

## WHAT WILL THE CIRCULAR ECONOMY (CE) MEAN FOR OCCUPATIONAL SAFETY AND HEALTH (OSH)?

### An overview of four foresight scenarios

#### Context


With its key policy initiative, the current European Commission has set Europe on a course towards a green future: the 2020 European Green Deal is primarily focused on making Europe climate neutral by 2050<sup>1</sup>. One of its main building blocks is the new Circular Economy Action Plan<sup>2</sup>, an expansion of the 2015 Circular Economy Package<sup>3</sup>. ‘Closing the loop’ to keep Europe’s resource consumption within planetary boundaries has many significant policy and regulatory implications that will affect future jobs in different ways and have a wide range of consequences for workers’ safety and health.

As part of its mission to ensure safe and healthy working conditions in the EU, the European Agency for Safety and Health at Work (EU-OSHA) has for some years been applying foresight approaches when analysing, preparing and disseminating information on possible future challenges for occupational safety and health (OSH). This document is part of a new foresight cycle that uses four scenarios to explore the effect that implementing a circular economy (CE) would have on OSH. The scenarios’ primary role is to encourage dialogue and reflection around future possibilities; they show alternative pathways to the future and demonstrate the broad range of imaginable developments. They are not intended to predict what the future may or may not hold and are not the final result of the project. Rather, they are a first step towards the next phase of stakeholder engagement, which will reflect in more depth on what the results imply for OSH research, initiatives and policy-making today.

#### European circular economies in 2040: four scenarios

Four scenarios looking at Europe in 2040 were developed for this project (see Figure 1). They represent the outcomes of policy decisions taken over the next decade: in each case, the CE was implemented and plays out differently, and the scenarios’ impacts on the world of work and OSH vary widely.

Figure 1: An overview of the four scenarios



The roaring 40's — fully circular and inclusive	Carbon neutrality — of a hazardous kind	Staying afloat — amid economic and environmental crises	Regional circularities — with European divides
In 2040, the products that sell best are those that are cradle-to-cradle and ‘net-positive’ in terms of social and environmental sustainability.	In 2040, Europe has achieved carbon neutrality. But with environmental outcomes taking top priority, job quality and working conditions have suffered – at least in some areas.	In 2040, work is what people want – any job will do. Keeping your head above the water is all that matters, the environment, social rights or job quality come a distant second.	By 2040, work has become a two-tier system: contracted employees are well looked after, those in non-standard employment are not. Neither is the environment, with circularity being mostly regional.

<sup>1</sup> For further information, including the Green Deal Action Plan, see COM (2019).

<sup>2</sup> For further information on the Circular Economy Action Plan, see European Commission (2020).

<sup>3</sup> For further information on the Circular Economy Package, see COM (2015).

## The Roaring 40s — fully circular and inclusive



In 2040, the products that sell best are those that are ‘cradle to cradle’ and ‘net positive’ in terms of social and environmental sustainability.


Working conditions across all sectors are significantly better than they were two decades ago; pollution has been reduced to a minimum; businesses find that keeping a small footprint is good for the balance sheet; and public trust in policy-makers and national and European leaders is greater than ever. Implementing serious sustainability measures and realising the principles of ‘reduce, reuse, recycle’ across all sectors takes a lot of collaborative fine-tuning, as does keeping workers safe and secure in a multifaceted labour environment with myriad platforms and forms of employment. But one key difference compared with the situation in 2020 is a palpable sense of optimism: with so many challenges successfully met, the future cannot be anything other than bright.

### The circular economy and working conditions in Europe up to 2040

- The EU and its Member States used the COVID-19 pandemic to rethink the economic system.
- Post-pandemic public spending focused on local and larger scale **sustainability initiatives**, improving **public infrastructure** (e.g. recharging networks for e-vehicles) and boosting funding for the **transition to renewables**.
- Workers who lost their jobs to new technologies (digitalisation, automation) retrained under the **Just Transition Mechanism** and became highly qualified for jobs in the CE. **Social inclusion legislation** and other pillars of social rights mean that no one is left behind.
- In 2040, Europe’s economy is growing but has **low resource inputs** and **considerable use of secondary raw materials**. The continent depends much less on imports, is less vulnerable to volatile resource prices and is attractive to talent from abroad.
- Businesses have shortened and greened supply chains and position themselves based on **ethical and environmental credentials**.
- Europe remains a **consumer society** but one centred on **ethical consumerism** with highly traceable product origins and ecological impacts. People put sustainability before price.
- **Products are durable, easy to repair and recycle** and made in safe environments with low-energy processes, where possible locally and from renewable materials.
- **Recycling rates are high**, helped by reduced and clearly labelled packaging. Europe has highly efficient waste processing plants and has become the **global leader in handling waste** (waste has become the largest import). The industry now offers **safe, well-paid jobs**. Reparations have been paid to other world regions that have lost income in their waste processing sectors.
- Jobs are safer, as **hazardous tasks** have been automated and **digital safety measures** (such as artificial intelligence (AI) ‘guardian angels’) protect workers at all times.
- The CE remains an ongoing process: **new materials emerge all the time** and have to be checked for health hazards and recyclability prior to market introduction.

## Key points for OSH from this scenario

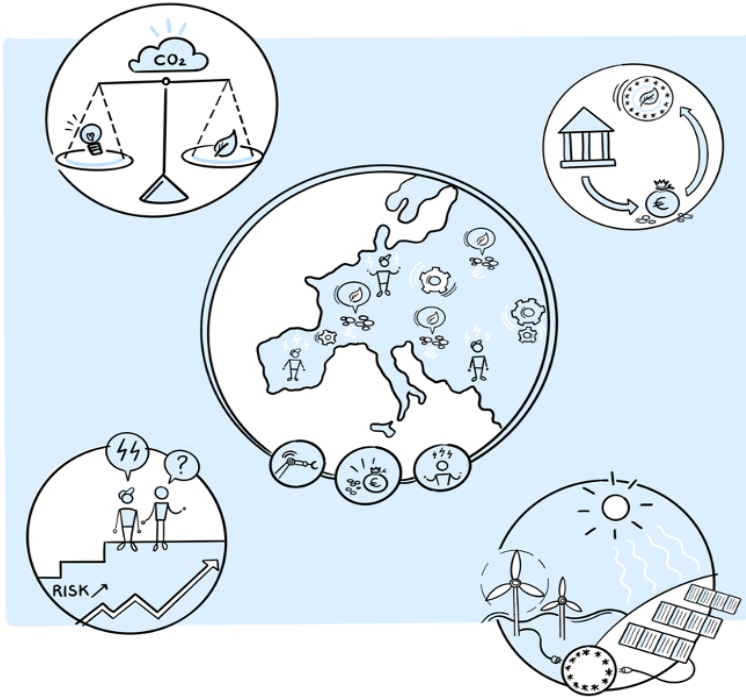
Each of the four scenarios results in both future challenges and opportunities for stakeholders (to varying degrees). The key points in Figures 2-5 outline ways in which stakeholder groups can address these potential future developments through the lens of improving OSH outcomes. In some cases, an issue may be of relevance to more than one stakeholder group, in which case it is placed under the stakeholder group where it has the highest relevance and impact

	<p><b>General/policy making</b></p> <ul style="list-style-type: none"> <li>• Ensure safety of shared, reused, repaired, or recycled equipment and tools, for both independent contractors and employees</li> <li>• Introduce legislative standards to build databases for all materials, reducing hazards in recycling (Ellen MacArthur Foundation, 2017)</li> <li>• Enforce standardisation to reduce e-waste and recycling hazards, e.g. in the case of e-vehicle batteries (Thompson et al., 2020)</li> <li>• Improve integration of OSH considerations into the drafting of environmental legislation (ILO, 2018a; ILO, 2019a;)</li> <li>• Push for OSH provisions for self-employed and platform workers (ETUI, 2017; EU-OSHA, 2019b)</li> </ul>
	<p><b>Dangerous Substances</b></p> <ul style="list-style-type: none"> <li>• Amend REACH<sup>4</sup> and other provisions, with the aim of improving information on the chemical content of products to make products safe and sustainable by design and increase recyclability (European Commission, 2020)</li> </ul>
	<p><b>Training/ skills</b></p> <ul style="list-style-type: none"> <li>• Train workers in human-robot interaction to improve workers' understanding of robots' capabilities and situational awareness (ILO, 2019b)</li> <li>• Push for continuous reskilling, as overreliance on robots may lead to deskilling (in particular, less experience in critical situations) (EU-OSHA, 2019a; EU-OSHA, 2021)</li> <li>• Introducing new technologies can present new risks to workers, e.g. complex handling of lithium-ion batteries (e.g. during maintenance in car workshops) (Thompson et al., 2020). Staff who handle these technologies need to be constantly updated on OSH-relevant skills</li> <li>• Ensure lifelong learning with regard to rapidly changing OSH environments</li> </ul>
	<p><b>New forms of work and digitalisation</b></p> <ul style="list-style-type: none"> <li>• Boost automation of tasks in hazardous environments and use of exoskeletons to reduce amount of time spent in tiring/painful positions (EU-OSHA, 2019a; EU-OSHA, 2020a)</li> <li>• Introducing smart personal protective equipment (PPE) has the potential to offer increased safety for workers (EU-OSHA, 2020b)</li> <li>• Monitoring via AI may improve workers' safety and health but may also increase stress if not properly regulated, designed and implemented, and AI often shares its programmers' blind spots. AI makes robots less predictable and may also outpace risk assessment (PwC, 2020; EU-OSHA, 2017a; EU-OSHA, 2019a; EU-OSHA, 2021)<sup>5</sup></li> <li>• Be aware that remote work increases psychosocial risks and leads to greater stress for workers ('lone-working' and greater perceived job insecurity, etc.) (ILO, 2019a)</li> </ul>

<sup>4</sup> Reach is the acronym used for: "Regulation, Evaluation, Authorisation and Restriction of Chemicals".

<sup>5</sup> The effect of the European Commission's regulative proposal for harmonised rules on artificial intelligence (COM, 2021) promises to address some of these issues (see, for example, Title V, Article 53 ff. in COM, 2021), but enforcement of these rules with regard to the OSH issues raised here (blind spots, outpacing of risk assessment) has not been fully clarified.

## Carbon neutrality — of a hazardous kind



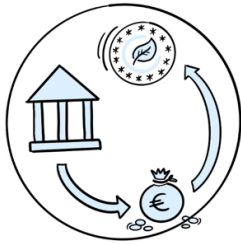
In 2040, Europe has achieved carbon neutrality. However, with environmental outcomes taking top priority, job quality and working conditions have suffered — at least in some areas.

In the early 2020s, a warming climate, extreme weather events and habitat loss took centre stage in the public's mind. Eco-consciousness reigned, leading to a surge in environmental regulation and environmentally friendly industry practices. However, with the bulk of funding spent on renewable energy infrastructure and CE initiatives, social concerns fell by the wayside. Social infrastructure and services, social rights, inclusion and job quality have declined for many.

### The circular economy and working conditions in Europe up to 2040

- Facing **catastrophic weather events** in the early 2020s, the EU accelerates its carbon neutrality programme by 15 years.
- **Rapid expansion of renewables** takes absolute priority, followed by the transition to a CE.
- By the early 2030s, Europe reaches 100 % renewable energy, carbon-heavy energy generation is outlawed, fossil fuel vehicles have been phased out without compensation and there is widespread adoption of e-vehicles.
- Small and medium-sized enterprises and individuals are encouraged to produce their own electricity (e.g. from solar photovoltaic (PV) panels or biogas), but certification of operators remains haphazard.
- By 2040, the rapidly erected **large-scale PV and wind power plants** are ageing rapidly, making inspection and maintenance risky.
- The successful green transition instils the EU and Member States with a sense of purpose that **makes enforcement of new standards easier**.
- Heavy promotion of CE initiatives with a focus on speed leads to the emergence of localised systems with varying standards.
- Recycling volumes outgrow processing capacities; thus, export of waste to other world regions for processing continues, with secondary raw materials reimported.
- Europe remains a **consumer society**, albeit one based on ethical consumerism; overall sales volumes grow more slowly.
- **Grassroots pressure** leads to new regulations and pushes businesses towards green processes; their environmental footprints shrink.
- **The sharing economy skyrockets**, and ownership slowly becomes less attractive than access.
- Digitalisation and automation have resulted in a **localised/decentralised economy** with short supply chains, meaning that businesses are often widely dispersed and no longer in a single location.
- Work is widely available, but there is **little collective bargaining**; workers have little say when it comes to aspects of inclusion, job quality and social rights.
- Employee **well-being continues to suffer** as people face increasing work-related pressures and frequently have to work alone. The threat of a **mental health pandemic** is rising, especially among workers aged under 40.
- Cuts to mental health and social services have left social infrastructure and services in the community hollowed out and overloaded.

## Key points for OSH from this scenario



### General/ policy making

- More regionalised supply chains offer the opportunity to improve cradle-to-grave documentation and enforce more stringent safety standards, as well as greater ease of OSH supervision
- Austerity measures are likely to reduce the number of OSH inspections, which leads to higher accident rates and lower safety standards (Papertrail, 2016)
- Integration of OSH considerations into the drafting of environmental legislation needs to be improved (ILO, 2018a; ILO, 2019b)
- Monitoring is more dispersed; harder to reach workplaces makes monitoring and enforcing good OSH conditions more challenging

### Dangerous substances

- If new, unexplored materials rapidly enter mainstream use while workers frequently change jobs, provisions have to be made to carefully document exposure to new materials over their lifetimes in case health hazards are discovered later (EU-OSHA, 2013)
- Use of new, unexplored materials (e.g. heat storage chemicals and new insulation) could result in exposure to new substances during installation, refurbishment or recycling (EU-OSHA, 2013), while new fuels may involve the use of nanomaterials with unexplored specific risks (Khoo et al., 2020)

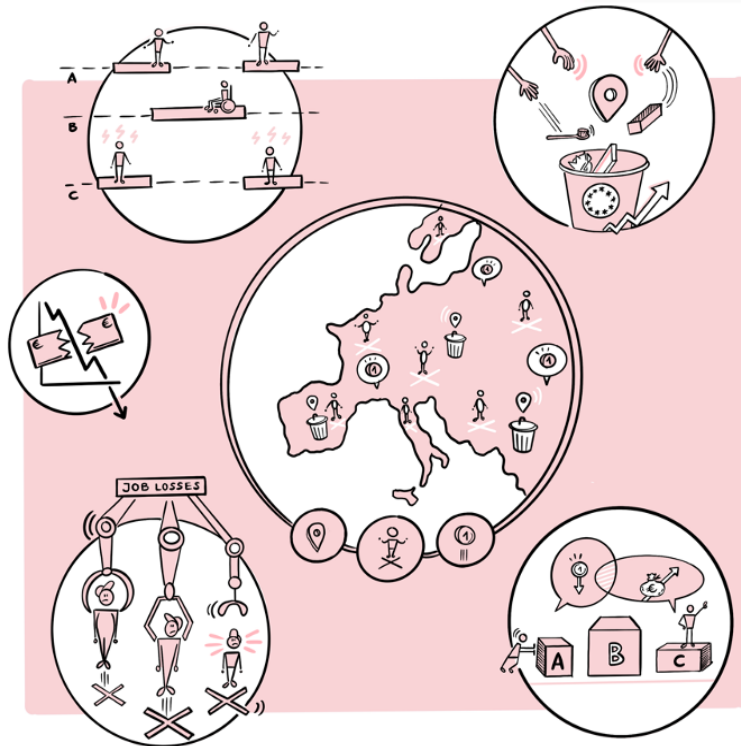
### New forms of work and digitalisation

- An expansion of 3D printing, in particular with regard to small-scale localised production, would lead to the emergence of new health hazards (NTRC, 2020a; NTRC, 2020b; EU-OSHA, 2017b; ETS, 2020)
- Sharing economy: users of peer-to-peer sharing services show a below-average concern for safety (Barbour et al., 2020). In addition, OSH training, supervision and rule enforcement becomes considerably more difficult
- AI and robotics have the potential to considerably improve safety in green energy generation, in particular in offshore wind energy production (EY, 2020)
- In a decentralised work environment, OSH awareness/culture may be lower/less developed and fewer OSH resources may be available (EU-OSHA, 2013)
- Remote work increases psychosocial risks and leads to greater stress for workers ('lone-working' and greater perceived job insecurity, etc.) (ILO, 2019a)
- If 'reuse, repair, recycle' becomes a mantra for making personal decisions, equipment — particularly if shared — may not always be safe to use

### Training/skills

- A rapid transition towards higher recycling rates/green energy without a Just Transition reskilling offensive may lead to shortages of skilled workers, resulting in a 'make do' attitude among employers unwilling to compete in the 'war for talent', and lower overall OSH skills
- If energy infrastructures (rooftop PV systems, biogas from organic production waste) are set up on company grounds, maintenance is likely to be handled in house by workers who will not always be familiar with basic risks and risk combinations (EU-OSHA, 2013)
- Extreme heat leads to impairment of cognitive abilities, which increases the likelihood of accidental injuries (ILO, 2018b). In addition to heat stress, workers may be less likely to use PPE correctly (ILO, 2019a)
- Rapid expansion of e-mobility and new energy storage technology will present considerable challenges for untrained staff (INRS, 2019; Battery 2030, 2020; Linjaho, 2020)
- OSH knowledge and skills from outdated jobs may not be readily transferable to new employment, even if some tasks remain similar

## Staying afloat — amid economic and environmental crises



In 2040, work is what people want — any job will do. Keeping your head above the water is all that matters; the environment, social rights or job quality come a distant second.


Recessions, cuts in public spending, environmental crises and rising unemployment: headlines in 2040 make for grim reading. In the business community, it is everyone for themselves; competitiveness and profits are all that count. New technologies, rationalisation and digitalisation have created an ever-growing pool of workers who lack the qualifications necessary to make it in this new, cut-throat economy. Platform work<sup>6</sup> brings rewards to only a few, and, even in the sectors where it is booming, the 'Russian doll effect' of sub-contracts within sub-contracts means that workers never receive their fair share. The CE remains a distant dream, and the transition everyone went through was neither green nor just.

### The circular economy and working conditions in Europe up to 2040

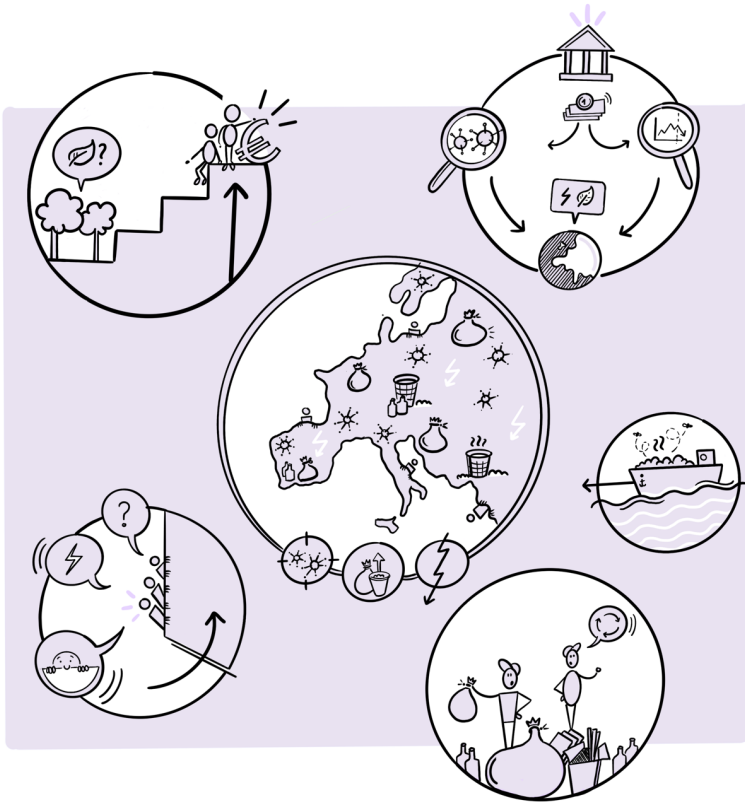
- Hygiene and health fears resulted in an even more extreme **throw-away culture**, vastly increasing waste and recycling volumes.
- The EU lost its leadership on environmental issues; there has been little progress on promoting **reusability or recyclability**, and even less change in adapting product design to aid repair.
- Environmental and ethical practices (also social inclusion) are mostly paid lip service; industry push-back against grassroots movements and weak political will mean that attempts at **strengthening regulation** have so far failed — there is neither sustainability nor decent working conditions.
- The rationalisation gains delivered by digitalisation and automation went to the top 0.1 %. Workers suffered **considerable job losses**, with little funding available for retraining.
- In 2040, mature workers are often overqualified and underemployed, and high unemployment severely limits collective bargaining power.
- People aged under 30 try to stay in education for as long as possible and primarily focus their talents on the information technology sector, which enjoys the most consistent growth.
- Platform and gig work have grown by leaps and bounds over the last two decades, but **jobs often go to the lowest bidder** and/or are excessively sub-contracted, in particular in the waste collection and sorting sectors.
- As geopolitical volatility grew, supply chains broke down repeatedly, and **waste now has to be processed within the European bloc**, but many Member States struggle to cope.
- Although waste volumes have grown and waste streams have become more diverse, a rollercoaster of economic crises means that there is **little funding available for the waste industry** or for appropriate worker (re)skilling.
- Across all industries and sectors, economic considerations take precedence; authorities base approval for new inventions primarily on **global competitiveness** and **economic value**.
- **Health hazards of new materials** are rarely properly assessed or even considered prior to introduction in the EU. Workers often lack the guidance and the knowledge on what they should be aware of, particularly those working with end-of-life products.

<sup>6</sup> This is at odds with the current EU initiative on platform work (scheduled for publication at the end of 2021 (European Commission, 2021)), which aims to improve the working conditions of platform workers. In this (and the following) scenario, the influence of this initiative and of the proposed Digital Service Act on workers and their collective bargaining potential was considered to have remained limited.

## Key points for OSH from this scenario

	<p><b>General/ policy making</b></p> <ul style="list-style-type: none"> <li>• Unless plastic recycling capacity in Europe is upgraded and decentralised to handle the much higher and more regionalised plastics streams expected in the coming decades, this may lead to increasing OSH hazards — particularly if new entrants to the industry with mismatched skills are in charge of handling waste (EPSU, 2017; McKinsey, 2020a)</li> <li>• More regionalised supply chains offer the opportunity to improve cradle-to-grave documentation and enforce more stringent safety/OSH standards, as well as increased supervision, which, with regard to recycling in particular, would be positive for OSH</li> <li>• Austerity measures are likely to reduce the number of OSH inspections, which may result in an increased number of industrial incidents and the loss of relevant skills (Papertrail, 2016). In addition, underfunded OSH institutes will be unable to match the pace of technological development (NFOGW, 2020)</li> <li>• Poor infrastructure investment will heighten the risk faced by workers, particularly in the building and construction sectors</li> <li>• Regional safety and health inequalities will increase, leading to vastly different outcomes for workers</li> </ul>
	<p><b>New forms of work and digitalisation</b></p> <ul style="list-style-type: none"> <li>• Platform work carries a number of risks to physical safety and health (ILO, 2018b; JRC, 2019), and in particular mental health risks (RSA, 2019). Furthermore, without a clear employment structure, responsibility for OSH ultimately rests with the workers</li> <li>• As companies shrink their permanent staff pool and more people become self-employed, the OSH landscape becomes more fragmented, and there are likely to be issues regarding the protection of freelance workers and contingent workers (ETUI, 2017; EU-OSHA, 2019b)</li> <li>• If peer providers of services are exempt from some requirements concerning OSH, this, coupled with the lack of platform responsibility, would intensify many issues (ILO, 2019a; OECD, 2019; ESPON EGTC, 2020)</li> <li>• During financial crises workplace safety and health becomes a secondary issue, for both workers trying to find employment and companies (especially smaller organisations). Furthermore, there is a greater likelihood of labour law flexibilization, which also negatively affects OSH (Boustras and Guldenmund, 2018)</li> <li>• Integrating platform workers into a company ('virtual enterprise') and bottom-up organisational principles mean that responsibility for OSH is transferred to the individual (competition between individuals for employment may also lead to safe practices not being shared)</li> </ul> <p><b>Training and skills</b></p> <ul style="list-style-type: none"> <li>• Low pay and higher job insecurity increase employee turnover, leading to a loss of organisational knowledge with OSH relevance. In addition, workers are less likely to discuss a lack of safe practices (Qlicket, 2019)</li> <li>• Persistent unemployment leads to a loss in skills (including OSH-relevant skills) among the unemployed (Ramsden, 2021), and potentially greater willingness to engage in risky behaviour in the workplace to secure employment</li> <li>• Conversely, increased recycling can reduce the number of jobs in material-intensive sectors, in particular construction, the most accident-intensive sector (OECD, 2020)</li> <li>• If (low-qualified) workers have to compete with robots on labour costs, OSH will only be considered a negative cost factor</li> </ul>

## Regional circularities — with European divides



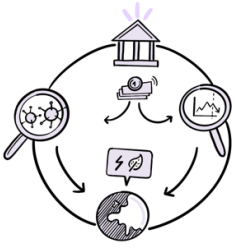
By 2040, work has become a two-tier system: contracted employees are well looked after, whereas those in non-standard employment are not. The environment is not well looked after either, and circularity is mostly regional.

For both policy-makers and the general public, a safe, growing economy was the overriding concern of recent decades. The environment fell by the wayside, but not everywhere. Richer European regions could afford to outsource disposal of waste and pollution to other world regions or poorer EU Member States and now boast some sort of localised CEs, but the loops are never fully closed — problems are simply offshored. Social inclusion was also neglected. With good jobs available to only a minority of well-trained, highly skilled individuals, a growing number of workers are driven towards the informal economy and to unregulated, underpaid and increasingly precarious employment.

### The circular economy and working conditions in Europe up to 2040

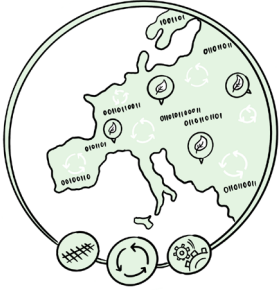



- The COVID-19 pandemic brought home how important workers are to businesses, and **employee well-being** became a central consideration in many sectors.
- Overall, **working conditions have improved** across Europe but only for those deemed crucial to the economy.
- As a result, **people are under tremendous pressure to perform**, as large sections of the labour pool remain unable to find permanent employment.
- The **informal economy continues to grow** as people find it more and more difficult to make ends meet, occasionally forcing them to work in **unsafe environments**.
- Policy-makers and stakeholder groups are unable to successfully push businesses towards inclusion and diversity, leaving many permanently excluded from the **competition for better jobs**.
- Since the early 2020s, there has been a **steady societal shift away from the CE**; only a few of the more wealthy regions place any emphasis on the environment.
- **Only a limited green transition** has occurred and public support for low-carbon technologies has been waning in recent decades, as has uptake of the 'reduce, reuse, recycle' model. **A throw-away culture remains**.
- Recycling and waste processing were significantly improved by **automation and digitalisation** but remain unable to handle increased waste streams.
- Although regulation has been strengthened, **imported new materials**, occasionally hazardous, have entered the waste stream.
- Some wealthier regions enjoy a measure of success in reducing their **environmental footprints** and providing social inclusion.
- Waste often ends up in **poorer areas**, sometimes as landfill, as it is a cheaper processing option to repairing or recycling.

## Key points for OSH from this scenario

	<p><b>General/policy making</b></p> <ul style="list-style-type: none"> <li>• Outsourcing waste processing to other regions reduces risks in the region of origin but can greatly increase hazards in the receiving region, particularly if the waste is stored for long periods of time, experiences high temperatures, etc.</li> <li>• In smart, circular cities the field of health and safety receives less focus in development strategies than other areas (Ristvej et al., 2020)</li> </ul>
	<p><b>Dangerous substances</b></p> <ul style="list-style-type: none"> <li>• Biology is interconnected, self-replicating and difficult to control (it does not respect jurisdictional boundaries); workers could be confronted with new biological agents where they least expect them. COVID-19 demonstrated the danger of the interspecies leap (McKinsey, 2020b)</li> <li>• Nano-paints and -coatings pose unique challenges during recycling activities (difficulties in identifying and safe processing) (G20 Insights, 2020). New risks are continually emerging in this area, including the risk of long-latency hazards (e.g. with carcinogens) and diseases that are difficult to trace back to jobs (EEA, 2013)</li> <li>• In biotechnology, low barriers to entering the market increase the potential for misuse by OSH-unaware operators, with potentially severe consequences (such as creating and unleashing viruses) (McKinsey, 2020b)</li> </ul>
	<p><b>New forms of work and digitalisation</b></p> <ul style="list-style-type: none"> <li>• Overall, automation has the potential to remove workers from hazardous environments (labourers in mining, construction, etc.), reducing OSH hazards (JRC, 2019)</li> <li>• In some areas, automation may outpace risk assessment, e.g. in the compliance of autonomous vehicles with road safety standards (RSA, 2019). However, autonomous vehicles have the potential to offer significant safety benefits over human drivers (Ellen MacArthur Foundation, 2015)</li> <li>• Digitalisation can increase stress in the workplace, exacerbating mental Health risks (ILO, 2019b). Similarly, automation and digitalisation increase perceived job insecurity, which also negatively affects psychosocial health (ILO, 2019a). Increased monitoring may have a similar effect (EU-OSHA, 2017a)</li> <li>• Introduction of smart PPE has the potential to offer increased safety for workers (EU-OSHA, 2020b)</li> <li>• Human-robot interaction may lead to increased risks in the workplace (e.g. workers over- or underestimating robots' capabilities and situational awareness) (ILO, 2019a). Workers find robots with integrated AI less predictable, potentially increasing OSH hazards (EU-OSHA, 2021). Overreliance on robots may lead to deskilling and cybersecurity issues (EU-OSHA, 2019a; EU-OSHA, 2021), less task variation and more sedentary tasks (EU-OSHA, 2021)</li> </ul>
	<p><b>Training and skills</b></p> <ul style="list-style-type: none"> <li>• Outsourced waste is usually processed by non-standard employment workers or workers in the informal economy. Studies show that injury rates among non-standard workers are higher (EU-OSHA, 2017c) — a result of increased time pressure (pay per assignment), lack of OSH training, OSH awareness and safety equipment, and exhaustion from working long hours (EU-OSHA, 2015; EU-OSHA, 2017c; Christie and Ward, 2019)</li> <li>• Workers in recycling often receive insufficient training in OSH — an issue that is largely overlooked (ILO, 2018a). This is of particular concern in the informal economy, where the majority of recycling work is conducted globally and where workers face major OSH hazards (EPSU, 2017; ILO, 2019a)</li> <li>• Noise and air pollution in the workplace are a serious hazard to workers' safety and health, in particular in the informal economy and for low-qualified workers (EEA, 2020)</li> </ul>

## Cross-sectional implications for OSH

Each scenario differs with regard to the opportunities and challenges it presents for the future of OSH. However, some implications can be found across all scenarios (Figure 6), albeit to different degrees, and may not have been mentioned in the figures connected to the individual scenarios, in order to keep the latter as concise as possible<sup>7</sup>.

			
<p><b>Regionalised supply chains:</b> whether supply chains shorten because of the search for smaller environmental footprints, or as a result of economic fragmentation, increased regionalisation regarding sourcing and production offers the chance to improve cradle-to-grave documentation and enforce more stringent safety standards.</p>			
<p><b>Integration of OSH into legislation:</b> so far, OSH considerations have not played a serious role in EU legislation on the CE or the environment. Initiatives to improve OSH integration are valuable in all four scenarios.</p>			
<p><b>New technologies:</b> during maintenance, and in particular during recycling, new technologies (from biotechnology to nanomaterials) can present new risks. Carefully exploring and minimising these risks is a clear challenge for OSH authorities, and the difficulty of the task varies according to the specific scenario.</p>			
<p><b>Platform work:</b> unless responsibility for OSH is handled in line with the EU's new platform initiative (see European Commission, 2021), any form of 'gig' economy will carry a number of risks to workers' physical safety and health. However, psychosocial risks due to 'lone working' (see also below for 'Remote work'), supervision by AI and the pressure of independent work will likely remain.</p>			
<p><b>Automation, digitalisation, AI and robotics:</b> technological and organisational advances remain a double-edged sword. While there are likely to be reduced risks from working in hazardous or physically challenging environments, these reductions will be accompanied by new emerging hazards (and their increasing spread) from human-robot interaction and increased stress as a result of increased monitoring and performance pressure.</p>			
<p><b>Remote work:</b> in each of the scenarios, CE-related work becomes more mobile and flexible, which can make OSH supervision and knowledge transfer more difficult and increase psychosocial issues.</p>			
<p><b>Reskilling:</b> large-scale reskilling and lifelong learning will be increasingly necessary to provide workers with the OSH knowledge and awareness necessary to work safely.</p>			
<p><b>Sharing economy:</b> similarly to platform work, safety in peer-to-peer sharing will have to be the subject of new regulation to clarify responsibilities; however, OSH supervision and knowledge transfer is likely to become more difficult owing to the diffusion of responsibility.</p>			

<sup>7</sup> Please note that the cross-sectional implications are not individually referenced; references are available in the 'Key points for selected stakeholders' figures for each scenario.

## Conclusion and next steps in the project

The four scenarios illustrate how widely the challenges for OSH may vary in the coming decades. The best-of-all-worlds situation ('The Roaring 40s') shows what could happen if today's environmental issues were handled responsibly and prudently by stakeholders and policy-makers: real, far-reaching sustainability is achieved in a CE that maintains a competitive edge while keeping workers' health and safety a key, constantly improved priority. The other, less positive, scenarios demonstrate that, while Europe might be able to kick its addiction to fossil fuels in an incredibly short time, this could come at the expense of workers' safety and health and lead to a far more regionalised and fragmented OSH landscape. Should Europe 'drop the ball' on sustainability, not even the green transition would be achieved, and environmental concerns and workers' safety and health would take a distant second place to economic considerations, to the detriment of all.

The current decade will be crucial for Europe's future: how can we realise a process in which the speedy transition to carbon neutrality is successfully managed and changes also contribute to improved safety and health for workers? These four scenarios are designed to encourage dialogue and reflection with stakeholders around future possibilities, with the aim of informing today's decision-making to make policy more future oriented. They show that the potential pathways for a CE in Europe and their effects on working conditions could vary widely, with a similarly wide-ranging set of initial implications for OSH and potential future policy areas.<sup>8</sup>

Work on the scenarios will continue in phase 2 of this project, which centres on the dissemination and tailoring of the scenarios via stakeholder dialogue and workshops.

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<sup>8</sup> The key messages from phase 1 of this project can be found in detail in *Foresight study on the circular economy and its effects on OSH. Phase 1: Marco scenarios. Final report* (see Chapter 7: Conclusions and outlook).

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