de-las-exposiciones-laborales; INSST (2015) *NTP 1036: Estrés por frío I: evaluación de las exposiciones laborales.* Available at: https://www.insst.es/documentacion/colecciones-tecnicas/ntp-notas-tecnicas-de-prevencion/30-serie-ntp-numeros-1031-a-1065-ano-2015/ntp-1.036-estres-por-frio-i-.

[766] The 2023 NTP for Heat Stress Risk Assessment, which details the methodology for assessing thermal conditions in the workplace using the WBGT Index; see also: INSST (2015) *NTP 1036: Estrés por frío I: evaluación de las exposiciones laborales.* Available at: https://www.insst.es/documentacion/colecciones-tecnicas/ntp-notas-tecnicas-de-prevencion/30-serie-ntp-numeros-1031-a-1065-ano-2015/ntp-1.036-estres-por-frio-i-; INSST (1994) *NTP 322: Valoración del riesgo de estrés térmico: índice WBGT.* Available at: https://www.insst.es/documentacion/colecciones-tecnicas/ntp-notas-tecnicas-de-prevencion/9-serie-ntp-numeros-296-a-330-ano-1994/ntp-322-valoracion-del-riesgo-de-estres-termico-indice-wbgt; INSST (2023) *NTP 1189: Evaluación del riesgo de estrés térmico: índice WBGT.* Available at: https://www.insst.es/documentacion/colecciones-tecnicas/ntp-notas-tecnicas-de-prevencion/36-serie-ntp-numeros-1176-a-1190-ano-2023/ntp-1189-evaluacion-del-riesgo-de-estres-termico-indice-wbgt.

[767] Ministerio de Trabajo y Asuntos Sociales (1997) *Real Decreto 486/1997, de 14 de abril, por el que se establecen las disposiciones mínimas de seguridad y salud en los lugares de trabajo*. Boletín Oficial del Estado, núm. 97. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-1997-8669.

[768] Ministerio de Trabajo y Seguridad Social (1995) *Real Decreto 1561/1995, de 21 de septiembre, sobre jornadas especiales de trabajo*. Boletín Oficial del Estado, núm. 230. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-1995-21346.

correlations[769]. This framework now includes paid climate leave and access to temporary layoff procedures (*los expedientes de regulación temporal de empleo*, ERTE) for work stoppages, a mechanism welcomed by SMEs for helping maintain employment during heat emergencies[770]. Regional authorities, in turn, issue guidance identifying high-risk sectors and recommending protective measures such as rescheduling work or adjusting tasks during orange/red alerts[771].

In some heat-exposed sectors, collective bargaining agreements increasingly operationalise these obligations. For instance, construction agreements in Andalusia[772] and Extremadura[773] stipulate that outdoor work must be suspended or rescheduled between 1:00 and 5:00 p.m. during extreme heat alerts. Such clauses demonstrate how negotiated solutions can complement statutory rules.

Floods, storms, and other emergencies

Beyond the general OSH law, specialised emergency planning legislation requires all companies to maintain emergency plans. As highlighted by INSST, such plans can integrate existing flood-risk mapping tools developed under EU flood directives, which obligate national authorities to identify high- and low-risk zones and make them publicly available[774]. Companies are expected to use this information, together with meteorological early-warning systems, when preparing their emergency protocols[775]. Additionally, the INSST offers guidance and scientific support via a range of materials, such as the Directory of Dangerous Work Situations (STP), which catalogues occupational risks arising from natural and atmospheric elements such as water,

[769] The system is supported with the broader civil protection warning system *Meteosalud*, managed by the *Observatorio de Salud y Cambio Climático*, publishes daily heat-risk maps with three-day forecasts. This complements civil-protection alerts, giving both citizens and workplaces timely information to adjust activities. See also: Government of Spain (2024) *The Ministry of Health activates the National Plan of Preventive Actions against the Effects of Excessive Temperatures on Health*. Available at: https://www.lamoncloa.gob.es/lang/en/gobierno/news/paginas/2024/20240516-plan-against-excessive-temperatures.aspx.

[770] Pascual Cortes, R. (2025) Las empresas que cometan infracciones por exponer al calor a sus empleados se enfrentan a multas de hasta casi un millón de euros, *Il País*. Available at: https://elpais.com/economia/2025-06-11/las-empresas-que-cometan-infracciones-por-exponer-al-calor-a-sus-empleados-se-enfrentan-a-multas-de-hasta-casi-un-millon-de-euros.html.

[771] Generalitat de Catalunya (n.d.) *Temperatures de risc.* Available at: https://treball.gencat.cat/ca/ambits/seguretat_i_salut_laboral/riscos_i_condicions_treball/mesures_per_risc/calor-estiu/temperatures-risc/.

[772] Junta de Andalucía (2023) *VI Convenio Colectivo General del Sector de la Construcción,* Artículo 166. Available at: https://www.juntadeandalucia.es/sites/default/files/inline-files/2023/06/1532_actualizacion-vi-convenio-general-del-sector-de-la-construccion.pdf.

[773] Ministerio de Trabajo y Economía Social (2023) *Resolución de 6 de septiembre de 2023, de la Dirección General de Trabajo, por la que se registra y publica el VII Convenio colectivo general del sector de la construcción*. Boletín Oficial del Estado, núm. 228, sec. III, p. 129033. Available at: https://boe.es/boe/dias/2023/09/23/pdfs/BOE-A-2023-19903.pdf.

[774] MITECO (2018) *Incorporación del cambio climático en la evaluación preliminar del riesgo de inundación (EPRI) en el segundo ciclo de aplicación de la Directiva de Inundaciones (2007/60/CE). Metodología general*. Available at: https://www.miteco.gob.es/content/dam/miteco/es/agua/temas/gestion-de-los-riesgos-de-inundacion/cambio-climatico-en-la-epri-metodologia-general_tcm30-485704.pdf.

[775] Interview with INSST representative [16 September 2025].

mud, snow, ice, and heat[776]. These resources provide recommendations on preventive measures and legal protections.

The government has recently reinforced these protections via the Royal Decree-Law 7/2024, which introduced a new entitlement to up to four days of paid climate leave for workers unable to access their workplace safely due to the DANA floods, alongside the possibility of temporary remote work where feasible[777]. This marked the first use of climate leave in Spanish law and aligned emergency response with OSH obligations, ensuring that workers are not forced to commute or remain at worksites in unsafe conditions.

Vulnerable workers and enforcement gaps

Spain's OSH framework recognises the need to protect vulnerable groups, though gaps remain. While RDL 4/2023 in principle extended coverage to precarious and migrant workers, protection in practice often depends on inspections and outreach[778]. Unions have repeatedly warned that migrant workers are overrepresented in agriculture and construction – sectors most exposed to extreme heat – and demanded stronger measures such as multilingual training, automatic recognition of heat stroke as a work accident, and targeted inspections in high-risk provinces[779]. Similarly, Spain's Public Health Strategy identifies Roma communities as a group requiring tailored preventive measures[780].

National policy frameworks and climate adaptation plans

Spain's national policy frameworks unevenly integrate climate-related occupational health risks, primarily within broader adaptation and health strategies. The National Climate Change Adaptation Plan (PNACC) explicitly aims to prevent climate impacts on workers' health, supported by concrete actions like inspection plans and employer guides. Regional and sectoral

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[776] The directory includes case studies of occupational risks arising from natural and atmospheric elements (water, mud, rain, snow, ice, etc.), which includes heat strokes. See also: INSST (2022) *BINVAC ACCIDENTES DE TRABAJO INVESTIGADOS*. Available at: https://www.insst.es/documents/94886/791388/BINVAC_042.pdf/b7ceb841-71b8-41c8-9d67-f869816df879?version=1.0&t=1663232610130;
INSST (n.d.) *102. Golpe de calor.* Available at: https://www.insst.es/stp/binvac/102-golpe-de-calor;
Junta de Andalucía (2018) *Pudo Haberse Evitado: Base de accidentes de trabajo investigados. Golpe de calor en invernadero.* Available at: https://www.juntadeandalucia.es/export/drupaljda/PHE_0060_2018.pdf.

[777] Jefatura del Estado (2024) *Real Decreto-ley 7/2024, de 11 de noviembre, por el que se adoptan medidas urgentes en materia de climatización con energías renovables en los centros del sistema nacional de salud*. Boletín Oficial del Estado, núm. 302, sec. I. Available at: https://www.boe.es/eli/es/rdl/2024/11/11/7; Europreven (2024) *¿Están obligados a trabajar los ciudadanos de las zonas afectadas por la lluvia?* Available at: https://www.europreven.es/noticia/690-estan-obligados-trabajar-los-ciudadanos-las-zonas-afectadas-por-lluvia-; Guardian staff and agencies (2024) Spain grants paid "climate leave" after floods, *The Guardian*. Available at: https://www.theguardian.com/world/2024/nov/29/spain-paid-climate-leave-floods.

[778] Interviews with Marouane Laabbas el Guennouni [17 July 2025] and INSST representative [16 September 2025].

[779] UGT (2025) *UGT alerta de la vulnerabilidad de las y los trabajadores inmigrantes ante las olas de calor y la necesidad de reforzar su protección.* Available at: https://www.ugt.es/ugt-alerta-de-la-vulnerabilidad-de-las-y-los-trabajadores-inmigrantes-ante-las-olas-de-calor-y-la.

[780] Ministry of Health (2023) *Public Health Strategy 2022,* p. 63. Available at: https://www.sanidad.gob.es/organizacion/planesEstrategias/saludPublica/docs/Estrategia_de_Salud_Publica_2022_version_ingles.pdf.

adaptation plans, however, often address OSH only implicitly. Meanwhile, the national Occupational Safety and Health Strategy (EESST 2023–2027) frames climate preparedness as a key objective, though regional uptake varies. Emerging coordination mechanisms, like the inter-ministerial Working Group on Vulnerabilities, signal growing recognition, but explicit worker safety measures remain underdeveloped in energy, transport, and agricultural policies.

Climate adaptation: gradual inclusion of workers' safety, predominantly from extreme heat

In the climate adaptation domain, Spain's National Climate Change Adaptation Plan (PNACC) provides the central framework for adaptation measures across policy areas, including health. Its most recent iteration (2021–2030) explicitly identifies occupational health within the health sector, with the stated objective of "preventing occupational health risks from climate change"[781]. This commitment is operationalised through Line of Action 2.5, which includes:

- Continued use and refinement of the National Plan of Preventive Actions against the effects of climate change on workers' health[782], and
- Developing recommendations to help companies identify the potential impacts of climate change on workers' health and incorporate prevention measures. The PNACC Programme of Work 2021–2025 goes further, setting concrete actions such as a Labour Inspection Plan against heat-stroke risk (Measure A02.L5.M01[783]) and a Guide on occupational health and climate change for employers and prevention services (Measure A02.L5.M02[784])[785].

Regional and sectoral adaptation plans only implicitly address occupational health. Most autonomous communities focus on infrastructure, energy, or urban planning, with few references to workplace risks. Likewise, sectoral strategies such as the Railway Administration's

[781] MITECO (2021) *National Climate Change Adaptation Plan 2021-2030 (PNACC)*, Section 7.2, p. 57. Available at: https://www.miteco.gob.es/content/dam/miteco/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/pnacc-2021-2030-en_tcm30-530300.pdf.

[782] Ministry of Health (2025) *Plan nacional de actuaciones preventivas de los efectos del exceso de temperature sobre la salud 2025.* Available at: https://www.sanidad.gob.es/areas/sanidadAmbiental/riesgosAmbientales/calorExtremo/publicaciones/docs/planNacionalExcesoTemperaturas_2025.pdf.

[783] Measure A02.L5.M01: The Labor Inspection Plan to combat heat stroke risks is marked as a target action for 2021–2025, and is meant to coordinate increased inspection of health and safety conditions of workers in the summer period to reduce the risks arising from the thermal conditions.

[784] Measure A02.L5.M02: Envisioned for design during 2022–2023 as a practical guide for identifying potential risks derived from climate change in the workplace and for the design and application of prevention measures.

[785] MITECO (2021) *Programa de Trabajo 2021-2025 (PT1-PNACC)*. Available at: https://www.miteco.gob.es/content/dam/miteco/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/PT1-PNACC.pdf.

2018–2030 Climate Change Action Plan[786], the Adaptation Strategy for the Spanish Coast[787], and the National Green Infrastructure Strategy all emphasise ecological resilience and nature-based solutions but leave OSH considerations implicit.

Health and OSH domain: broad recognition, but uneven regional uptake

Climate and occupational health are increasingly visible in public health strategies[788], but attention remains uneven across regions. At the national level, the Health and Environment Strategic Plan 2022–2026 (PESMA) adopts a One Health approach, integrating climate, biodiversity, and environmental determinants into its risk framework[789]. PESMA explicitly acknowledges occupational health as a distinct priority and calls for training and capacity-building for prevention services of unions and companies to protect workers from climate-related risks[790]. Regional health–environment plans, however, vary. Some (Asturias[791], Extremadura[792], and Catalonia[793]) note climate–health linkages but focus primarily on extreme heat responses. Others, such as La Rioja[794] and Madrid[795], also address cold spells. OSH integration remains limited: Asturias' plan even states that OSH falls outside its scope due to separate regulatory regimes[796].

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[786] *Plan de Lucha Contra el Cambio Climático 2018-2030*. Available at: https://www.adif.es/documents/20124/1809001/PLCCC_publicacion.pdf/972137a7-0407-2f05-4164-3934fe12c0a0?t=1620648275372.

[787] MITECO (n.d.) *Estrategia de Adaptación al Cambio Climático de la Costa Española 2018-2030 Resumen.* Available at: https://www.miteco.gob.es/content/dam/miteco/es/costas/temas/proteccion-costa/estrategiaadaptacionccaprobada_tcm30-420088.pdf.

[788] Ministerio de Sanidad (n.d.) *Planes y Estrategias.* Available at: https://www.sanidad.gob.es/organizacion/planesEstrategias/home.htm.

[789] Ministerio de Sanidad and Ministerio para la Transición Ecológica y el Reto Demográfic o(2022) *Plan Estratégico de Salud y Medio Ambiente 2022-2026*. Available at: https://www.sanidad.gob.es/organizacion/planesEstrategias/pesma/docs/241121_PESMA.pdf.

[790] Ibid. p. 69.

[791] Gobierno del Principado de Asturias (2019) *Plan de Asturias de Salud y Medio Ambiente.* Available at: https://www.astursalud.es/documents/35439/38124/Plan+de+Asturias+de+Salud+y+Medio+Ambiente+%28PASYMA%29.pdf/d3507eb6-4454-08c7-2a2c-c61dced2858f?t=1566202384783.

[792] Plataforma sobre Adaptación al Cambio Climático en España (n.d.) *Extremadura.* Available at: https://adaptecca.es/comunidades-autonomas/extremadura.

[793] Generalitat de Catalunya (n.d.) *Programa de Salut Pública i Canvi Climàtic.* Available at: https://salutpublica.gencat.cat/ca/ambits/proteccio/programa-salut-publica-canvi-climatic/index.html#googtrans(cales).

[794] Gobierno de La Rioja (n.d.) *IV Plan de Salud de La Rioja 2030.* Available at: https://web.larioja.org/landing/plan-salud-2030/files/IVPLanSalud.pdf.

[795] Comunidad de Madrid (2020) *Plan de Vigilancia y Control de los Efectos del Frío en la Salud de la Comunidad de Madrid.* Available at: https://www.comunidad.madrid/sites/default/files/doc/sanidad/epid/plan_vigilancia_y_control_efectos_del_frio_en_la_salud_cm_nov_2020_.f.pdf.

[796] Gobierno del Principado de Asturias (2019) *Plan de Asturias de Salud* y Medio *Ambiente.* Available at: https://www.astursalud.es/documents/35439/38124/Plan+de+Asturias+de+Salud+y+Medio+Ambiente+%28PASYMA%29.pdf/d3507eb6-4454-08c7-2a2c-c61dced2858f?t=1566202384783.

Spain's OSH agenda is informed on the national level through the Strategy for Safety and Health at Work (EESST)[797], whose 2023–2027 iteration – developed by the Ministry of Labour with the autonomous communities and social partners – places workplace preparedness for climate risk as a key objective[798]. The strategy frames climate change within "emerging risks," highlighting prevention, vulnerable groups, and awareness-raising[799]. Regionally, strategies show uneven uptake. Some, such as Madrid[800], Aragon[801], Galicia[802] and Murcia[803] integrate climate and weather-related risks into their strategies, mostly as action points on risk assessment procedures and awareness campaigns. Madrid's VII Plan is particularly explicit: it includes objectives on extreme weather, solar radiation, and air quality, directly responding to evaluation of its 2021–2024 plan that found company-level gaps in planning for cold, floods, and pollution[804]. By contrast, some regional strategies, such as Catalonia's and Basque County's, have not included similarly detailed measures.

[797] Approved by the Council of Ministers based on the consensus between the General State Administration, the Autonomous Communities and the social partners, with projects financed and overseen by the Ministry of Labour and Social Economy and the Ministry of Inclusion, Social Security and Migration.

[798] INSST (2023) *Estrategia Española de Seguridad y Salud en el Trabajo 2023-2027*, Objective 2. Available at: https://www.insst.es/documents/94886/4545430/Estrategia+Espa%C3%B1ola+de+Seguridad+y+Salud+en+el+Trabajo+2023-2027.pdf/793be632-afe9-c738-320a-a0908dcd6110?t=1679059860069.

[799] Ibid.

[800] Comunidad de Madrid (2023) *VII Plan Director de Prevención de Riesgos Laborales de la Comunidad de Madrid,* p. 94. Available at: https://www.comunidad.madrid/transparencia/informacion-institucional/planes-programas/vii-plan-director-prevencion-riesgos-laborales-comunidad.

[801] Action 4.15 *('Develop outreach and awareness-raising actions to promote the detection, diagnosis and prevention of the risks that climate change produces in the workplace, with health effects on workers due to extreme weather events, exposure to solar radiation or epidemic diseases, among other examples')*, p. 39. See: Gobierno de Aragón (2022) *Estrategia Aragonesa de Seguridad y Salud Laboral 2022-2027*, p. 39. Available at: https://www.aragon.es/documents/20127/2185542/ESTRATEGIA+ARAGONESA+SEGURIDAD+Y+SALUD+LABORAL+2022-2027.pdf/286e4418-9f22-0c96-eb25-748f3a1fee51?t=1662981477095.

[802] Objective 3.2.6. *('Risks arising from the ecological and climate transition. Solar panels. Extreme temperatures and work')*, p. 76.

[803] Objective 3 *('Adapting occupational risk prevention to emerging risks arising from new production processes and new forms of work organization, demographic evolution and climate change')*, Actions 3.3.1. (*'Awareness campaign on the risk of heat stress')* and 3.4.1 *("Addressing the problem of high environmental temperatures in work centers and workplaces, intensifying prevention, surveillance and control measures', measured by the number of workplaces inspected).* pp. 48–49.

[804] Objective 2 *('Reduction of occupational risks arising from extreme weather events')*, including:
OE1: Identify occupational risks associated with extreme weather events and establish measures to mitigate their effects on the work environment, with special attention to biological risks.
OE2: Analysis and management of risks associated with rising temperatures and exposure to solar radiation.
OE3: Promote a culture of prevention and safety at work, promoting safe behavior and raising awareness about the risks associated with extreme weather events.
These objectives are a direct response to a study conducted under the previous plan (2021–2024), which found that despite widespread adoption of heat protocols, companies lacked plans for other weather-related impacts, such as cold spells, UV radiation, and extreme events such as intense rainfall and floods. The study emphasised incorporating indirect effects (air quality) and individual factors (age, health) and offered templates and guidance on initiating participatory discussions on preventive measures. See CCOO de Madrid (2023) *Estudio sobre el impacto del cambio climático en las condiciones de trabajo y la salud laboral.* Available at: https://adaptecca.es/sites/default/files/documentos/estudio-impacto-del-cambio-climatico-comprimido.pdf.

Institutional coordination: emerging mechanisms

Institutional coordination between environment, health, and labour is developing but remains limited. A notable step was the July 2025 creation of the Working Group on Vulnerabilities and Climate Change under the *Observatorio de Salud y Cambio Climático*, led by the Ministry of Social Rights with participation from Health, Environment, and Science ministries, alongside civil society stakeholders[805]. The group is tasked with analysing fair climate-adaptation measures from a public health perspective and fostering inter-ministerial coordination. While focused primarily on vulnerable populations (elderly, children, people with chronic illness), the group explicitly highlights occupational exposure in agriculture and construction as a climate vulnerability[806].

Other frameworks: weak interlinkages with OSH

In other domains, climate–OSH linkages remain underdeveloped. In the energy domain, the National Energy and Climate Plan 2021–2030, Spain's central energy transition strategy, focuses on ecological and economic adaptation. The plan only mentions working population in terms of just transition measures (e.g., reskilling and employment for workers in the mining industry[807]. Nonetheless, it acknowledges the PESMA and EESST as complementary frameworks, citing the latter's research agenda on climate change and workers[808].

Similarly, National Adaptation Strategy for Transport Infrastructure under the Ministry of Transport, Mobility and Urban Agenda addresses infrastructure resilience but contains no explicit worker safety dimension, despite construction and maintenance crews being highly exposed. In the agricultural sector, the CAP Strategic Plan for Spain (PEPAC) 2023-2027 outlines Spain's interventions to improve sustainability, resilience, and compliance with environmental and climate goals, but does not include explicit OSH or worker-extreme weather protection clauses[809].

Finally, Spain's National Civil Protection Strategy 2021–2035[810] and related State Plan for Civil Protection against Flood Risk and Special Plans against Forest Fires do include labour

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[805] Ministerio de Derechos Sociales, Consumo y Agenda 2030 (2025) *El Grupo de Trabajo sobre Vulnerabilidades y Cambio Climático analizará medidas de adaptación climática justa desde el ámbito de la salud pública*. Available at: https://www.dsca.gob.es/es/comunicacion/notas-prensa/grupo-trabajo-vulnerabilidades-cambio-climatico-analizara-medidas.

[806] Ibid.

[807] Government of Spain (2020) *Spain's Integrated National Energy and Climate Plan 2021-2030 (NECP)*. Available at: https://cdn.climatepolicyradar.org/navigator/ESP/2020/spain-s-integrated-national-energy-and-climate-plan-for-2021-2030_2ec27c493896ab9e1c606ac4990c5c67.pdf.

[808] Ibid. p. 723.

[809] Ministerio de Hacienda (n.d.) *Common Agricultural Policy*. Available at: https://fondoseuropeos.gob.es/en-gb/Paginas/agr%C3%ADcola.aspx.

[810] Sistema Nacional de Protección Civil (2021) *Plan Nacional de Reducción del Riesgo de Desastres Horizonte 2035*. Available at: https://www.interior.gob.es/opencms/pdf/archivos-y-documentacion/documentacion-y-publicaciones/publicaciones-descargables/proteccion-civil/Horizonte_2035_spa_eng_126230080.pdf.

considerations indirectly (vis-a-vis firefighters, emergency services, civil protection volunteers), but do not systematically connect to OSH frameworks.

Labour inspectorates and enforcement

Spain's Labour and Social Security Inspectorate (ITSS) is the country's main body overseeing a range of occupational safety-related activities, including compliance monitoring, technical assistance, arbitration, and inspection actions, as established under Law 23/2015 of 21 July 2015. Physical inspections are conducted by local teams of labour inspectors across the 50 provinces[811], guided by priorities set out in strategic multi-year plans (*Plan Estratégico*). The latest plan (2025–2027), for example, identifies key priorities as fraud prevention, equal treatment, and the effects of emerging technologies[812], with climate change mentioned only under Action 13, committing ITSS to "combating climate change and its effects" by "anticipating risks arising from transitions"[813].

While the inspectorate is not formally mandated to trigger inspections specifically based on extreme weather events, recent legislation, including the aforementioned Royal Decree 8/2024, has placed adverse meteorological phenomena more prominently within the scope of Spain's labour inspection system[814]. Heat hazards, in particular, have gained attention: since 2021, the ITSS has conducted additional inspections in high-risk sectors during the summer months under the *Plan Estival*[815]. For instance, according to *El País*, in June 2024 inspectors issued approximately 112,000 warning letters to firms in sectors such as construction, agriculture, gardening, and hospitality, urging the adoption of heat-prevention measures[816]. In 2025, the campaign was expanded, with Minister Díaz announcing intensified monitoring of heat risks and

811 Government of Spain (2018) Real Decreto 192/2018, de 6 de abril, por el que se desarrolla la estructura orgánica básica del Ministerio de Trabajo, Migraciones y Seguridad Social. *Boletín Oficial del Estado*, núm. 85, sec. I, p. 2.

812 INAP (2025) *Plan Estratégico de la Inspección de Trabajo y Seguridad Social 2025-2027,* 12 September. Available at: https://laadministracionaldia.inap.es/noticia.asp?id=1258468.

813 Ministerio de Trabajo y Economía Social (2025) Resolución de 8 de septiembre de 2025, de la Secretaría de Estado de Trabajo, por la que se publica el Acuerdo de Consejo de Ministros de 26 de agosto de 2025, por el que se aprueba el Plan Estratégico de la Inspección de Trabajo y Seguridad Social 2025-2027. *Boletín Oficial del Estado*, núm. 220, sec. I, p. 119007. Available at: https://boe.es/boe/dias/2025/09/12/pdfs/BOE-A-2025-18078.pdf.

814 Jefatura del Estado (2024) Real Decreto-ley 8/2024, de 28 de noviembre, por el que se adoptan medidas urgentes complementarias en el marco del Plan de Respuesta Inmediata, Reconstrucción y Relanzamiento para hacer frente a los daños ocasionados por la Depresión Aislada en Niveles Altos (DANA) en diversos municipios entre el 28 de octubre y el 4 de noviembre de 2024. *Boletín Oficial del Estado*, núm. 287, sec. I, p. 1. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-2024-24840.

815 Salas, S. (2024) ¿Podemos prevenir los riesgos laborales durante los fenómenos climáticos extremos? El papel de la normativa, *Por Experiencia*. Available at: https://porexperiencia.com/condiciones-laborales/podemos-prevenir-los-riesgos-laborales-durante-los-fenomenos-climaticos-extremos-el-papel-de-la-normativa/; Interview with ITSS representatives [26 August 2025].

816 Pérez, G. R. (2024) Trabajo enviará 112.000 cartas a las empresas para que eviten que las altas temperaturas del verano perjudiquen a sus empleados, *EL PAÍS*. Available at: https://elpais.com/economia/2024-06-21/trabajo-enviara-112000-cartas-a-las-empresas-para-que-eviten-que-las-altas-temperaturas-del-verano-perjudiquen-a-sus-empleados.html.

targeted information campaigns for agriculture, construction, hospitality, commerce, and informal sectors. Non-compliance carries substantial fines[817].

The inspectorate has also developed an action guide for inspections addressing a wide range of adverse weather phenomena, including rain, snowfall, fog, wind, storms, extreme temperatures, coastal events, and avalanches[818]. The guide, issued under the Spanish Occupational Health and Safety Strategy (2023–2027), provides a checklist for inspectors to assess company preparedness, including the use of AEMET's *Meteoalerta Plan* and alignment of response measures with civilian protection laws[819].

While some longitudinal studies indicate the overall declining rates of heat-related occupational accidents (partly attributed to the legislative frameworks and prevention strategies[820]), more recent evidence still points to persistent implementation gaps. A 2023 CALORADAPT survey found that less than one-third of workers consider heat protection measures in their workplaces adequate. The survey also revealed that 37% of workers reported the absence of a heat management plan, and 33% were uncertain whether one existed[821].

Data collection and reporting

Spain's primary data collection on occupational accidents (*accidentes de trabajo*) and diseases (*enfermedades profesionales*)[822] is managed by the Ministry of Labour and Social Economy (MITES). The system collects granular data on occupational injuries using a combination of its own methodology and that of the European Statistics on Accidents at Work (ESAW), which requires employers to report accidents through a standardised electronic system.

Accident data is captured across multiple dimensions, including deviation events, injury types, material agents, time of occurrence, activity performed, and injury severity metrics. Two coding dimensions in particular enable partial tracking of extreme temperature-related incidents. First, the material agents category includes physical phenomena and natural environment elements

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817 Pascual Cortés, R. (2025) Las empresas que cometan infracciones por exponer al calor a sus empleados se enfrentan a multas de hasta casi un millón de euros, *El País*. Available at: https://elpais.com/economia/2025-06-11/las-empresas-que-cometan-infracciones-por-exponer-al-calor-a-sus-empleados-se-enfrentan-a-multas-de-hasta-casi-un-millon-de-euros.html; INSST (2025) *Presentación del Plan Estival 2025. Yolanda Díaz: "Lo que queremos es prevenir y no reparar".* Available at: https://www.insst.es/noticias-insst/presentacion-plan-estival-2025.

818 ITSS (2025) *Guía de actuación inspectora Fenómenos meteorológicos adversos*. Available at: https://oeitss.gob.es/content/dam/oeitss/documentos/4-0-información-y-normativa/4-1-b-documentación-prl/15-FMA-web.pdf.

819 ITSS (2025) *Guía de actuación inspectora Fenómenos meteorológicos adversos*. Available at: https://oeitss.gob.es/content/dam/oeitss/documentos/4-0-información-y-normativa/4-1-b-documentación-prl/15-FMA-web.pdf.

820 Díaz, J., Carmona, R., Mirón, I.J., Luna, M.Y., and Linares, C. (2018) Time trend in the impact of heat waves on daily mortality in Spain for a period of over thirty years (1983–2013), *Environment International,* 116, 10–17. Available at: https://doi.org/10.1016/j.envint.2018.04.001.

821 Salas Nicás, S. and Di Stasi, M. (2024) *Informe de Resultados Encuesta CALORADAPT: Condiciones de trabajo y salud laboral frente al calor.* Available at: https://1mayo.ccoo.es/78d0b1e496ef36565ed6f928cec753cf000001.pdf.

822 The dataset on occupational injuries does not account for any natural phenomena among the factors contributing to occupational diseases. Some indicators could be implicitly relevant for extreme weather events (such as various vector-borne diseases among the biological factors) but would not allow capturing natural hazards as contributing or causal agents.

(ESAW Category 20), which can be recorded as contributing factors. Second, injury types, since 2020, incorporate temperature-related codes for heatstroke and sunstroke (*Calor e insolación*), effects of low temperatures (*Efectos de las bajas temperaturas*), and other effects of extreme temperatures (*Otros efectos de las temperaturas extremas*)[823]. *Table 35* below lists injury-related dimensions from MITES' workplace accident methodology.

Table 35: Injury-related indicators used by MITES in the occupational accident dataset (demographic and administrative indicators are not included)

Indicator	Description	Coding system
Traffic accident (*Accidente de tráfico*)	Whether the accident occurred in a traffic context	Yes / No
Location type (*Tipo de lugar del accidente*)	The physical location of the worker at the time of the accident	ESAW (at usual place of work; while commuting during the working day; on the way to or from work; at another work center or place of work)
Work type (*Tipo de trabajo realizado*)	The general category of work being performed	ESAW (e.g., manual work, operating machinery, driving, presence)
Specific physical activity (*Actividad física específica*)	The precise physical action at the moment of the accident	ESAW (e.g., 61 – walking, running; 51 – lifting; 13 – operating a machine)
Deviation (*Desviación*)	The initial event that deviated from the normal course of work and led to the accident	ESAW (e.g., 50 – Fall of a person; 40 – Loss of control of machinery, hand-held tools, objects, etc.; 20 – Spill, leak, emission of material; 10 – Electrical problem, explosion, fire)
Form of contact (*Forma de contacto*)	The manner of injury, i.e., how the injury was inflicted	ESAW (40 – Hit by a moving object; 50 – Contact with a sharp, pointed agent; 60 – Trapped, crushed; 10 – Contact with electric current, fire, extreme temperatures, substances)
Material agents (*Agentes materiales*)	The object, substance, or physical element	ESAW (8-digit codes recording three agents per accident (1)

[823] MITES (n.d.) *Informe Metodológico Estandarizado de Estadísticas de Accidentes de Trabajo (ATR).* Available at: https://www.mites.gob.es/estadisticas/eat/Informe_Metodologico_Estadarizado_ATR.pdf.

Indicator	Description	Coding system
	that was most closely associated with the injury	associated with the specific physical activity, (2) associated with the deviation, and (3) associated with the form of contact) Relevant for extreme weather: Category 20 – Physical phenomena and natural environment (20.02: Elements of the natural environment (water, earth, rain, hail, snow, ice, etc.); 20.03: Factors from natural forces (e.g., lava, flood wave, fire))
Nature of injury (*Descripción de la lesión*)	The type of physical harm sustained	DELTA/ESAW Relevant for extreme weather (extreme temperatures): 101 – Heat stroke and sunstroke; 103 – Effects of low temperatures, e.g., hypothermia; 102 – Effects of non-thermal radiation
Accident severity (*Gravedad del accidente*)	The outcome severity of the accident	ESAW/MITES (1 – Minor; 2 – Serious; 3 – Very Serious; 4 – Fatal)
Accident context (*Lugar del accidente*)	Whether the accident happened at the workplace or during a commute	MITES (During work hours; During commute)

Source: Author's own elaboration.

In addition to injury-specific indicators, the dataset is comprehensively disaggregated by economic activity (NACE-2009), regional distribution (down to Autonomous Community and provincial levels), employment characteristics (contract type, company size, preventive organisation mode), as well as demographic variables and occupational categories. This multidimensional reporting facilitates the identification of vulnerable groups and emerging risk trends.

However, granular data on material agents and nature of injury is not typically featured in MITES' annual reports, which emphasise broader accident trends[824]. More detailed breakdowns,

[824] MITES (2023) ESTADÍSTICA DE ACCIDENTES DE TRABAJO Año 2022. Available at: https://www.mites.gob.es/estadisticas/eat/eat22/Resumen_resultados_ATR_2022.pdf; INSST (2023) *Informe Anual de Accidentes de Trabajo en España: Datos 2023*. Available at: https://www.sesst.org/wp-content/uploads/2024/09/fb20a685-d44d-8f99-50b4-59a546a3608b.pdf.

including statistics on the injury type by severity and accident context (on-site or in transit), are available in official yearbooks[825]. Heat-related accident statistics are also tracked against heatwave periods by the INSST, indicating their use in informing policy campaigns[826].

Despite Spain's relatively detailed data compared to many other EU countries, current statistics on heat-related accidents do not allow precise attribution to weather impacts[827], prompting social partners to call for improved accident attribution and reporting[828]. Systematic tracking of occupational accidents linked to other extreme weather events (such as floods, storms, or wildfires) is currently absent, highlighting a significant gap in Spain's OSH data system.

Role of social partners

Social partners play a visible but uneven role in shaping Spain's response to weather-related occupational safety and health risks. While they influence strategies, protocols, and awareness campaigns, they are not always involved in devising legislative instruments.

Spain's labour governance system traditionally relies on consultation with trade unions and employer organisations, with the National Commission for Safety and Health at Work (CNSST) serving as the main tripartite platform for OSH negotiations. Social partners are represented in the drafting of broader frameworks, such as the 2023–2027 OSH strategy and the national heat prevention protocol. The recently adopted RDL 8/2024[829] codifies collective negotiation as a requirement for developing action protocols for adverse weather events – a measure long demanded by trade unions. However, consultation has not been systematic: the government bypassed extended tripartite negotiation when adopting RDLs 4/2023 and 5/2023 on heat and floods under emergency procedures[830].

Trade unions (USO, CCOO, UGT, ISTAS) have been vocal advocates for stronger protection against extreme heat. They lobby for the inclusion of climate risks in the revised Law on the

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825 MITES (2024) *Anuario de Estadísticas del Ministerio de Trabajo y Economía Social 2023: Accidentes de Trabajo*, (ATR-27). Available at: https://www.mites.gob.es/ficheros/ministerio/estadisticas/anuarios/2023/ATR/ATR.pdf.

826 INSST (2025) *El INSST alerta de que los accidentes laborales aumentan un 17% durante las olas de calor.* Available at: https://www.insst.es/noticias-insst/el-insst-alerta-de-que-los-accidentes-laborales-aumentan-un-17-durante-las-olas-de-calor.

827 Narocki, C. (2021*) Heatwaves as an occupational hazard: The impact of heat and heatwaves on workers' health, safety and wellbeing and on social inequalities,* ETUI. Available at: https://www.etui.org/sites/default/files/2021-11/Heatwaves%20as%20an%20occupational%20hazard%20The%20impact%20of%20heat%20and%20heatwaves%20on%20workers'%20health%2C%20safety%20and%20wellbeing%20and%20on%20social%20inequalities-2021.pdf.

828 ISTAS (2019) *Guía para la evaluación y prevención del riesgo de estrés térmico por exposición a calor.* Available at: https://istas.net/sites/default/files/2019-04/Guia%20EstresTermico%20por%20exposicion%20a%20calor_0.pdf; UGT-Servicios Públicos (2024) *Ante las temperaturas extremas, exige tus derechos.* Available at: https://ugt-sp.es/ante-las-temperaturas-extremas-exige-tus-derechos-2/.

829 Jefatura del Estado (2024) *Real Decreto-ley 8/2024, de 28 de noviembre, por el que se adoptan medidas urgentes complementarias en el marco del Plan de Respuesta Inmediata, Reconstrucción y Relanzamiento para hacer frente a los daños ocasionados por la Depresión Aislada en Niveles Altos (DANA).* Boletín Oficial del Estado, núm. 288, sec. I, p. 1. Available at: https://www.boe.es/buscar/act.php?id=BOE-A-2024-24840.

830 UGT (2023) *El Gobierno regula la protección de las personas trabajadoras frente a las olas de calor.* Available at: https://www.ugt.es/el-gobierno-regula-la-proteccion-de-las-personas-trabajadoras-frente-las-olas-de-calor.

Prevention of Occupational Hazards (LPRL)[831] and for stricter sanctions against companies failing to meet heat-protection obligations[832]. Beyond lobbying, unions produce practical tools such as guidance notes and best-practice catalogues[833], run awareness campaigns[834], develop model protocols[835], and negotiate targeted seasonal agreements, such as the 2023 heat protocol signed by ASELIP, UGT-SP, CCOO del Hábitat, and CG for Madrid's cleaning services[836]. Employers' associations also contribute, albeit less systematically, often by supporting awareness and training campaigns: for instance, Proexport (part of FEPEX) collaborates with unions and authorities on heat-safety training for agricultural workers[837].

Atypical and vulnerable workers, including migrants and those in informal or precarious employment, generally lack direct representation in tripartite bodies. Their concerns are typically voiced through unions. UGT has repeatedly highlighted the particular vulnerability of migrant workers to extreme heat, issuing detailed demands: expedited revision of the LPRL to include climate risks, sector-specific heat protection plans, training adapted to linguistic and educational needs, strengthened labour inspections in high-risk areas, automatic recognition of heatstroke as an occupational accident, regularisation policies for irregular workers, and collective agreements with clauses on extreme weather[838].

Good practices and innovations

Legally enshrined climate leave and remote work provisions. The introduction of paid "climate leave" and the right to remote work via Royal Decree-Law 7/2024 for workers unable to safely

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831 UGT (2025) *UGT alerta de la vulnerabilidad de las y los trabajadores inmigrantes ante las olas de calor y la necesidad de reforzar su protección.* Available at: https://www.ugt.es/ugt-alerta-de-la-vulnerabilidad-de-las-y-los-trabajadores-inmigrantes-ante-las-olas-de-calor-y-la.

832 USO (2025) *El calor extremo, un riesgo laboral que exige protección y acción sindical*. Available at: https://www.uso.es/el-calor-extremo-un-riesgo-laboral-que-exige-proteccion-y-accion-sindical/.

833 ISTAS (2022) *La adaptación y la protección de la salud ante el cambio climático: Catálogo de experiencias y buenas prácticas en administraciones públicas y empresas.* Available at: https://www.adaptecca.es/sites/default/files/documentos/catalogo_saludapt_def.pdf; ISTAS (2019) *SALUDAPT. Estrategias territoriales para la adaptación y la protección de la salud ante el cambio climático.* Available at: https://istas.net/medio-ambiente/saludapt.

834 CCOO de Aragón (2018*) Campaña de prevención de riesgos laborales por altas temperaturas.* Available at: https://aragon.ccoo.es/73714263397a0b68c65ed829144be82a000051.pdf; Avilés Pozo, A. (2023) Trabajadores en el punto invisibilizado de los riesgos extremos*, El Diario*. Available at: https://www.eldiario.es/castilla-la-mancha/trabajadores-punto-invisibilizado-riesgos-extremo_1_1465179.html.

835 UGT (2024) *Cláusulas convencionales en materia de seguridad y salud laboral*. Available at: https://www.ugt.es/sites/default/files/2024_02_saludlaboralguianegcol_OK.pdf.

836 CCOO (2023) *Protocolo Actuación ante Ola de Calor para el Servicio de Limpieza de los Espacios Públicos de la Ciudad de Madrid y Servicio Especial de Limpieza Urgente de Madrid.* Available at: https://habitat.ccoo.es/ec321ad4ea17da715bcbae01504ec777000072.pdf.

837 PROEXPORT (2024) *Empresas de PROEXPORT activan las medidas de prevención contra los efectos de la ola de calor en trabajadores*. Available at: https://www.proexport.es/empresas-de-proexport-activan-las-medidas-de-prevencion-contra-los-efectos-de-la-ola-de-calor-en-trabajadores/.

838 UGT (2025) *UGT alerta de la vulnerabilidad de las y los trabajadores inmigrantes ante las olas de calor y la necesidad de reforzar su protección.* Available at: https://www.ugt.es/ugt-alerta-de-la-vulnerabilidad-de-las-y-los-trabajadores-inmigrantes-ante-las-olas-de-calor-y-la.

commute or work due to extreme weather events (such as DANA floods) represents a pioneering social protection measure, directly linking emergency response to OSH rights.

Multi-level heat alert system integrated with occupational health. The National Plan of Preventive Actions on the Effects of Excessive Temperatures activates region-specific health impact thresholds seasonally. This system provides a science-based framework for employers to mandate work suspensions or adaptations during official orange/red alerts, as required under RDL 4/2023.

Proactive and targeted labour inspection campaigns. The Labour and Social Security Inspectorate's (ITSS) annual *Plan Estival* involves large-scale, targeted inspections and pre-emptive warning letters to high-risk sectors (e.g., construction and agriculture) ahead of the summer heat season, backed by substantial fines for non-compliance.

Development of a comprehensive inspection guide for adverse weather. The ITSS's action guide provides inspectors with a standardised checklist to assess company preparedness for a wide range of meteorological phenomena (rain, snow, wind, heat, etc.), ensuring a consistent and informed enforcement approach across the country.

Tripartite development of a national OSH strategy with explicit climate objectives. The Spanish Strategy for Safety and Health at Work (EESST) 2023-2027, developed with social partners, explicitly frames climate change as an emerging risk and sets workplace preparedness as a key objective, driving a coordinated national response.

Mandating collective bargaining on weather-related prevention protocols. The recent RDL 8/2024 codifies the requirement for adverse weather action protocols to be developed through collective negotiation, empowering social partners to create tailored, sector-specific solutions that operationalise broader legal obligations.

Inter-ministerial working group on climate vulnerability and health. The establishment of a working group under the *Observatorio de Salud y Cambio Climático*, involving ministries for Health, Environment, and Science, fosters cross-sectoral coordination and recognises occupational exposure as a key climate vulnerability.

ANNEX 4. LIST OF STAKEHOLDERS CONSULTED

- EU institutions:
  - EU-OSHA
  - Eurofound
  - EU institution that preferred to stay anonymous
  - A European stakeholder with cross-country insight into OSH enforcement that preferred to stay anonymous
- EU-level social partners:
  - European Trade Union Confederation (ETUC)
  - European Federation of Building and Woodworkers (EFBWW)
  - An EU-level employer organisation that preferred to stay anonymous
  - A European trade union that preferred to stay anonymous
  - An EU-level SME organisation that preferred to stay anonymous
- National institutions:
  - Irish Health and Safety Authority
  - Spanish la Inspección de Trabajo y Seguridad Social (ITSS, Labour inspectorate)
  - Spanish INSST – Instituto Nacional de Seguridad y Salud en el Trabajo (OSH institute)
  - Polish national institution that preferred to stay anonymous
  - Polish national institution that preferred to stay anonymous
  - Polish Centralny Instytut Ochrony Pracy - Państwowy Instytut Badawczy
  - Italian Ministry of Labour and Social Policies (written response received)
  - Italian INAIL – Istituto nazionale per l'assicurazione contro gli infortuni sul Lavoro (OSH institute)
  - Finnish Institute of Occupational Health (FIOH) (2 interviews)
  - Finnish Occupational Safety and Health Administration (Labour inspectorate)
  - Lithuanian Valstybinė darbo inspekcija (Labour Inspectorate, written response received)
  - Lithuanian national institutions that preferred to stay anonymous

- Netherlands Labour Authority (Labour inspectorate, written response received)

- National social partners:
  - Irish employer organisation that preferred to stay anonymous
  - Pimec (Catalan SME organisation)
  - Federation of Lithuanian Forest and Forest Industry Workers' Trade Unions (written response received)
  - Lithuanian trade union "Solidarity"
  - Kaunas chamber of commerce, industry and crafts (Lithuanian SME organisation)
  - C.N.A. National Confederation of Crafts and Small and Medium-Sized Enterprises (Italian SME organisation)
  - Confartigianato Imprese (Italian SME organisation)
  - Italian regional social partner that preferred to stay anonymous
  - FNV – Dutch Federation of Trade Unions
  - VNO-NCW and MKB-Nederland – Dutch employers' organisations (joint secretariat)
  - The Central Organisation of Finnish Trade Unions (SAK)
  - Finnish employer organisation that preferred to stay anonymous

- Experts and researchers:
  - Marouane Laabbas el Guennouni from ETUI
  - Dr Ivan Williams Jimenez from IOSH
  - An academic expert that preferred to stay anonymous

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This study analyses the impacts of extreme weather events (heatwaves, floods, storms, droughts and cold spells) on occupational health and safety (OSH) across the European Union. It explores regional and sectoral vulnerabilities, examines effects on different worker groups, and elaborates on potential economic costs. The study reviews EU and national policy frameworks, identifies implementation gaps, and offers evidence-based recommendations to strengthen OSH systems in a changing climate. This document was prepared at the request of the Committee on Employment and Social Affairs (EMPL).

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