

CLIMATE-DRIVEN SCENARIOS FOR FUTURE OCCUPATIONAL SAFETY AND HEALTH IN EUROPE 2050

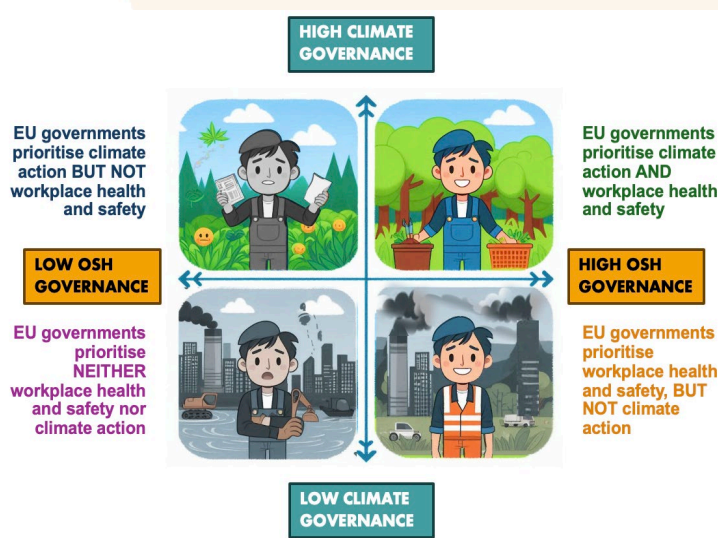
Background and context

The European Agency for Safety and Health at Work (EU-OSHA), based in Bilbao, Spain, plays a pivotal role in making working life across the European Union (EU) safer, healthier and more productive. One key aspect of its work is anticipating future changes in the world of work by undertaking foresight studies, which inform policymakers, researchers and workplace stakeholders about emerging OSH risks, and help set research and action priorities. Previous foresight cycles have explored OSH risks associated with the circular economy (European Agency for Safety and Health at Work, 2024), digitalisation (European Agency for Safety and Health at Work, 2021b) and green jobs (European Agency for Safety and Health at Work, 2021a), generating both macro- and micro-scenarios to guide targeted interventions.

This series of policy briefs presents the outcomes of the fourth foresight cycle, which was delivered by RAND Europe in partnership with the Insight Foresight Institute (IFI) and the support of the Austrian Institute of Technology (AIT) as part of the Foresight-on-Demand consortium. The focus of the cycle was OSH challenges and opportunities related to climate change developments and crises. Through the development, exploration, and analysis of future scenarios, this study aimed to explore the **potential indirect impacts of climate change on OSH and the nature of work in Europe over the next 10 to 25 years.**

This policy brief, the second of three, presents **four possible future scenarios**. These scenarios were developed and refined by a group of expert participants, who worked closely with the research team and EU-OSHA to co-create the narratives presented below. As the graphic opposite illustrates, each narrative explores a different combination of two key dimensions: climate governance and OSH governance.

The future scenarios method¹ involves creating multiple stories about how the future might unfold. These scenarios are not predictions, but plausible examples that show different ways in which major uncertainties could interact. By focusing on what could reasonably happen rather than on what is most likely to happen, the scenarios help people visualise some of the range of possible outcomes. The aim is to make future possibilities tangible enough for people to reflect on their implications.



¹ For a discussion of the typical elements of the scenario method, see e.g. Matthew J. Spaniol and Nicholas J. Rowland, 'Defining scenario', *Futures Foresight Science* 2019, <https://doi.org/10.1002/ffo2.3>.

Scenario 1: Just transition Europe: united for a greener, safer future

European governments prioritise climate action AND workplace health and safety. A high climate governance, high OSH governance scenario



The year is 2050. Following extensive awareness campaigns in the early 2030s, Europe has decided to tackle the problem of climate change head-on while also protecting all its workers. Over the past 20 years, this green and just transition has been proceeding rapidly, and the continent's economy and labour market have undergone some radical shifts. Some citizens have struggled with the pace of change, but most are united behind the effort to create a safer and more sustainable Europe.

Europe in 2050

By 2050, **Europe has** taken bold, collective action to address climate change, making significant progress towards achieving climate neutrality through widespread investment in green and renewable energy, sustainable transport, and the implementation of strict carbon and climate resilience taxes. This coordinated approach has influenced global partners, with many regions following suit. Europeans' lifestyles have shifted towards sustainability, with changes in diet, personal consumption and transport, underpinned by robust educational campaigns and the introduction of measures such as carbon credits and shared ownership of goods. Cities have become greener and more climate-resilient, enhancing public health and well-being. Despite broad support for these changes, a vocal minority resents the restrictions and higher costs, expressing their opposition through protests and populist politics.

The world of work

The green transition has significantly reshaped Europe's economic landscape, phasing out traditional sectors like oil and gas and boosting new industries centred on renewable energy, sustainable construction and climate-resilient transport. This transformation has led to the creation of jobs in emerging fields such as urban farming and biodiversity restoration, while also driving demand for workers in health and social care to support an ageing population. Migration has played a vital role in meeting workforce needs, with migrants receiving equal OSH protection and support through proactive integration policies. Technological advancements, particularly in AI, are employed ethically and strategically – enhancing efficiency and safety where they add clear social value, though personal care remains a largely human domain. Despite efforts to include everyone, some workers and businesses have struggled to adapt, especially smaller enterprises facing complex regulations and high taxation, although robust social safety nets have helped to minimise hardship.

Key sector spotlight: agriculture has shifted towards sustainable practices such as urban and vertical farming, climate-resilient crops and alternative proteins, resulting in new, diverse roles that combine manual work with high-tech management, while some traditional jobs such as dairy farming have largely disappeared.

Occupational safety and health

- **OSH is a top priority for all stakeholders.**

The green transition has been accompanied by a strong focus on safe, healthy work, supported by considered, evidence-based policy and regulation. OSH is a priority for governments, employers, businesses and workers, and is designed into jobs, especially in newer sectors such as urban farming and permaculture (sustainable, energy-efficient, low-waste food production).

- **OSH management is proactive and joined up.**

OSH management is focused on eliminating or minimising both physical and psychosocial hazards. Waves of investment in OSH have created a new type of OSH professional: holistic safety, health and well-being consultants who offer personalised services to workers and organisations, connecting workers to the safety, health and well-being support and training they need at any given moment. Many are also employed in ensuring that there are no unintended risks in the green transition. For example, new 'green' products and materials are subject to thorough life-cycle assessments to ensure that they have no unforeseen safety or health consequences for either workers or the population at large.

- **Traditional industries are safer than they once were.**

For instance, construction is now done largely off-site through the mass production of prefabricated parts for flooding-resilient and heat-resilient buildings. This has reduced the risk of accidents and injuries on building sites (and has had the welcome side effect of attracting more women into a traditionally male industry). Social norms and attitudes to safety in the industry have changed too. OSH is now a top priority and is recognised as both a way to prevent harm to workers and a means of reducing business costs and increasing productivity in the long term. Supervisors see instilling a strong safety culture as one of the most important parts of their role, and risks are eliminated or reduced wherever possible, ideally at the design stage (e.g. by minimising dangerously noisy tasks or tasks involving repetitive manual handling).

- **However, some old risks remain.**

For example, retrofitting old houses with greener heating and cooling systems continues to bring workers into contact with asbestos; and large-scale 'greening' projects, which aim to make cities more environmentally friendly, require labourers to work outside, sometimes in high temperatures or extreme weather conditions. Larger construction companies can afford to put time and money into reducing their workers' exposure to these risks, e.g. by minimising the time they spend outside in hot weather or supplying them with modern personal protective equipment (PPE) that is relatively comfortable to wear; but smaller enterprises and sole traders are often obliged to make do with bulky, hot, ineffective PPE that reduces mobility and increases the risk of overheating, especially in the summer months.

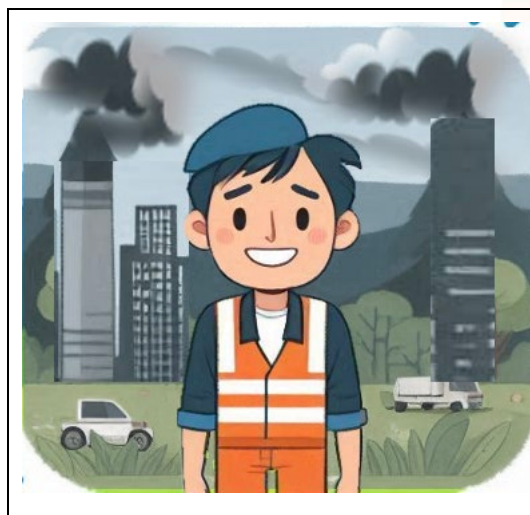
- **Overall, work is safer, healthier and more sustainable.**

There may still be issues to iron out but, overall, Europe has made steady progress towards better workplace safety and health over the past couple of decades. Increasingly, work promotes individuals' health and well-being rather than damaging them, and most workers feel their work is meaningful: after all, their labour is helping to create a more sustainable, greener and healthier Europe.

Focus on vulnerable workers: older people have generally supported the green transition, but many now face financial challenges due to reduced pensions and a higher retirement age. Some have struggled to adapt to rapid societal changes, leaving them less well off than previous generations despite strong social safety nets.

Scenario 2: OSH havens Europe: adaptation through technology in a divided society

European governments prioritise workplace health and safety, BUT NOT climate action. A low climate governance, high OSH governance scenario



The year is 2050. Having failed to stop the progress of climate change, Europe has attempted to adapt to it through rapid technological progress. Many jobs have been automated. The working-age citizens who do still work, however, are well-protected by extensive OSH management: keeping the skilled workforce safe and healthy is a priority for governments and businesses, especially at a time when the climate is increasingly affecting public health. As a result, the minority of Europeans with jobs are both wealthier and healthier than Europeans who are not in work, who survive on a universal basic income. How sustainable is this divide between valued workers and the rest of the population?

Europe in 2050

By 2050, the world has largely abandoned its efforts to mitigate climate change. Europe has shifted its focus to rapid technological adaptation. Facing extreme weather, air pollution and deteriorating living conditions that keep many people indoors, Europe has embraced accelerated advances in AI and other technologies to cope with the new climate reality. These innovations have enabled the region to adapt – such as through AI-managed vertical farms and technologically supported healthcare systems – while also fuelling economic growth and funding a universal basic income. Despite these successes, vulnerabilities persist, including an over-reliance on technology, a heightened risk of cyberattacks, and growing public health issues linked to stressful societal changes and worsening environmental conditions.

The world of work

Climate change and advances in artificial intelligence have dramatically reshaped Europe's economy. Levels of unemployment are rising due to automation, and a universal basic income now supports most working-age citizens. This shift has brought mixed experiences: some enjoy greater leisure and personal fulfilment, while others struggle with a lack of purpose, contributing to rising social unrest. Meanwhile, a select group of highly skilled professionals remains in demand, particularly in technical fields responsible for maintaining climate-resilient infrastructure and in roles that rely on human empathy, such as health and social care, underscoring a growing divide between workers and the rest of the population.

Key sector spotlight: engineering professionals are in great demand to manage the complex AI systems upon which society relies.

Occupational safety and health

- **Valued employees enjoy excellent workplace protections.**

Europe's labour force may be skilled and motivated, but it is also drawn from a population that, for the reasons described above, is increasingly sick and stressed. Governments and the private sector have recognised the importance of supporting workers' health and well-being to retain this highly valuable, but also vulnerable, workforce. All jobs are now 'safe by design', with OSH considerations a priority. Extensive OSH regulation has been implemented and strictly enforced, lowering rates of work-related

illness and accidents. Almost all repetitive tasks are now done by machines, the skilled workforce is given a great deal of autonomy in their work, and working hours are strictly limited. The few remaining manual workers make frequent use of exoskeletons and hi-tech PPE.

- **They also receive high-quality, data-driven private healthcare.**

Companies offer extensive well-being programmes and mental health support that attempts to plug the gaps in state healthcare, which, despite having received a great deal of investment, focuses on tackling emergencies and acute illness. These AI-supported programmes collect and analyse a wealth of data on workers' health, enabling early and tailored intervention to prevent illness – but at a cost to individual privacy.

- **However, these OSH protections do not extend to Europe's supply chains.**

Europe is now heavily dependent on countries that supply the rare earth minerals, proprietary technologies and advanced components needed to support the continent's hi-tech way of life. As a consequence, it has little ability to influence these countries' OSH standards. What is more, Europe's focus on securing a reliable (not necessarily renewable) energy supply has led to the widespread adoption of nuclear power, which depends on uranium sourced from unregulated mining in developing countries. As a result, OSH standards are enforced in Europe but often neglected in supply chains.

- **Companies of different sizes have responded differently to the push for better OSH.**

SMEs initially struggled to keep up with the increasing volume of OSH regulation. In the 2030s, however, OSH AI platforms designed for SMEs were introduced to reduce the financial and bureaucratic burden of regulatory compliance. In larger companies, OSH management is still an in-house affair. To attract and retain the very best talent, some companies have developed radical new health and well-being programmes that go beyond the traditional boundaries of the workplace. For instance, certain major companies are starting to create huge, indoor, self-contained 'villages' for employees and their families. These 'villages' offer workers and their families state-of-the-art private healthcare, high-quality company-run schools, a vast array of entertainment options, excellent security, a ready-made community, and housing in a perfectly climate-controlled environment, where the temperature is pleasant all year round, the air is pure and UV radiation is blocked.

- **For valued employees, life is good – but resentment of the professional elite is growing.**

There is an increasingly large divide between elite workers, who enjoy fulfilling work, high job satisfaction and excellent living and working conditions, and the rest of the population, who are largely surviving rather than thriving. This division is creating simmering tensions that fuel support for radical, anarchic, egalitarian political movements and occasionally lead to physical conflicts, such as robberies and assaults.

Focus on vulnerable workers: informal workers. While most working-age people rely on universal basic income, some supplement it through informal, flexible work without official oversight, resulting in increased risk of accidents.

Scenario 3: Climate race Europe: climate action at the expense of worker safety

European governments prioritise climate action BUT NOT workplace health and safety. A high climate governance, low OSH governance scenario



Europe in 2050

By 2050, European governments have only just started implementing green policies to prioritise climate action, after many have lost their lives and homes in devastating disasters during the 2040s. This shift includes strict environmental regulations, high carbon taxes and generous support for green industries, but achieving climate targets takes precedence over other concerns. Consequently, millions of people from southern Europe have migrated northwards in search of safer living conditions, putting immense pressure on jobs, housing, healthcare and infrastructure in more temperate regions, as cities expand rapidly to accommodate the influx.

The world of work

Mass migration from southern to northern Europe has dramatically reshaped the continent's economy, intensifying competition for secure, well-paid jobs. Green industries are being prioritised, with rapid development in climate-resilient construction, sustainable agriculture, renewable energy manufacturing, and circular economy initiatives. However, despite creating many jobs for lower-skilled workers, the oversupply of labour has driven down wages and worsened working conditions, as companies prioritise cheap human labour over automation to meet the urgent demands of the green transition.

Key sector spotlight: energy. Europe is rapidly transitioning from fossil fuels to renewables, often overlooking OSH and safety risks. Nuclear power is dismissed over cost, speed and safety concerns.

Occupational safety and health

▪ OSH has been deprioritised.

With fighting climate change at the top of Europe's agenda, occupational safety and health is not a priority for governments or businesses. Governments are focused on legislating and regulating to promote the green transition, while businesses are pouring their limited resources into complying with sustainability requirements. As a result, many former OSH specialists in industry are now sustainability specialists, with a broad remit that might technically include workplace health and safety but is predominantly focused on environmental considerations.

▪ Not all 'green' jobs are good jobs.

There has been a real push to introduce more climate-resilient approaches within established industries, including circular economy models in waste management or flooding-resistant designs in construction. However, these jobs remain as demanding, stressful and hazardous as jobs that are less 'green'. Indeed, rapid deployment of more climate-friendly technologies often involves poorly designed and implemented projects, leading to frequent accidents and product failures that are hazardous to both workers and the public, such as fires caused by low-quality solar panels.

- **Regulation intended to promote sustainability has had unintended consequences for workers and the public.**

There has been a flood of well-meaning but ill-considered regulation obliging businesses to use 'sustainable' technologies and 'green' materials, which has had several unfortunate consequences. One of these is that many small businesses, unable to keep up with the pace of regulatory change, have either shut down or begun operating illegally. As a result of this, informal work is booming, the quality of workmanship and products tends to be poor, and workers are at increased risk of accidents and injuries. Another consequence of the recent raft of climate regulation is that new 'green' products and materials, such as biodegradable plastics and biopesticides, are coming onto the market without sufficient testing. It is increasingly coming to light that some of these materials and products are harmful to the health of both workers and the general public.

- **Manual workers are poorly protected.**

Workers are poorly protected in general, including in new sectors such as geoengineering, where trade unions are not yet well established. However, front-line workers and manual labourers are bearing the brunt of this de-prioritisation in workplace safety and health. For example, emergency responders are under huge stress in the face of increasingly frequent fires and floods, which they are obliged to tackle without adequate support for their physical or mental health. Workers in other industries, too, are under pressure to work fast to meet enormous demand, but often without adequate protections. Wearable tech is commonly used to track workers' movements or output to ensure they are working at peak efficiency, rather than to monitor their health or provide support.

- **Knowledge workers are also under pressure.**

In some ways, higher-skilled workers are in a better position than lower-skilled manual workers: they are at least not expected to risk their lives at work. However, they are still under considerable stress. As a consequence of both the impressive capabilities of AI and the increased concentration of highly skilled professionals within the liveable areas of Europe, the market for highly skilled jobs in northern Europe is saturated. This means firms have less of an incentive to compete for workers by offering more secure, healthy or flexible working environments: after all, if one employee cannot take the strain of a high-pressure environment, a dozen more will soon be queueing up to take their place. As a result, burnout, overwork, and mental and musculoskeletal problems are common among knowledge workers.

- **Accidents and ill health are on the rise, and productivity is plummeting.**

Poor OSH regulation and enforcement have increased workplace accidents and illnesses. Workers are often exposed to new risks without proper training or equipment, resulting in more injuries, chemical exposure and stress. Although migrant labour has filled staffing gaps, this substitution has not translated into sustained productivity. Many new workers enter unsafe, unsupported roles, particularly in high-risk sectors like construction and waste management, where climate targets drive rushed, hazardous practices. These conditions have led to lower morale, greater absenteeism and declining health. Productivity is faltering – not because of a lack of labour, but because the conditions under which people work are increasingly unsustainable.

Focus on vulnerable workers: migrants face low pay, hazardous conditions and limited access to occupational safety and health services, due to language barriers and a lack of awareness.

Scenario 4: Grassroots hope Europe: geopolitical instability, neglect, and the rise of people power

European governments prioritise NEITHER climate action NOR workplace health and safety. A low climate governance, low OSH governance scenario



The year is 2050. Long years of geopolitical instability have exhausted Europe and its resources, leading to chronic neglect of both climate change and OSH. Both businesses and workers are under enormous stress, and occupational safety and health considerations have been neglected. Could grassroots movements and collectives that prioritise human well-being, including in the workplace, point to the way forward?

Europe in 2050

By 2050, years of war and geopolitical instability have left Europe depleted, with weakened economies, strained international relations, and declining confidence in political institutions. Climate change has worsened, largely ignored due to political instability and the prioritisation of military needs, resulting in extreme heat and environmental crises. Despite escalating environmental pressures, migration within Europe remains limited, as stricter borders and the fear of proximity to conflicts discourage movement. Public health is deteriorating, with frequent natural disasters and pandemics overwhelming the already strained resources. Yet, amid these challenges, grassroots movements led by determined individuals are emerging, seeking to foster hope and rebuild society through community-driven initiatives rather than relying on traditional government or corporate structures.

The world of work

In post-war Europe, the economy is slow, with low growth, high unemployment and widespread insecurity, compounded by worsening climate disruptions and unreliable technology. The rapid, poorly regulated adoption of AI, driven by wartime pressures, has introduced new risks and hazards for workers and communities. While formal jobs are scarce and insecure, there is a notable rise in informal, community-based roles that provide local resilience, autonomy and a sense of purpose, despite lacking traditional protections and benefits. Social media has become vital in organising this grassroots workforce, marking a shift towards bottom-up innovation as people adapt to continued resource scarcity and instability.

Key sector spotlight: manufacturing remains one of the few expanding sectors in Europe, offering relatively stable jobs despite demanding conditions, but the increased use of robots has introduced new risks to worker safety.

Occupational safety and health

▪ OSH has dropped off the agenda.

Distracted by other priorities and facing resource shortages, Europe's governments and businesses have neglected OSH. There has been little new occupational safety regulation for the past few decades, and existing regulation is rarely enforced. Some businesses are now so frequently affected by natural disasters that they have become uninsurable or face extortionate premiums, with the result that some employers and employees are no longer covered by liability insurance.

- **Working conditions are poor.**

The workforce is under pressure to do more with less, especially given the need to keep Europe battle-ready. As a result, most working environments are extremely stressful and sometimes dangerous: injuries, accidents and deaths at work are relatively common among manual workers. As unemployment is high, workers have little bargaining power. While employed workers technically still have rights, a pervading sense of insecurity at work makes most workers unwilling to speak out about unsafe conditions for fear of coming into conflict with their boss and potentially losing their job. At the same time, businesses have little incentive to attract potential employees by offering better working conditions (especially for lower-skilled workers, who are particularly at risk of being replaced by either other workers or AI).

- **However, there are some bright spots.**

'People power' is on the rise, and this phenomenon is starting to spill over into the world of work. For instance, small cooperative organisations that value their workers' health and well-being have begun to appear across Europe. These organisations tend to have relatively flat hierarchies, an ethos of mutual support and respect, and a focus on flexibility, autonomy and purpose for workers. Some commentators are even predicting a resurgence of trade unions and workers' rights movements, as what was an increasingly individualistic continent rediscovers its collectivist spirit.

Focus on vulnerable workers: disabled workers. In post-war Europe, where climate issues persist, disabled people encounter greater difficulties. Limited workplace accessibility and insufficient support – combined with some employers' unwillingness to provide reasonable accommodations – increase the risk of poverty. As a result, many workers with long-term health conditions must depend on their families and communities for assistance.

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