EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR EMPLOYMENT, SOCIAL AFFAIRS AND INCLUSION

Quality Jobs, Working Conditions and Social Dialogue
Health and Safety at Work, EU-OSHA

Doc. 014-25

The Advisory Committee on Safety and Health at Work

Opinion

Climate Change – extreme weather and other topics

Adopted on 10/12/2025

The Advisory Committee on Safety and Health at Work (ACSH)

HAVING REGARD TO:

- The EU "Strategic framework on health and safety at work 2021-2027 - Occupational safety and health in a changing world of work"[1] focuses on three crosscutting key objectives for the period and among them on anticipating and managing change in the new world of work brought about by the green, digital, and demographic transitions as well as on improving prevention of workplace accidents and illnesses.
- The EU OSH strategic framework acknowledges that climate change can also affect workers' safety and health, including through increased ambient temperature, air pollution and extreme weather.
- The EU Occupational safety and health (OSH) stocktaking summit, held in Stockholm on 15-16 May 2023, has identified climate change as "ongoing growing OSH issues that need intensified further consideration".
- The relevant EU legal framework on OSH and, in particular, directives 89/391/EEC (Framework Directive), 89/654/EEC (Workplace Directive), 92/57/EEC (Construction Sites Directive), 92/91/EEC & 92/104/EEC (Extractive Industries Directives), 93/103/EC (Fishing Vessels Directive) and 89/656/EEC (Personal Protective Equipment [PPE] Directive).
- The EU OSH legal acquis, including the Framework Directive 89/391/EEC[2], and in particular:
  - its Article 2 (Scope), which indicates that the Directive "*shall apply to all sectors of activity, both public and private (industrial, agricultural, commercial, administrative,*

[1] COM(2021) 323
[2] Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work, OJ L 183, 29.6.1989, p. 1–8.

service, educational, cultural, leisure, etc.)".
  - its Article 5 (General provision) which mentions that "*The employer shall have a duty to ensure the safety and health of workers **in every aspect related to the work**.*"
  - its article 6, where it states that "*the employer shall take the measures necessary for the safety and health protection of workers, including prevention of occupational risks*"
- The answers to a questionnaire directed to the ACSH members, collecting data among the Member States on existing legislation and policy documents, social partner initiatives & best practices, and technical & practical guidance (see annex 1 in this opinion).
- Data available in the OSH Barometer (EU-OSHA), regarding effects of climate change and its inclusion in the national strategies.
- The OSH Pulse 2025: Occupational safety and health in the era of climate and digital change.
- Other relevant references used by WP members in the preparation of the opinion.
- The mandate of the ACSH Working Party " Climate Change and OSH " adopted on 29/11/2023. In this mandate the COM requests to the ACSH to prepare a draft opinion for adoption by the ACSH in 2025
- The ACSH opinion "Climate Change – extreme weather conditions" adopted on 27/11/2024[3] prepared by the Working Party "Climate Change and OSH".

ADOPTS THE FOLLOWING OPINION:

1. BACKGROUND AND CONTEXT

Although the EU OSH Strategic Framework does not address the impact of climate change on occupational safety and health (OSH) in detail, it acknowledges that climate change can affect workers' safety and health through increased ambient temperature, air pollution and extreme weather events.

Moreover, the ACSH, during its plenary session on 29 November 2023, considered that climate change is an issue that needs to be addressed, as it may be considered as an emerging risk arising from changes that affect the world of work and may be the origin of health crisis. Consequently, the ACSH decided to include in its multiannual program, the establishment of a dedicated Working Party to analyse and provide opinions to the Commission on possible actions to mitigate the impact of climate change on the health and safety of workers.

According to the EU OSH Pulse Survey 2025[4], climate change related risks are already affecting a significant share of the EU workforce. Across the EU, one-third of workers (33%) report being exposed to at least one climate change-related risk factor at work. More specifically, 20% of workers report exposure to extreme heat (either indoors or outdoors) and 19% to air quality issues such as pollen, dust, or smoke (either indoors or outdoors). Lower shares of workers report being affected by intense sun exposure (12%) or extreme weather-related events (e.g. floods, wildfires, droughts, or hurricanes) (9%).

Exposure to climate change-related risk factors varies across sectors. For example, for indoor or outdoor air quality issues, such as pollen, dust or smoke: 30% of workers in agriculture, horticulture, forestry or fishing and 25% in building and construction report being exposed to this risk, compared to, for instance, 17% of workers in administration and support services,

[3] Doc. 016-24
[4] OSH-pulse-2025-climate-digital-change_EN.pdf

finance, professional, scientific or technical services and social, cultural, personal and any other Service.

The effects of climate change may increase psychosocial risks, potentially leading to negative effects on workers' health. The impact of climate change on psychological health is still not sufficiently well known, due to the novelty of the subject[5]; however, it's possible to advance that, in some specific sectors where effects of climate change are more extreme (such as emergency response, healthcare professionals and firefighters), the impact will be higher[6]. In consequence, actions to prevent its consequences must be adopted at the workplace level, as well as carrying out more research on the effects and its correlation to workers' health at EU and Member State level.

2. INTRODUCTION

2.1. Process followed by the WP

In 2025, the WP "Climate change and OSH" met 17 March, 15 April, 12 May, 26 May, 8 September, 8 October, 20 October, 24 October, 3 November, 4 November. A drafting subgroup on other topics than heat was created and met 3 July, 28 August, 18 September, 20 October.

1. A first meeting was organized with the aim to plan the tasks for this year.
2. Two drafting groups were created. One drafting group on heat which continued with the topic heat to follow up on the opinion that was adopted in the 2025 November plenary. And a second drafting group to write an opinion on the other topics than heat related to climate change.
3. A list of items to be addressed was elaborated by the WP members. This list of items was explored by the members of the subgroup. They prepared a state of the art of each identified item.
4. For each item, possible actions were identified, as well as the stakeholders involved in each of them
5. Finally, the WP extracted the recommendations for this opinion.

2.2. List of occupational risk factors related to climate change

The working party has considered a number of ways how climate change impacts OSH. In this opinion it has decided to focus on the other effects of climate change than heat at work, including extreme weather events as well as compound events, changing weather patterns, air quality, biological agents, chemical agents and toxic substances. In some specific sectors and occupations, workers are highly exposed due to the above list of risks. A description of the risks and consequences for workers is included in Annex 2.

3. RECOMMENDATIONS

The following recommendations identify necessary and appropriate actions to improve prevention of work-related accidents and illnesses related to exposure to extreme weather conditions and other climate change risks addressed in this opinion.

[5] EU-OSHA (2024). Eco-anxiety and its implications for occupational safety and health | Safety and health at work EU-OSHA

[6] EU-OSHA (2020). Review of the future of agriculture and occupational safety and health (OSH): foresight on new and emerging risks in OSH. https://osha.europa.eu/en/publications/future-agriculture-and-forestry-implications-managing-workersafety-and-health/view

Recommendations for the European Commission:

1. **Guidance Development (including micro enterprises and SME support):**

   The European Commission should consider, in the context of the preparation of the next EU OSH Strategic Framework, the need to develop guidance and tools for climate change related issues addressed in this opinion, in collaboration with national authorities, employer and worker representatives, and taking in to account the needs of enterprises of different size and in different sectors. The guidelines should contribute to awareness-raising, be practical, and include tailored OSH checklists for different sectors. This includes providing targeted guidance and tools for micro, small and medium-sized enterprises to help them integrate climate change-related risk factors into their workplace risk assessments, simplified methodologies, sector-specific examples, easy-to-use templates and if necessary, financial support.

2. **Digital Tools Utilisation:**

   Encourage the use of digital tools to disseminate good practices among various actors, especially in work environments with unexpected, fast-changing conditions, where quick access to reliable information is essential to avoid injuries and damage. Digital tools can also be useful for awareness raising campaigns, to disseminate guidance as well as to provide training among employers and workers. They can also help enforcement by facilitating data collection, processing and representation, for improving efficiency of preparedness and proactive OSH management.

3. Eurostat and other data concerning the topics included in this opinion as well as progress of actions taken and their results should be further developed in order to follow-up the improvements and effectiveness of such actions. Furthermore, Eurostat data on occupational diseases and accidents, in particular those arising from exposure to risk factors due to climate change, should be improved. This data needs to be time-specific in order to allow useful conclusions.

4. Extreme weather conditions and their effects on OSH should not be considered in an isolated way but integrated in relevant policy fields.

5. Developments and knowledge about the effects of climate change on OSH are rapidly evolving, including the impact on workers. Based on data collected and new scientific knowledge, the Commission should analyses the actions adopted and identify issues that need to be addressed in the future.

Recommendations for Member States:

6. **Awareness Raising:**

   National authorities in charge of OSH should invest in awareness-raising activities that are practical, science-based, and forward-looking to address intensified workplace risks due to climate change.

7. **Studies:**

   More studies should be conducted on compound events and their results integrated into early warning systems and the action plans at Member State level.

8. **Early warning:**

   National authorities in charge of OSH should be in contact with national, regional and/ or local authorities in charge of environment and/or public health when plans

of actions are prepared for the issues mentioned in this opinion as relevant and provide information to stakeholders. Information must be accurate, up to date, immediate, publicly available.

9. **Plans of action:**

   National authorities in charge of OSH should contact national, regional and/ or local authorities in charge of environment and/or public health to establish plans of action and determine the actions to be taken to protect workers in case of relevant events related to climate change risks addressed in this opinion. Plans must take into account relevant undertakings (e.g. public buildings, schools, elderly homes, etc.) and preventive actions as well as mitigating and health care actions.

10. **Competence and training on psychosocial factors:**

    Occupational safety and health (OSH) professionals, both at workplace and national levels, may lack adequate competences, training, and tools to manage psychosocial factors related to climate change, such as eco-anxiety. Member States should take action to strengthen these capacities.

Recommendations for Employers:

11. **Training & Education:**

    Employers should facilitate relevant training and safety briefings for workers, enabling them to recognize and respond to emerging risks linked to climate change and OSH. Training should incorporate the Commission's guidance documents mentioned above, latest scientific findings and practical, easy-to-use guidance.

12. **Standard Procedures Development:**

    Employers, in consulting with workers and/or workers representatives should carry out risk assessments and develop procedures for measures in relation to relevant climate change related OSH risks referred to in this opinion. Responsibilities and roles should be clearly defined and coordinated.

13. **Planning Action at undertaking level:**

    Based on the information received and the recommendations provided by the competent national, regional or local authorities, employers will prepare their own planning and make the necessary provisions to act proactively when a climate change related event (e.g. outbreaks or extreme weather events) is declared that may affect workers' health.

14. **Lesson Learned Analysis and recovery:**

    Ensure that risky events are carefully analyzed for lessons learned and good practices, including analysis of human factors and ergonomics. For example, provide mental health support with easy access when necessary to assist workers in recovering from extreme events, according to Member States law, requirements and practices.

15. **Organisational Resilience:**

    When a company adopts an OSH management system[7], in consultation with workers and/ or workers representatives , it should consider climate change effects on

[7] see for example :https://www.ilo.org/topics/safety-and-health-work/occupational-safety-and-health-management-systems

OSH, to assure company level preparedness and foster organisational resilience, the capability to anticipate, mitigate, cope, recover and learn from the already emerged critical events.

Recommendations for Social Partners:

16. Collaborative Efforts and collective bargaining:

Social partners should consider climate change effects on OSH in collective agreements when appropriate and try to find common solutions.

Social partners should work closely with authorities, to enhance awareness, improve sector-specific competences and understanding of workplace risks, including those intensified by climate change.

General Recommendations:

17. Human-centered Approaches:

Implement human-centered approaches in relation to climate change effects on OSH to enhance motivation, commitment, and mutual trust within organizations, in addition to normative-based rules and guidelines.

Specific recommendations on biological agents:

18. When the COM performs an ex-post evaluation of the EU OSH directives it should be explored whether Member States indicate that an update of the Annex I of the Biological Agents Directive related to disease transmitting vectors is needed.

19. Employers should consider the type of work, geographic location and transmission chain when assessing the exposure of workers to disease transmitting biological vectors and prepare related preventive measures.

20. The European Commission should consider, in the context of the preparation of the next EU OSH Strategic Framework, the need to prepare EU technical guidelines about the application of the Biological Agents Directive, paying special attention to articles 5 to 14 and, attention must be paid to the application of the provisions of articles 6, 7 and 9, according to art. 4.2 of the Directive.

This EU technical guidelines should include actions to prevent the proliferation of insects and other vectors in the undertaking.

Specific recommendations on Hazardous chemicals, climate change & OSH

It is recommended that the ACSH Working Party Chemicals (WPC) addresses chemical risks in the context of climate change and considers the following points:

21. Further research and analysis is necessary regarding climate change in connection with hazardous substances, including differences between different groups of

workers, and whether this is relevant e.g. for risk management, preventive and protective measures[8][9][10].

22. The OSH framework and the existing chemicals legislation provide a sound basis for the management of additional risks related to chemicals that may arise due to the impacts of climate change. Building on this legislative basis, and with the aim to improve their implementation, the ACSH recommends the following actions:

- The prioritisation exercise for hazardous chemicals and related OSH measures should take into account the impact of climate change on workers' exposure to chemical agents.
- Awareness raising among employers and workers on risks related to chemicals that may arise due to the impacts of climate change, based on latest scientific findings.
- Employers should include relevant information into training and education of workers.
- The European Commission should consider, in the context of the preparation of the next EU OSH Strategic Framework, the need to update existing EU Guidance related to Risk Assessment with additional criteria linked to climate change, including which organisational and technical measures. Employers shall ensure to take the additional risk factors into account in the workplace risk assessment.
- SME-specific support for the incorporation of risk factors related to climate change and chemical substances into the workplace risk assessment, where necessary.
- It must be ensured that relevant information on physico-chemical properties is mentioned in the safety data sheets established according to REACH regulation and communicated in the supply chain, to be able to take into account climate change impacts in the risk assessment of hazardous chemicals. Relevant physico-chemical properties are already considered in the safety data sheets, as they are essential information in relation to the handling and storage of chemicals. The Commission should convene a meeting involving EU-OSHA, ECHA (European Chemicals Agency) and the relevant ACSH WP to discuss this aspect and define which action may be taken.

The intensification of chemical risks due to climate change requires both scientific recognition, and further analysis. Consistently, appropriate preventive and protective measures will be key to safeguarding workers' health in a changing climate. In addition, the existing legislative framework foresees regular review processes. The challenges of climate change as outlined must be taken into account comprehensively in the existing processes where relevant and necessary, in order to ensure an up-to-date framework. ACSH therefore recommends the Commission to follow up new findings regarding climate change and its impacts on chemicals' OSH and ask the ACSH to include tasks into the WPC mandate when relevant and necessary

[8] wcms_811455 (4).pdf
[9] Report - Gender issues in safety and health at work | Safety and health at work EU-OSHA
[10] Women, Chemicals and the SDGs

4. FURTHER EXPECTATIONS

The individual Interest Groups are considering the following points of view and observations:

Employer Interest Group:

"Specific recommendations on air quality"

The Employers Interest Group (EIG) provides the following remarks:

a) Regarding air pollution due to climate change

EIG considers that air pollution is the competence of environmental or public health authorities (at national, regional or local level, depending on the Member State). As a consequence, when air pollution may impact on health, it's the responsibility of such authorities to determine the actions to be adopted. Employers should apply such actions as regards worker's protection and prevention.

According to it, EIG agrees to the following actions:

When high air pollution episodes are declared by a national, regional and local authority, the following preventive measures should be applied:

- *Adopt action plans at company level for situations of alert for high concentrations of pollutants in the air, taking into account/according to official information and instructions provided by national, regional and local authorities, taking into account outdoors work.*
- *In the case of outdoor workers, preventive measures must be taken during high-concentration alert episodes, in accordance with the guidance of the national, regional and local authorities.*
- *When other preventive measures are not adequate, the use of respiratory protection equipment (RPE) may be considered. Such equipment must be appropriate for the contaminants present.*

But not to other actions that go beyond the responsibilities of employers.

b) Regarding air quality

EIG considers that air quality is out of the mandate of the WP. Air quality is regulated under EU environmental legislation[11], which is directed to Member States and specifically excludes workplaces of its scope.

Additionally, the responsibilities of the employer according to the workplace's directive are limited to providing proper ventilation with fresh air. The quality of fresh air, unless it is directly linked to intended company's activities, is an environmental issue and falls out of the capacities and responsibilities of employers, except in cases of pollution events, as indicated in the previous point. Based on this, employers do not support:

- to include air quality in the mandatory risk assessment
- to recommend mandatory monitoring of air quality (outdoor or indoor)

Moreover, air quality is defined for the entire population (including babies, old persons or individuals with respiratory disfunctions) and the pattern of exposure is 24/7 and all lifelong, which is considerably different to that corresponding to work exposure.

[11] Directive (EU) 2024/2881, see art. 4

UV radiation

Employers consider that UV radiation was sufficiently discussed by the WP on 2024. In fact, the opinion adopted by the ACSH on 27th November 2024 includes UV radiation: "*Other effects of climate change included in extreme weather conditions that have been taken into account in the elaboration of this opinion are exposure to ultraviolet (UV) radiation and ozone*"

The opinion provided recommendations on all aspects related to the prevention at workplace level, including identification of UV as a hazard, integration in risk assessment, technical, organizational and personal measures, and consideration of specific sectors or groups of workers. The opinion even provided a specific point dedicated to prevention of exposure to UV radiation.

The opinion also recommended other complementary actions, such as sharing best practices and knowledge, facilitating pooling of research resources and harmonization of systems to collect cases of accidents and diseases related to exposure to extreme heat and cold or UV radiation.

Finally, the opinion recommended to take into account the specificities of SME and improving Eurostat data on occupational diseases and accidents, in particular those arising from exposure to heat, cold, and UV radiation.

Government Interest Group:

The Government Interest Group (GIG) recognises:

Regarding episodes of high air pollution and the resulting risks to air quality, the following measures and organisational actions are proposed:

- Monitoring and control of indoor air quality in closed workplaces, through the use of air conditioning (or HVAC) systems with air filtering capabilities.
- Local, regional or state authorities should have systems for early warning and communication to the population in cases of episodes due to high concentrations of pollutants in the air.
- Adopt action plans at company level for situations of alert for high concentrations of pollutants in the air: PM_s, tropospheric ozone, nitrogen oxides, fire smoke, etc.
- In the case of outdoor workers, in accordance with the results of the risk assessment and the recommendations of the competent authorities, it may be necessary to avoid certain outdoor works during high-concentration alert episodes, allocating, wherever possible, alternative tasks in indoor locations. This measure is especially important if tasks with high physical demands are carried out.
- Concerning outdoor work, the use of respiratory protection equipment can be also considered, although these equipment must be appropriate for each pollutant and require adjustment tests and training of the workers for its correct use.
- In the specific case of tropospheric ozone, its formation is mediated by light, so it can adapt the working hours outdoors to the first hours of the day, where the concentration of this pollutant is minimal, and avoid them in the final hours.
- Risks related to air quality may be not sufficiently covered by directives on chemical agents and workplaces. To ensure that outdoors exposure and non-industrial indoor workplaces is properly assessed, it would be advisable to promote research on these risks and monitor compliance in these workplaces.

With regard to the risks associated with exposure to solar ultraviolet radiation, the ACSH did not have sufficient time to discuss this issue adequately, and therefore an extension of the mandate is proposed in order to address it. Similarly, it is considered appropriate to address in greater depth the risks related to air quality in relation to climate change, as no consensus opinion has been reached among stakeholders.

Workers Interest Group:

Based on the analysis about air quality and its impact on OSH in Annex 2, the Workers Interest Group (WIG) recognises that:

- Any modification coming from climate change regarding the behavior of pollutants present at workplace, both indoors and outdoors, should be taken into consideration in the mandatory Risk Assessment and preventive measures should be applied.
- In addition, when warnings are issued due to high air pollution episodes, by national, regional or local authorities, the risks to workers' health should be assessed and technical and organisational measures should be established. Employers should follow the guidance of these authorities.
- According to this, the following preventive measures can be applied:
  - Monitoring and control of indoor air contamination in closed/indoor workplaces, through the use of air conditioning (or HVAC) systems with air filtering capabilities and engineering controls,
  - Adopt action plans at company level for situations of alert for high concentrations of pollutants in the air.
  - In the case of outdoor workers, measures must be taken during high-concentration alert episodes, e.g organisational measures, allocating, wherever possible and needed, alternative tasks in indoor locations. This measure is especially important if tasks with high physical demands are carried out.
  - When other measures are not adequate, the use of respiratory protection equipment can be considered. Such equipment must be appropriate for the contaminants present.

Furthermore, the WIG’s opinion is that that UV radiation is an important topic when it comes to climate change. We note that skin cancer caused by UV radiation has already been recognised as an occupational disease in some Member States. In WIG’s opinion, this issue has not been adequately addressed neither in last year's opinion as in de draft opinion on heat or this opinion on other topics than heat. The WIG considers it important that this topic be explored in greater depth by the Working Party on Climate Change and OSH and therefore requests the committee to extend the mandate by six months for the subject of UV radiation.

5. Conclusions

The ACSH strongly recommends the Commission to follow the recommendations stated in this opinion.

Annex 1

Overview existing EU and national legislation and social partner initiatives

National legislation and policy documents

As the impacts of climate change intensify and grow, some Member States have developed tools and legislation to address evolving risks. The Working Party Climate Change and OSH sent out a questionnaire to the ACSH members in March 2024 to provide relevant information, in the context of climate change and OSH, on national legislation and policy documents, social partner initiatives and good practice examples from companies, as well as practical and technical guidance. In total, 25 member states have contributed to the results. However, the results should be seen with prudence as it would be possible that they are not exhaustive. This opinion provides a summary of the questionnaire results regarding to the 'other topics than heat', supplemented with some new developments since March 2024.

In case of **adverse weather conditions**, the employer must take additional protective measures and, in extreme cases, change work schedules (CY, ES, RO) or prohibit work (BG, ES, GR, RO). In Germany, a technical rule (concretizing how legal OSH requirements can be fulfilled) on 'outdoor work' has been adopted. In Spain, preventive measures shall include prohibition of carrying out certain tasks in case of adverse weather conditions and where adequate protection of workers cannot be ensured otherwise. The Spanish RD 1561/1995 also contains a provision which limits working hours in the field to 6h20 per day in case of high physical effort and abnormal ambient conditions. Last but not least, Spain introduced in 2024 a paid 'climate leave' of up to four days, with extension possibilities, applicable when workers cannot access their workplace due to public authority orders or serious weather-related risks. When the nature of the work is compatible with remote working and the state of communication networks allows for it, the company may establish remote working, observing the formal and material obligations set out on remote working, in particular, the provision of adequate means, equipment and tools. Collective bargaining agreements in Spain must include action protocols that set out risk prevention measures specifically designed to respond to adverse weather events (RD 8/2024).

In Italy, The Worklimate project, coordinated by INAIL and CNR-IBE, developed a heat risk forecasting system for different work settings and exposures[12]. Based on the WBGT indicator and the MOLOCH meteorological model, the system provides three-day forecasts for each location[13]. By 2025, all Italian regions (except two) have implemented worker protection measures based on the results and maps of Worklimate, which represents a significant model for integrating scientific research and public health policies. Furthermore, on July 2, 2025, the social partners signed a Framework Protocol for the Management of Climate Emergencies in the Workplace, with the aim of providing a shared framework for addressing exceptional situations related to climate change.

With regards to **emergency preparedness**, risk assessment is key and needs to be updated accordingly if working conditions or the working environment have significantly changed after the emergency. In France, provisions for the prevention of OSH risks due to major natural hazards include informing workers and training competent employees. Both Ireland and Sweden indicated that employers must prepare and review plans for emergencies and take necessary measures.

In some countries, employers must explicitly identify and assess risks arising from **natural UV radiation** (AT, BG) and specific effects of natural UV radiation are recognized as occupational

[12] https://www.worklimate.it/scelta-mappa/
[13] https://worklimate.it/profilo/ordinanza-caldo-lavoro

diseases (AT, DE, FI). In some cases, the protection of workers from natural UV radiation must also be considered when providing appropriate PPE (BE, FI). In Germany, optional health care must be provided in the case of outdoor activities involving intense burdens due to exposure to natural UV radiation for regularly one hour or more per day. In Cyprus, adjustments to outdoor spaces must be made to avoid exposure to solar radiation, including possibly rescheduling or deferring work times.

With regards to emerging **biological risks** due to climate change, most countries referred to their national transposition of the Biological Agent Directive 2000/54/EC. In Germany, there are technical rules for biological agents specifying protective measures while handling biological agents in laboratories, in health care and welfare facilities and when collecting and utilizing waste.

Some countries have incorporated climate change it in their **national OSH strategies** (AT, ES, FI), or are planning to do so (LV, SK), particularly in the context of the green transition.

Social partner initiatives

A lot of the initiatives mentioned in the responses to the questionnaire **raise awareness, provide information, and advocate for measures** to protect workers from impacts of climate change, specifically from **heat stress and natural UV radiation** (CY, DE, ES, FR, LV, NL, PL, SL). Some of the countries developed apps to inform workers on air temperature and on protective measures (AT, GR, NL). In the Netherlands, non-binding OSH catalogues were developed jointly by employers and trade unions describing the ways employers can comply with OSH legislation. Social partners decide which topics they want to include in the OSH catalogue in their sector. The labour inspectorate uses these catalogues as a point of reference during inspections.

In Poland, a real-time UV hazard evaluation and risk assessment algorithm was developed for construction workers to ensure comprehensive and adaptive safety measures and a daily UV index forecast is accessible during the summer months. Spanish social partners have developed several applied research projects to tackle the OSH challenges posed by climate change (see for example The Adaptheat, the CalorAdapt, and the monography on Adapting productive sectors to climate challenges and employment generation.

A few **good practice examples** from companies are described. In Latvia, the 'Golden Helmet' award, organized annually by the labour inspectorate, was given to the company 'SCHWENK Latvija' for comprehensive measures to mitigate the risks of climate change at the workplace.

2.3.3 Technical and practical guidance

Member states attached diverse **information material and guidance** which are relevant for the protection of workers from excessive heat (AT, BE, BG, DE, ES, FR, HU, IE, IT, NL, SK, SW) and cold (DK, HR, HU, IE, NL), UV radiation (AT, DE, ES, HR, MT), ozone (BE, ES), extreme weather (MT, SW), biological risks (BG, DK, ES) and from other risks associated with climate change (DE, FI, SK). Some of the countries launched **initiatives and campaigns to increase awareness** of the impacts of climate change on workers, specifically in the context of heat and UV radiation (BE, ES, FR, IT).

Natural UV Radiation

Croatia has contributed to several scientific projects related to the protection of outdoor workers, for instance guidelines for prevention of skin cancer and a paper showcasing the results of the UV radiation dose measurement project in outdoor workers. The Spanish INSST has carried out a study on solar ultraviolet radiation exposure on fishing vessels. HSE Ireland published a video on UV risks for outdoor workers on their YouTube channel.

Air Pollution

In Belgium, measures to protect workers from **ozone** exposure can be based on the measurements and forecasts of the Interregional Environment Unit (CELINE). Exceedances of the information threshold (180 µg/m3) and the alarm threshold (240 µg/m3) are communicated via the media. Additional information provides the Heat Wave and Ozone Spike Plan.

Ireland published a Code of Practice on indoor air quality in 2023.

The Bulgarian Ministry of Health provided guidelines recommending that workplaces must be provided with clean and fresh air to protect workers from infectious diseases. When performing activities associated with a medium to high risk of exposure to infection, an increased degree of ventilation through natural ventilation or artificial ventilation, preferably without air recirculation is recommended.

Emergency Preparedness

The Swedish Civil Contingencies Agency (MSB) authority is responsible for helping society prepare for major accidents and crises by providing training and exercises for organisations, public authorities and individuals at both a national and an international level. The objective is to ensure that societal actors are well prepared for emergencies and the management of the consequences.

Biological Risks

BASEBiO is a database that provides updated information on the biological agents included in Spanish legislation. In 2024, twelve new factsheets on emerging viruses have been published in the BASEBiO collection including the Dengue virus and the West Nile Virus. In addition, the Spanish National Plan for Preparedness and Response to Vector-Borne Diseases aims to reduce the risk and minimize the global impact of this type of emerging disease.

Green transition jobs

The Finnish contribution indicated the adaptation plan **by the Ministry of Social Affairs and Health (2021-2031) for the healthcare and social welfare sector as well as a** report on "Climate change adaptation and working life". In Germany, the ongoing policy workshop "climate changes work" deals with how climate change endangers the health of workers and the productivity of companies. It lasts for 12 months and involves 130 experts. The goal is to adapt OSH to the changed climatic conditions and create a framework for climate-proof work to ensure productivity and the protection of workers. In 2023, Latvia organized online seminars on the 'Health and safety and Green Energy', discussing OSH requirements during construction and maintenance of wind parks, and 'Occupational health and safety in building insulation'. Seminars on 'Choosing PPE under climate change' and 'Work in heat' are planned for 2024.

Annex 2

List of occupational risk factors related to climate change

1 EXTREME/ ADVERSE WEATHER EVENTS (DIRECT EFFECTS)

Frequency, intensity and impacts of adverse weather events are increasing due to a changing climate[14]. They are expected to be more aggressive and frequent in Europe[15]. These events pose a clear risk for workers who are exposed to conditions that not only disturb the normal working day but can have important consequences for their health and safety regarding both short and long-term diseases[16]. The main direct effects of climate change on OSH include[17]:

a) Excessive heat: We refer to the 27 November 2024 adopted opinion Climate Change - extreme weather conditions, paragraph 3.1, definition of heat and heat stress.

b) Heavy rains, thunderstorms, heavy storms, blizzards and floods: Unpredictable and increasingly intense rainfall, thunderstorms, cyclones, floods[18], and blizzards are becoming seasonal phenomena that recur year after year –sometimes in regions unprepared for such events[19]. Their severity poses multiple risks for workers[20]. Outdoor workers are the most exposed, facing falls on slippery surfaces, injuries from flying or falling objects, electrocution from wet electrical equipment, being swept away by rapidly rising water, or being trapped by debris and collapsed infrastructure. Workers exposed to severe weather during their tasks or commute are especially vulnerable to traffic accidents, reduced visibility, numbness, diminished dexterity, impaired responsiveness, and isolation due to power outages and transport disruptions. Indoor workers are also at risk from building impacts during extreme weather. In both indoor and outdoor settings, floods and storms damage workplace infrastructure, interrupt safe access, weaken air quality and delay return-to-work conditions. Workers also face health risks from contaminated water, mold, and bacteria. Beyond the physical effects, all these phenomena generate significant psychological strain, linked to uncertainty, trauma, and disruption of normal working and living conditions.

c) Droughts: In 37% of enterprises, workers are exposed to heat, cold or draught[21].The impacts of droughts are particularly significant in sectors that depend heavily on water availability, such as agriculture and water-intensive industries. However, their consequences extend beyond these sectors. Prolonged droughts cause severe economic damage across many sectors. They can severely degrade the water resources that people, agriculture, industry and

[14] ILO, (2024). Ensuring safety and health at work in a changing climate. Geneva, International Labour Office.

[15] EUROFOUND, (2024). Job quality side of climate change. Luxembourg, Publications Office of the EU, 6-7.

[16] It is important to note that both extreme weather events and compound events can have serious immediate and long-term health effects. E.g. Excessive heat can imply heat stress, heatstroke, heat exhaustion, rhabdomyolysis, among others. However, from a long-term perspective, it can also cause occupational diseases including: cardiovascular diseases, acute kidney injuries, chronic kidney diseases. Similarly, extreme weather conditions can aggravate existing issues such as cardiovascular disease, diabetes, asthma, mental health problems, or trigger new issues like eco-anxiety. EU-OSHA, (2025). Eco-anxiety and its implications for occupational safety and health, Discussion paper, Bilbao.

[17] A summary included in a table can be consulted in the appendix.

[18] Flood risk is regulated at EU level by Directive 2007/60/EC. Employers should be informed about the Flood risk management plans (Art. 7) applicable in their region in order to better assess the risk and protect their workers.

[19] Bednar-Friedl, B., et. al., (2022). Europe. In: IPCC., Climate Change 2022: Impacts, Adaptation and Vulnerability. Cambridge University Press, Cambridge, UK and New York, 1860-1865; Van Daalen KR, et al., (2024). The 2024 Europe report of the Lancet Countdown on health and climate change: unprecedented warming demands unprecedented action. In Lancet Public Health, 9(7), 495-522.

[20] LO, (2024). Ensuring safety and health at work in a changing climate. Geneva, International Labour Office.

[21] EU OSHA, 2025, First findings of the Fourth European Survey of Enterprises on New and Emerging Risks (ESENER 2024). Please see Figure 1. Risk factors present in the establishment (% establishments, EU-27), 2014, 2019 and 2024 on page 3.

ecosystems depend on, as well as hamper transport via inland waterways[22]. Droughts can worsen the quality of water stored in ponds and natural reservoirs. Reduced availability and quality of water can lead to dehydration and increase the risk of heat-related illnesses. Prolonged drought conditions also raise dust levels, contributing to respiratory problems among exposed workers. Moreover, droughts exacerbate risks by creating favourable conditions for wildfires (see 'wildfires').

d) Extreme cold: Stratospheric polar vortex disturbances, in the context of Arctic warming, can influence cold air surges in the Northern hemisphere, including Europe.This may contibute to more frequent severe winter weather including disruptive cold spells[23]. Among the variety of extreme cold-related health problems to workers, the most dangerous are hypothermia (extreme low body temperature) which can be fatal, but not common in typical work situations, frostbite (freezing of skin and tissues), cold-related injuries and cold-induced musculoskeletal injuries. In addition, having trouble using your hands easily and carefully because of the cold (reduced dexterity), which can also slow down your reaction time, may further heighten the risk of workplace accidents in cold environments. These hazards are pronounced in northern latitudes during the winter among outdoor workers and those in poorly insulated, but they also reach central and southern regions in Europe more often. Cold work environment may be especially challenging for some workers with vulnerabilities to cold, such as workers with chronic diseases, aged workers and different cultural backgrounds. In an Italian study was found that extremely cold temperatures increase the commuting accident rate, especially during rainy days[24].

2 COMPOUND EVENTS

Climate change contributes to an increased frequency and intensity of compound events. It is a compound event if (1) two or more extreme (weather) events occurring simultaneously or successively, (2) combinations of extreme events with underlying conditions that amplify the impact of the events, or (3) combinations of events that are not themselves extremes but lead to an extreme event or impact when combined[25]. These events can affect workers' health and safety through direct exposure to hazards and/or the disruption of critical infrastructure and services.

a) Wildfires: Rising temperatures and prolonged droughts resulting from Climate Change increase the likelihood and severity of wildfires. These events pose multiple occupational risks to firefighter and emergency workers, workers involved in the fire prevention and post-fire recovery, and workers in affected surroundings areas. More frequent wildfires generate higher amounts of particles in the air which can be affected by climate change in several ways, such as through altered atmospheric movements and precipitation[26]. Due to wildfires workers can be exposed to poor air quality, smoke, physical hazards, hazardous substances, and psychosocial risks (among others)[27].

b) Natural hazards triggering technological accidents (Natech events): Floods, wildfires, and other extreme weather events can damage critical facilities, such as in energy and transportation (railway; maritime/ports), leading to secondary technological hazards. These Natech events present complex risks for both the general population and workers, particularly in high-risk sectors such as nuclear installations, chemical plants and toxic waste sites. These also tend to harm supply chains and thus have risks for productivity.

---

[22] European Environment Agency, 2024, European Climate Risk Assessment
[23] Edward Hanna et al. 20224 Environ. Res.: Climate 3
[24] Mattia Filomena & Matteo Picchio (2024). Unsafe temperatures, unsafe jobs: The impact of weather conditions on work-related injuries. Journal of Economic Behavior & Organization, Volume 224, p 851-875
[25] IPCC, (2012). Managing the risks of extreme events and disasters to advance climate change adaptation, New York, Intergovernmental Panel on Climate Change, p.118.
[26] https://pmc.ncbi.nlm.nih.gov/articles/PMC10561567/#S0002
[27] Schaapman, M., et. al., (2024). Workers and the climate challenge. In HesaMag, 28, 34-37.

c) Damaged infrastructure: Climate change accelerates the deterioration of existing infrastructure as well as the likelihood of acute damage to roads, power lines, water systems and other critical services[28][29]. These can lead to a range of occupational health and safety issues. Examples include *Increased accident risk* for workers directly affected by infrastructure failure; *heightened exposure to hazards* for workers tasked with repairing damaged infrastructures; and *indirect impacts on a broader workforce, where disruption to essential services* can compromise both working conditions and emergency response capacity. Indoor workers are not exempt: structural impacts on buildings during extreme weather can cause electrical hazards, physical damage, mold growth, and "sick building syndrome".

3 AIR QUALITY AND ITS IMPACT ON OSH

While the main sources of air pollutants are human activity and particularly combustion processes, changes in rainfall and temperature regimes that are generated as a result of climate change may influence the amount of air pollutants. The concentrations of fine and ultra-fine particles (PM_{10} and $PM_{2.5}$), nitrogen oxides (NO_x), ground level ozone (O_3) and sulphur dioxide (SO_2) will mainly be affected (ILO 2024). For example, higher temperatures increase the formation of O3 through intensified photochemical processes involving NOx and Volatile Organic Compounds (VOCs) and their emissions and atmospheric chemistry may further be modified by climate change[30]. The impact of Climate Change on the concentration of these pollutants and its trends depend on the region[31].

The Air quality status report 2025 issued by the European Environment Agency[32], indicates that air pollution has reduced steadily across Europe over recent decades and complies with current EU limit values. However, achieving lower concentrations of pollutants is still a challenge in the entire EU.

According to the World Health Organization, air pollution is linked to the increase in diseases suffered by the general population, such as chronic obstructive pulmonary disease, ischemic heart disease, stroke, asthma and cancer (WHO, 2022[33]). In addition, changes in weather patterns and in the concentration of CO_2 in the atmosphere are generating an increase in asthma and other pollen-related allergic pathologies. Climate change may exacerbate this impact due to longer growth seasons as well as northwards migration of certain plants[34].

Air pollution affects the entire population, including the working population, especially those who work outdoors and in those jobs where physical activity is high. Air pollution can affect the safety and health of workers.

Current environmental legislation.

The policies and legislation that can best prevent damage related to air pollution in the long term are those aimed at reducing pollutant levels. In this regard, Directive (EU) 2024/2881 on ambient air quality and cleaner air in Europe[35] has recently been published. This Directive aim

[28] Leal Filho, W., Abeldaño Zuñiga, R.A., Sierra, J. *et al.* An assessment of priorities in handling climate change impacts on infrastructures. *Sci Rep* **14**, 14147 (2024). https://doi.org/10.1038/s41598-024-64606-3

[29] Forzieri et al. (2018) Glob Environ Change
. 2018 Jan;48:97–107. doi: 10.1016/j.gloenvcha.2017.11.007

[30] https://pmc.ncbi.nlm.nih.gov/articles/PMC10561567/#S0002

[31] EPA. Climate Change Impacts on Air Quality | US EPA

[32] European Environment Agency. Air quality status report 2025. 9 April 2025. https://www.eea.europa.eu/en/analysis/publications/air-quality-status-report-2025

[33] WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Executive summary, 2022. https://iris.who.int/bitstream/handle/10665/345334/9789240034433-eng.pdf

[34] https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/aeroallergens

[35] Directive (EU) 2024/2881 of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast).PE/88/2024/REV/1OJ L, 2024/2881, http://data.europa.eu/eli/dir/2024/2881/oj

of achieving a zero-pollution objective, so that air quality within the Union is progressively improved to levels no longer considered harmful to human health, natural ecosystems and biodiversity at the latest by 2050. While it excludes specifically workplaces, it establishes the responsibilities of Member States in acting to achieve the goals determined in the Directive to reduce pollutants levels for the entire population.

Current legislation on Safety and Health at Work

Existing Directives, mainly the OSH Framework Directive[36] as well as the Chemical Agents[37] and Carcinogens, Mutagens and Reprotoxic[38] Directives and the Workplaces Directive[39] set the basis for workers protection.Specifically, the Chemical Agents and the Mutagens and Reprotoxic Directives lay down minimum requirements for the protection of workers from the risks arising from dangerous chemical agents *which are or may be present at the workplace, as well as limit values*. These Directives lay down minimum requirements for the protection of workers from risks to their safety and health arising, or likely to arise, from the effects of chemical agents that are present at the workplace or as a result of any work activity involving chemical agents[40] .

According to the existing EU rules, the application of these Directives is assessed every five years and updated when needed. In the case of the two chemicals directives, updating the technical annexes is permanent.

4 BIOLOGICAL AGENTS

The main effect of climate change on occupational safety and health in the field of biological agents is related to changes in the distribution and life cycles of disease-transmitting vectors and pathogens. These diseases are caused by parasites, viruses and bacteria that are transmitted by the bites of vectors such as mosquitoes, ticks and fleas.

Changes in temperature, rainfall and humidity patterns, as well as global trade and travel, enable the distribution and survival of both vectors and pathogens in places where they were not previously present and even alter reproductive patterns, increasing the risk of transmission of such diseases.

In Europe, the most relevant vectors include ticks, mosquitoes and sand flies, and the diseases they transmit are tick-borne encephalitis, Lyme disease, dengue, chikungunya, Zika, leishmaniasis and West Nile virus.

These vectors exhibit different incidences and impacts depending on the longitude, latitude and altitude of a specific location (e.g. the tiger mosquito, which can transmit dengue, chikungunya and Zika, is widely established in southern Europe, while ticks are expected to increase in areas of higher altitudes and latitudes, such as Sweden, Austria and the Czech

[36] Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC) and amendments. Consolidated text: http://data.europa.eu/eli/dir/1989/391/2008-12-11

[37] Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) and amendments. Consolidated text: http://data.europa.eu/eli/dir/1998/24/2024-04-08

[38] Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens, mutagens or reprotoxic substances at work (Sixth individual Directive within the meaning of Article 16(1) of Council Directive 89/391/EEC) (codified version) (Text with EEA relevance) Text with EEA relevance and subsequent amendments. Consolidated text: http://data.europa.eu/eli/dir/2004/37/2024-04-08

[39] Council Directive of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) (89/654/EEC) Consolidated text: http://data.europa.eu/eli/dir/1989/654/2019-07-26

[40] Chemical agent' means any chemical element or compound, on its own or admixed, as it occurs in the natural state or as produced, used or released, including release as waste, by any work activity, whether or not produced intentionally and whether or not placed on the market;

Republic). High temperatures, rainfall and dense vegetation favour the proliferation of these vectors, so they can be used as predictors.

Outdoor workers are most likely to be affected by vector-borne diseases due to their greater exposure to bites of vectors present in their location and activity. These include farmers, foresters, landscapers, gardeners, painters, roofers, pavers, construction workers and firefighters. First responders and healthcare workers who treat infected individuals are also at risk of exposure .

Climate change can also increase the presence of pollen in the air, as well as the presence of other agents such as indoor moulds, which can cause allergies and respiratory problems due to changes in temperature and humidity. In the case of pollen, it falls outside the definition of a biological agent on which the Biological Agents Directive is based and should be treated as an air quality issue. On the other hand, the proliferation of indoor mould is considered to fall within the scope of the Biological Agents Directive.

Finally, climate change and biodiversity loss increase the risk of pandemics.

Current legislation

Diseases caused by exposure to biological agents at work may include vector-borne diseases (see Commission Recommendation (EU) 2022/2337 of 28 November 2022 concerning the European schedule of occupational diseases). Thus, they fall within the scope of Directive 2000/54/EC - biological agents at work, when the cause of exposure is work-related. This directive stipulates that risk assessments must be renewed regularly and whenever there is a change in the conditions under which biological agents may affect workers, what includes changes in the distribution or prevalence of vectors or pathogens related to climate change.

5 HAZARDOUS CHEMICALS , CLIMATE CHANGE & OSH

Rising temperatures, changes in humidity, and extreme weather events have the possibility to interact with hazardous chemical substances, potentially modifying and sometimes intensifying risks to workers' health. E.g. rising temperature and humidity may modify toxicokinetics of chemical substances[41]. Against this background, and although the WP Chemicals traditionally covers any issues related to chemicals and OSH within the ACSH, it seems appropriate to further explore the potential impact of climate change on the management of chemicals in the WP Climate Change and OSH. Any concrete proposals shall be forwarded to the WP Chemicals. It must also be noted that there exists a wide body of specific EU chemical legislation. The European framework should integrate the new dimensions of climate change in the process of regular review normally foreseen.

For example, climate change will contribute to increased unpredictability and risks for crops, animals, and farmers[42]. Changing weather patterns (precipitation, humidity, temperature, etc.) affect soil composition and crop yields. To compensate, a number of adaptation measures such as new crop varieties, modified farming techniques and irrigation methods as well as more agrochemicals, including fertilisers and pesticides, are expected to be used (ILO, 2024)[43]. The impacts will be variable, depending also on the other adaptation measures, but if not properly used under safe conditions, it could pose risks to the health of agricultural workers who handle them during their application, the harvest, and while cleaning the machinery. Peer-reviewed research studies show that agricultural workers exposed to certain pesticides and herbicides, as well as fungicides, used in European territory, increase the risk of developing certain

[41] Simultaneous exposures to heat and chemicals and the impact on toxicokinetics and biomonitoring - ScienceDirect
[42] Enhancing climate change resilience in agricultural crops - ScienceDirect
[43] Ensuring safety and health at work in a changing climate, Geneva: International Labour Organization, 2024.

diseases such as lung cancer, central nervous system tumors, Parkinson's disease, asthma, or chronic bronchitis[44][45][46][47][48].

Other sectors, such as firefighters, may also face increased risks due to modified exposure to chemical agents under changing climatic conditions. For additional sectors, especially where heat is already central to the production process, the impact of climate change with regards to exposure to chemicals should be more taken into account in the risk assessment and the risk management processes. Heat could affect the percutaneous absorption of chemicals. Heat also increases the rate of breathing, which may increases the rate of absorption of toxic substances (ILO 2024; WHO 2025)[49].

[44] Tual S, Clin B, Levêque-Morlais N, Raherison C, Baldi I, Lebailly P. Agricultural exposures and chronic bronchitis: findings from the AGRICAN (AGRIculture and CANcer) cohort. Ann Epidemiol. 2013 Sep;23(9):539-45. doi: 10.1016/j.annepidem.2013.06.005. Epub 2013 Jul 22. PMID: 23886973.

[45] Piel C, Pouchieu C, Carles C, Béziat B, Boulanger M, Bureau M, Busson A, Grüber A, Lecluse Y, Migault L, Renier M, Rondeau V, Schwall X, Tual S; AGRICAN group; Pierre L, Baldi I. Agricultural exposures to carbamate herbicides and fungicides and central nervous system tumour incidence in the cohort AGRICAN. Environ Int. 2019 Sep;130:104876. doi: 10.1016/j.envint.2019.05.070. Epub 2019 Jul 22. PMID: 31344646.

[46] Boulanger M, Tual S, Lemarchand C, Guizard AV, Delafosse P, Marcotullio E, Pons R, Piel C, Pouchieu C, Baldi I, Clin B, Lebailly P; AGRICAN group. Lung cancer risk and occupational exposures in crop farming: results from the AGRIculture and CANcer (AGRICAN) cohort. Occup Environ Med. 2018 Nov;75(11):776-785. doi: 10.1136/oemed-2017-104976. Epub 2018 Sep 5. PMID: 30185443.

[47] Pouchieu C, Piel C, Carles C, Gruber A, Helmer C, Tual S, Marcotullio E, Lebailly P, Baldi I. Pesticide use in agriculture and Parkinson's disease in the AGRICAN cohort study. Int J Epidemiol. 2018 Feb 1;47(1):299-310. doi: 10.1093/ije/dyx225. PMID: 29136149.

[48] Baldi I, Robert C, Piantoni F, Tual S, Bouvier G, Lebailly P, Raherison C. Agricultural exposure and asthma risk in the AGRICAN French cohort. Int J Hyg Environ Health. 2014 Apr-May;217(4-5):435-42. doi: 10.1016/j.ijheh.2013.08.006. Epub 2013 Sep 2. PMID: 24070717.

[49] Climate change and workplace heat stress: technical report and guidance. World Health Organization and World Meteorological Organization, 2025.