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Shaping inclusive digital and green transitions in working life: a policy review

POLICY REPORT

About this report

This report examines the policy dimension of the digital and green transitions, and their interactions in the context of working life. Drawing on a review of documents from nine European and international organisations, alongside insights from key informant interviews and a policy webinar, the report identifies opportunities to drive more inclusive and sustainable transitions. This report is part of the *JustTransform: Enabling a sustainable, just, and inclusive green and digital transformation* research project, led by the Western Norway Research Institute (Vestlandsforsking), in collaboration with Cambridge Industrial Innovation Policy and NORCE.

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Executive summary

The digital and green transitions offer a unique opportunity to reshape our societies and economies in a more sustainable, just and inclusive way. As these transitions progress, they intersect and influence each other, giving rise to what is increasingly known as the "twin transitions". The digital, green and twin transitions (DGTT) are transforming working life, from the demand for new skills to changes in how workers interact with one another and with technology, as well as introducing new opportunities and risks for labour inclusion.

This report focuses on the policy dimension of these transitions, examining the discourses that shape policies related to the digital and green transitions, and their interactions in the context of working life. The main analysis is conducted at global and European level, while Annex C presents a national-level analysis for Norway. The report draws on a review of 101 documents, sourced from nine European and international organisations. Key informant interviews and a policy webinar complement the findings from the document review.

This report is part of the *JustTransform: Enabling a sustainable, just, and inclusive green and digital transformation* research project, led by the Western Norway Research Institute (Vestlandsforsking), in collaboration with Cambridge Industrial Innovation Policy and NORCE.

1. What are the digital, green and twin transitions (DGTT)?

The digital transition is generally understood as the adoption of digital technologies across various structures and processes. It is described as primarily led by the private sector and driven by factors such as the increased accessibility of digital technologies, rising global competition, changing customer behaviour and skills shortages.

In comparison, the green transition is defined as the shift towards resource-efficient economies and societies. It is discussed as being primarily led by the public sector and driven by changes in regulation and other policy instruments aimed at decoupling economic growth from resource use.

The term "twin transitions" is increasingly used to refer to the capacity of the two transitions to reinforce each other. In discussions about "twin" transitions, the digital transition is usually portrayed as enabling the green transition.

2. How are the DGTT changing working life?

Five key themes emerged from the document review on how DGTT are transforming working life:

i. *Evolving skills demands.* Skills are the most discussed theme. Skills development is shown as a way to give diverse population groups access to the benefits of these transitions while minimising the social costs. However, evidence suggests that the green and digital transitions are outpacing the changes and participation rates in education and training.

ii. *Labour shifts across sectors, including job displacement and creation.* Early discussions about job automation raised alarms about massive displacements; but recent debates have shifted the focus to skills and the increasing polarisation of work in favour of higher-skilled jobs. In comparison, labour shifts from the green transition

are expected to be lower and more localised than those from the digital transition. There is also some expectation that green mid-skill jobs will partly offset the decrease in mid-skill occupations driven by the digital transition.

iii. *Reconfiguring the workplace and work relationships.* The debate about this topic centres on the changes in the workplace, work patterns and work relations driven by the digital transition. Opportunities arising from these new configurations include work flexibility and autonomy, reduced entry barriers, flatter organisational structures and e-activism. Risks are also acknowledged, including precarious work conditions, increased work intensity and stress, digitally enabled surveillance, data extraction, deepening power asymmetries, and undermining the role of social dialogue actors.

iv. *New risks and opportunities in occupational health and safety.* As the workplace evolves, workers are increasingly exposed to new machines, equipment and materials. In the context of the twin transitions, the discussion focuses on the potential of digital technologies to reduce workers' exposure to hazardous substances and physical workloads in green jobs. However, the combined physical and psychosocial impacts of these transitions may affect workers, including increased cognitive workload and exposure to new materials and processes.

v. *Inclusion and exclusion dynamics.* Overall, the discussion about inclusion in the digital transition primarily emphasises workplace accessibility and removing barriers to employment, whereas the green transition adopts a broader perspective, addressing social justice and regional impacts. However, similar job polarisation is expected from both transitions, with higher-skilled workers benefiting most from both transitions and low- and medium-skilled workers facing the negative impacts.

3. Policies for inclusive and sustainable transitions

The uncertainty and complexity involved in these transitions and their interactions call for a comprehensive policy mix. Based on the document review, four key areas of policy action were identified:

i. *Understanding observable and potential impacts.* Analysis and capacity development to enhance our understanding of the observable and potential effects of the transitions. Examples of policy instruments are systematic labour market and skills monitoring, foresight analysis, sector- and occupation-specific gender-disaggregated data, and distributional impact assessments.

ii. *Addressing challenges and opportunities.* Direct support to address the challenges and opportunities faced by individuals, households and businesses. Examples of policies in this area are active labour market policies, skills development, entrepreneurship and business support, and social protection.

iii. *Ensuring initiatives include diverse voices.* Social dialogue to ensure all stakeholders' voices are heard. Examples of initiatives are skills and advisory councils, framework agreements, collective agreements and best-practice sharing.

iv. *Creating an enabling environment.* Developing and updating infrastructure, regulations and policy frameworks to create an enabling environment for inclusive and sustainable transitions. Examples of policy instruments are standards and regulations, investment in infrastructure, policy coordination, policy frameworks and new measures of country progress.

4. Moving forward: opportunities for inclusive and sustainable working lives

Drawing on the policy review and key informant interviews, six key opportunity areas were identified:

i. *Skills vs structural barriers.* Skills are a central theme in discussions about the digital and green transitions, and their interactions, often seen as tools for inclusion and mitigating negative impacts. However, overemphasising skills risks neglecting the structural barriers that sustain inequalities, including marginalisation of under-represented groups in labour markets and policy-making processes.

ii. *Preventing inequalities vs transforming societies and economies.* The prevailing discourse focuses on upskilling, reskilling and implementing social protection measures to mitigate inequalities. However, a more ambitious and forward-looking approach could position the DGTT as catalysts for societal and economic transformation.

iii. *Business as usual vs creating new economic models.* Current discussions mostly emphasise supporting workers and businesses in adapting to and leveraging the opportunities created by the DGTT, with insufficient focus on how the existing economic model perpetuates climate change and social inequalities. In contrast, alternative approaches may include reshaping business incentive structures and creating new economic models.

iv. *Just transitions vs global justice and solidarity.* Justice and inclusion are frequently framed within the context of national or regional boundaries, neglecting the broader global dimensions of inclusion and social justice. In contrast, a global justice and solidarity perspective underscores the unequal distribution of the costs and benefits of these transitions, particularly the disproportionate burden on developing countries.

v. *Controlled futures vs navigating uncertainty.* The prevailing discourse focuses on expert-led risk assessment and impact prediction as a way to address the knowledge gaps on the DGTT and their effects. The importance of this work in preventing risks is undeniable, particularly in the context of occupational health and safety, but where lives are at stake it is equally crucial to acknowledge the limitations of our understanding. In comparison, navigating uncertainty requires flexible, adaptive systems rooted in local action, co-produced knowledge, and commitments to solidarity and care.

vi. *Twin transitions vs a systemic understanding.* The term “twin transitions” is often used technocratically, emphasising digital facilitation of the green transition, while overlooking their distinct characteristics and heterogeneous impacts. A more nuanced approach would consider the differences between these transitions, and their interplay with context-specific characteristics and other socio-economic transformations, such as demographic shifts and increasing inequality.

Introduction

The digital and green transitions offer a unique opportunity to reshape our societies and economies in a more sustainable, just and inclusive way. As these transitions progress, they intersect and influence each other, giving rise to what is increasingly referred to as the “twin transitions”. The digital, green and twin transitions (DGTT) are transforming working life, from the demand for new skills to changes in how workers interact with one another and with technology, as well as introducing new opportunities and risks for labour inclusion. Understanding the implications of these changes is crucial to ensuring a sustainable, just and inclusive future.

This report focuses on the policy dimension of these transitions, examining the discourses that shape policies related to the digital and green transitions, and their interactions in the context of working life. The main analysis is conducted at global and European level, while Annex C presents a national-level analysis for Norway. The report draws on a review of 101 documents, sourced from 9 European and international organisations: the European Agency for Safety and Health at Work (EU-OSHA); the European Foundation for the Improvement of Living and Working Conditions (Eurofound); the European Centre for the Development of Vocational Training (Cedefop); the European Commission (EC); the European Parliament (EP); the International Labour Organization (ILO); the Organisation for Economic Co-operation and Development (OECD); the United Nations Industrial Development Organization (UNIDO); and the World Economic Forum (WEF).

Key informant interviews and a policy webinar complement the findings from the document review by capturing the perspectives of those directly involved in shaping and implementing policies related to the digital and green transitions. Annex A presents a list of the interviewees.

This report is part of the *JustTransform: Enabling a sustainable, just, and inclusive green and digital transformation* research project. The project examines how working life is affected by the green and digital transitions, and how to enable sustainable, just and inclusive transformations. The project is led by the Western Norway Research Institute, in collaboration with Cambridge Industrial Innovation Policy (University of Cambridge) and NORCE.

The report is structured as follows:

- **Section 1** discusses how international organisations understand and envision the digital, green and twin transitions, their drivers, stages of development and policy involvement.
- **Section 2** examines five key themes capturing how international organisations discuss the observed and expected impacts of the DGTT on working life: (i) evolving skills demands, (ii) labour shifts across sectors, including job displacement and creation, (iii) reconfiguring the workplace and work relationships, (iv) new risks and opportunities in occupational health and safety, and (v) inclusion and exclusion dynamics.
- **Section 3** delves into the policies used or recommended by international organisations for promoting inclusive and sustainable transitions.
- **Section 4** concludes by discussing dominant and alternative narratives in the policy discourse about the DGTT.
- **Annex A** presents a list of the interviewees and webinar participants.
- **Annex B** provides an overview of the main policies supporting the DGTT in the European Union (EU).
- **Annex C** provides insights into the national policy landscape of the DGTT in Norway.

1. What are the digital, green and twin transitions (DGTT)?

Key messages

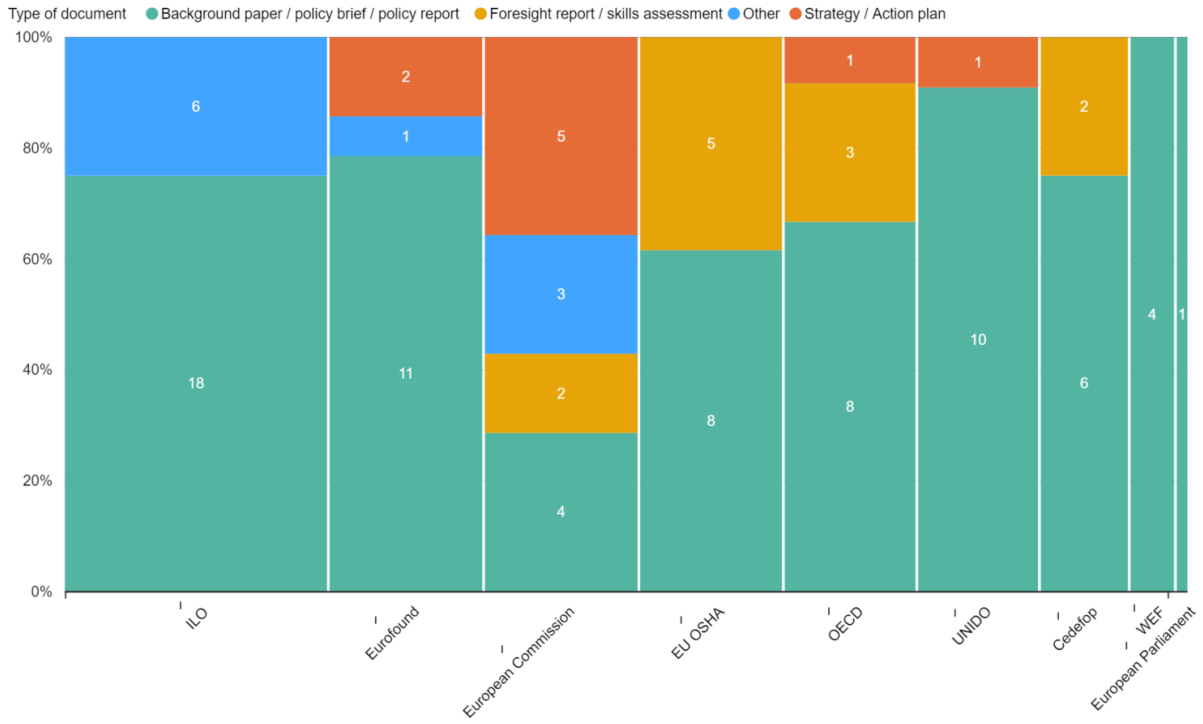
- The digital transition is generally understood by European and international organisations as the adoption of digital technologies across various systems and processes. It is described as primarily led by the private sector and driven by factors such as the increased accessibility of digital technologies, rising global competition, changing customer behaviour and skills shortages.
- The green transition is defined as the shift towards resource-efficient economies and societies. It is discussed as being primarily led by the public sector and driven by changes in regulation and other policy instruments aimed at decoupling economic growth from resource use.
- The term “twin transitions” is increasingly used to refer to the capacity of the two transitions to reinforce each other. In discussions about “twin” transitions, the digital transition is usually portrayed as enabling the green transition.
- Overall, there is some agreement on the need to shape inclusive transitions where all population groups can participate and benefit from the new opportunities. There is also some emphasis on how transitions should be human- rather than technology-centred. Organisations also stress the gender dimension of inclusion in these transitions.
- The justice dimension of these transitions is more frequently addressed in the discussions about green transitions. However, little attention is given to justice between countries – particularly relationships between the developing and developed nations involved in these transitions – or to a critical examination of the distributional impacts of economic growth.

This section examines how key European and international organisations conceptualise and articulate these transitions, focusing on their implications for working life. It outlines the rationale for selecting these organisations, discusses the terminologies they use to describe these transitions, and analyses the narratives underpinning their envisioned futures.

1.1 Selection of European and international organisations

We reviewed 101 policy-related documents published by nine European and international organisations between 2014 and 2025. The documents were identified from the Policy Commons platform and organisations' search engines, using the following keywords: "digital", "green", "twin", "jobs", "work", "transition", "transformation", "inclusion", "automation", "net zero", "circular economy" and "sustainability". The documents reviewed included: policy reports, briefs and papers, skills assessments, foresight reports, guidelines, strategies, action plans, council recommendations, regulations, declarations and governing body notes, among others (Figure 1).

FIGURE 1: OVERVIEW OF DOCUMENT REVIEW



Note: International Labour Organization (ILO); European Agency for Safety and Health at Work (EU-OSHA); Organisation for Economic Co-operation and Development (OECD); United Nations Industrial Development Organization (UNIDO); European Foundation for the Improvement of Living and Working Conditions (Eurofound); European Centre for the Development of Vocational Training (Cedefop); World Economic Forum (WEF). "Other" includes regulations, guidelines, programming notes, council recommendations and declarations, among other documents.
Source: Author.

The organisations were selected based on their authority, expertise and global relevance in shaping policies and research related to labour, climate-change action and industrial policy more broadly. At the European level, the European Agency for Safety and Health at Work (EU-OSHA) and the European Foundation for the Improvement of Living and Working Conditions (Eurofound) were chosen because of their specific mandates to improve working conditions and ensure the safety

and health of workers across the European Union (EU). The European Centre for the Development of Vocational Training (Cedefop) is included because of its focus on vocational education and training, considering that policy and academic literature underscore the relevance of skills as an enabler of the DGTT. The European Commission (EC) and the European Parliament (EP) are integral to the study, as they play a central role in shaping the policy landscape of the EU, including labour, technology and environmental regulations.

Internationally, the International Labour Organization (ILO) was selected for its long-standing commitment to global labour standards and its research on the future of work in the context of technological and environmental changes. Similarly, the Organisation for Economic Co-operation and Development (OECD) brings critical insights from its analyses of economic trends and labour market developments, particularly in advanced economies. The United Nations Industrial Development Organization (UNIDO) was chosen for its expertise in promoting inclusive and sustainable industrial development, which is directly relevant to the DGTT. Finally, the World Economic Forum (WEF) offers a corporate perspective on the DGTT. Together, these organisations provide a comprehensive and diverse perspective of the impacts of the DGTT on working life, ensuring that this report is informed by both European and international standpoints.

1.2 How do European and international organisations conceptualise the digital, green and twin transitions (DGTT)?

The policy review and interviews revealed how different terms are used to refer to the digital and green transitions. For example, digitalisation, Industry 4.0, Industry 5.0 and Fourth Industrial Revolution are commonly used in the context of the digital transition; and decarbonisation, circular economy, green economy and environmental sustainability are commonly used in the context of the green transition.

Although there are differences in the terminology and understanding, commonalities were also found. The digital transition is generally understood as the adoption of digital technologies across various structures and processes. Technologies described as digital usually include artificial intelligence, big data, distributed ledger technology (including blockchain), the internet of things, robotics, 3D printing, cloud computing, unmanned autonomous vehicle systems, virtual and augmented reality, sensors and actuators, and quantum computers.[1,2]

The digital transition is framed in these documents as being primarily led by the private sector and driven by factors such as the increased accessibility of digital technologies, rising global competition, changing customer behaviour and skills shortages in sectors such as manufacturing.[3,4,5] As shown in Table 1 and Figure 2, the motivations for digitalisation are typically presented in terms of efficiency, profit and resilience. Policy documents also discuss how the digital

[1] UNIDO (2021). *Standards and digital transformation.*
[2] WEF (2022). *Augmented Workforce: Empowering People, Transforming Manufacturing.*
[3] Bednorz, J, Sadauskaitė, A, et al (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[4] UNIDO (2023). *Gender, Digital Transformation, and Artificial Intelligence*.
[5] Heinold, E., Rosen, P. H. and Wischniewski, S. (2023). *Advanced Robotics and AI-Based Systems in the Workplace: OSH Challenges and Opportunities*.

transition has been accelerated by the challenges brought about by the COVID-19 pandemic, as well as by the related digitalisation support from governments, supranational and international organisations.[6]

In comparison, the green transition is defined as the shift towards low-carbon and resource-efficient economies and societies. It is discussed as being primarily led by the public sector and driven by changes in regulation and other policy instruments aimed at decoupling economic growth from resource use.[7,8] These policy changes are presented as a response to the impacts of climate change,[9] while advances in technology and innovation, and the creation of new business opportunities, are discussed as enablers and drivers of the green transition.[10]

The digital transition is generally considered to be at an intermediate stage and progressing rapidly, while the green transition is generally considered to be at an earlier stage and progressing more slowly. Nonetheless, their interactions continue to be emphasised, and the term “twin transitions” is increasingly used to refer to their capacity to reinforce each other.[11] This term was found in 18 of the 101 documents reviewed from international organisations, and it was cited between 1 and 102 times in these documents.

In discussions about “twin” transitions, the digital transition is usually portrayed as enabling the green transition. However, differences are evident in how organisations conceptualise these interactions. For instance, while the WEF tends to emphasise the role of technology,[12] the EC highlights the role of changes in behaviour and social norms (Table 1). In addition, limited attention has been devoted to the environmental impacts of the digital transition. Only 4 of the 101 documents reviewed address this issue.[13,14,15,16]

[6] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[7] EC (2019). *European Green Deal.*
[8] OECD (2023). *Job creation and local economic development 2023. Bridging the Great Green Divide*.
[9] International Labour Organization (2019). *Skills for a greener future: A global view based on 32 country studies*.
[10] Ibid.
[11] Koundouri, P. et al. (2023). *Twin Skills for the Twin Transition: Defining Green & Digital Skills and Jobs*.
[12] WEF (2022). *What is the “twin transition” – and why is it key to sustainable growth?*
[13] European Commission (2022). *Strategic foresight.*
[14] Muench et al. (2022). *Towards a green and digital future*.
[15] UNIDO (2021). *Standards and digital transformation*.
[16] Eurofound (2024). *Job quality side of climate change, Working conditions and sustainable work series*.

TABLE 1: DEFINITIONS OF THE DIGITAL, GREEN AND TWIN TRANSITIONS

Organisation and source	Definition (quotes from documents)
International Labour Organization (ILO) **ILO (2024). *Challenges and opportunities of digitalization*, p. 3**	**"Digitalization** is understood in broad terms to mean the application of digital technologies, and thus digitized information or data, in the economy and society. In the world of work, digitalization entails the transformation of organizational structures and processes with the aim of improving efficiency, revenues and resilience. Such application reshapes the organization of work, and thus has consequences for the amount and type of employment offered as well as working conditions and labour protection."
United Nations Industrial Development Organization (UNIDO) **UNIDO (2021). *Standards and digital transformation*, p. 4**	"The 4IR [Fourth Industrial Revolution] is characterized by the widespread and ever increasing phenomena of digitization, i.e. the conversion of analogue information into the digital form. At the same time, the ever-greater digitalization—the development and application of digital and digitalized technologies that augment and dovetail with all other technologies and methods—is serving to reinforce and expand the digital economy. In a larger context, **digital transformation** is a broader term than digitalization. It is the integration of digital technology into all organizational areas, fundamentally changing how the organization operates and delivers value to customers or stakeholders. It is also about prioritizing organizational culture change, which requires organizations to continually challenge the status quo, experiment, and learn from failure. Digital transformation is a widely used term that, in practice, will look very different in each organization. In essence, it refers to the customer-driven strategic business transformation requiring organizational change and the implementation of digital technologies."
European Commission (EC) **EC (2019). *European Green Deal*, p. 43**	"The European Green Deal is a response to these challenges. It is a new growth strategy that aims to **transform the EU i**nto a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use."
European Commission (EC) **EC (2022). *Ensuring a fair transition towards climate neutrality*, p. 43**	"'Green transition' means the **transition** of the Union economy and society towards the achievement of the climate and environmental objectives primarily through policies and investments, in accordance with the European Climate Law laying down the obligation to achieve climate neutrality by 2050, the European Green Deal and international commitments, including the Paris Agreement, other Multilateral Environmental Agreements and the Sustainable Development Goals."
European Commission (EC) **EC (2022). *Towards a green and digital future*, pp. 7 and 11.**	"The term **'twin transitions'** refers not only to two concurrent transformational trends (the green and digital transitions); the term also refers to uniting the two transitions, which could accelerate necessary changes and bring societies closer to the level of transformation needed. To succeed with the green and digital transitions, a better understanding of the possibilities to link them is fundamental, especially when it comes to knowing what must be done most urgently." "The **green and digital transitions** are about profound changes in our way of life. The factors influencing the green and digital transitions are multifaceted and often interconnected. Their influence is difficult to predict. As in past transitions, technology will play a role, but it is unlikely that the changes needed to succeed with the twin transitions will be solely technology-driven. For example, massive changes in behaviour and social norms are needed for many innovations, such

Organisation and source	Definition (quotes from documents)
	as moving from owning a car to car-sharing. How any theoretical change plays out in real life is heavily dependent on the specific context (for example personal practicality, cost, fairness). There are many contextual factors that will determine the outcomes of the twin transitions."
International Labour Organization (ILO) **ILO (2018). *Greening with jobs*, pp. 51 and 53**	"The **circular economy**, as an alternative, is based on the principle of produce-use-service-reuse. One of its tenets is to reduce the extraction of raw materials and to rely instead on reuse, repair and recycling. In a circular economy, products are designed to have longer lives and to be repaired, reused or recycled." **"Green jobs** are defined as follows: they reduce the consumption of energy and raw materials, limit greenhouse gas emissions, minimize waste and pollution, protect and restore ecosystems and enable enterprises and communities to adapt to climate change. In addition, green jobs have to be decent (UNEP, 2008)."
United Nations Industrial Development Organization (UNIDO) **UNIDO (2024). Industrial Development Report 2024, p. 13**	**"Sustainable industrialization** entails fighting climate change, promoting economic growth and generating millions of decent jobs while harnessing cutting-edge technologies."
World Economic Forum (WEF) **WEF (2022). What is the "twin transition" – and why is it key to sustainable growth?**	"A **twin transition** approach recognizes that there is a huge and largely untapped opportunity for technology and data to drive sustainability goals. Rather than treating digital and sustainability in isolation, a twin transitions strategy combines these critical functions to unlock huge benefits in terms of efficiency and productivity. The twin transition can make a positive impact by "greening" technology, data assets and infrastructures while accelerating sustainability across the organization."

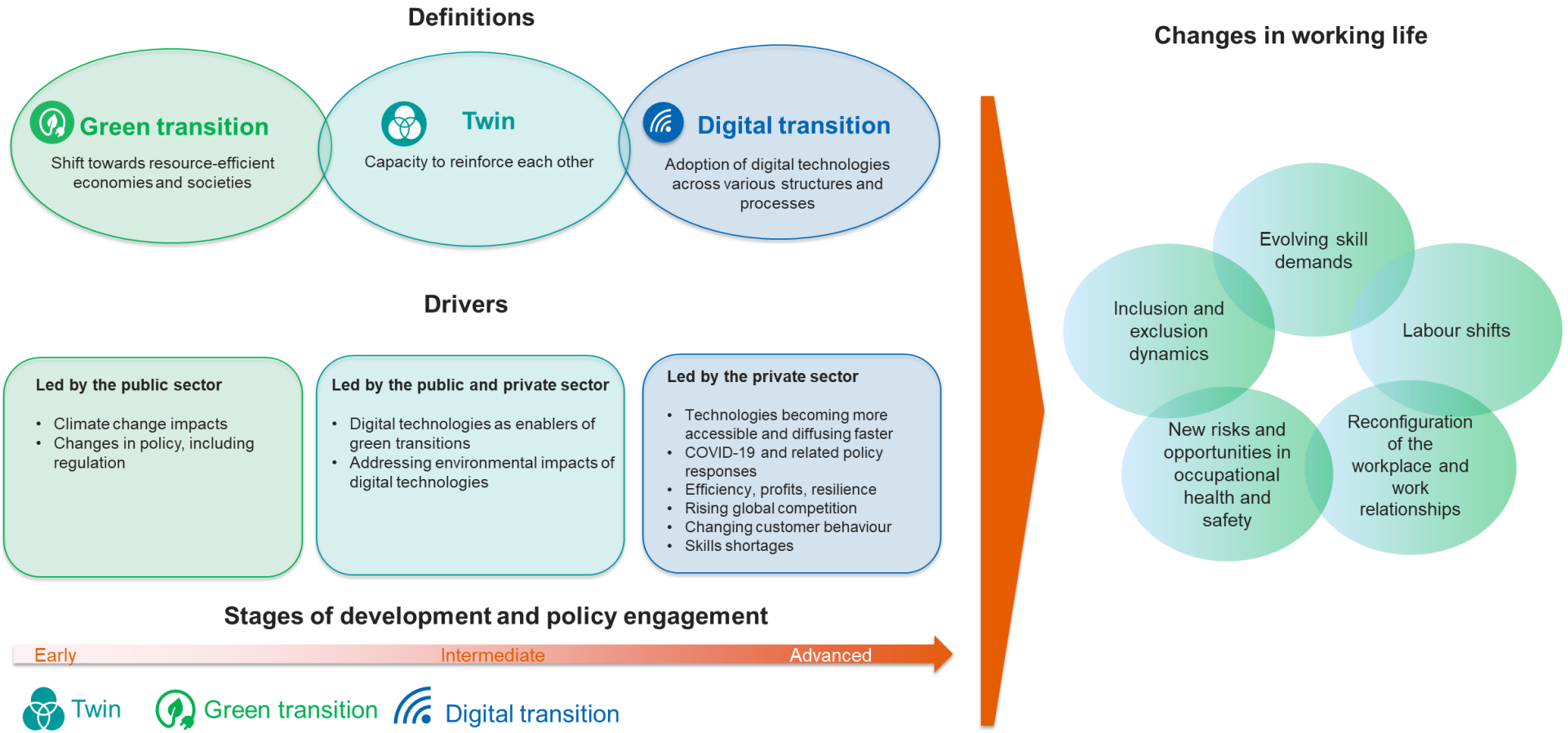
Source: Author.

When the discussion moves from transitions to transformations in the context of working life, the focus shifts to how these trends are changing the organisation of work, who participates in it and who is excluded, the skills needed, how the benefits of work are distributed, how workplace and work relationships are reconfigured, and the related new occupational health and safety risks and opportunities (Figure 2).

For instance, UNIDO distinguishes between *digitalisation*, as the adoption of digital technologies, and *digital transformation*, the integration of digital technology across all organisational areas, which drives changes in how organisations operate and their culture.[17] Similarly, the EC emphasises how the digital and green transitions are about *profound changes in our way of life*, including changes in behaviour and social norms.[18]

[17] UNIDO (2021). *Standards and digital transformation*.
[18] Muench et al. (2022). *Towards a green and digital future*, p. 11.

FIGURE 2: THE DIGITAL, GREEN AND TWIN TRANSITIONS IN WORKING LIFE



Source: Author, based on the review of 101 documents; see references list.

1.3 How do international organisations envisage the future of the digital and green transitions?

There is some general agreement among international organisations on the need to shape inclusive transitions where all population groups can participate and benefit from the new opportunities. For instance, the EC envisions a "just and inclusive" transition in the European Green Deal, meaning transitions that "put people first, and pay attention to the regions, industries and workers who will face the greatest challenges".[19]

There is also some emphasis on how transitions should be human- rather than technology-centred. For example, Cedefop refers to Industry 5.0, placing humans at the centre of the digital transformation:

> It is expected that European economies will move swiftly to Industry 5.0 (…) Policymakers and researchers have expressed hopes that the new economic paradigm will reshape work in a *human-centric* way, where people collaborate with technology, rather than being replaced by it (…) This will require a focus on technology as a means to achieve societal goals beyond efficiency, such as sustainability and worker wellbeing.[20]

Similarly, in its *Centenary Declaration for the Future of Work*, the ILO highlights its social justice mandate and human-centred approach:

> The ILO must carry forward into its second century with unrelenting vigour its constitutional mandate for social justice by further developing its *human-centred* approach to the future of work, which puts workers' rights and the needs, aspirations and rights of all people at the heart of economic, social and environmental policies.[21]

Organisations also stress the gender dimension of inclusion in these transitions. For instance, the ILO asserts:

> A just transition, if managed well, creates decent work opportunities with a *gender-sensitive* approach, contributes to the elimination of poverty, and ensures just and equitable social inclusion on the way toward greener, resilient and climate-neutral economies and societies, while at the same time [it] acknowledges uneven distribution of [the] costs and impacts associated with climate change.[22]

The justice dimension of these transitions is more frequently addressed in discussions about green transitions. However, little attention is given to justice between countries – particularly the relationships between the developing and developed nations involved in these transitions – or to a critical examination of the distributional impacts of economic growth. Exceptions identified include UNIDO and the ILO:

> What we need is a new global ethical code of responsibility and a rethinking of our models of growth, globalisation and sustainable development. This, in turn, necessitates a fair balance of

[19] EC (2019). *European Green Deal*, p. 2
[20] Cedefop (2022). *Setting Europe on course for a human digital transition*, p. 101.
[21] ILO (2019). *ILO Centenary Declaration for the Future of Work*, pp. 2–3.
[22] ILO (2023). *Occupational safety and health in a just transition*, p. 3.

interests between rich and poor, between industrialised countries, developing countries and emerging economies. We have the technologies, knowledge, and investment resources to provide effective answers to growing global challenges.[23]

New measures of country progress also need to be developed to account for the distributional dimensions of growth, the value of unpaid work performed in the service of households and communities, and the externalities of economic activity, such as environmental degradation.[24]

[23] UNIDO (2024). *Industrial Development Report 2024,* p. 11.
[24] ILO (2019). *Work for a brighter future – Global Commission on the Future of Work*.

2. How are the DGTT changing working life?

Key messages

Five key themes emerged from the document review on how the DGTT are transforming working life:

i. Evolving skills demands

- Skills are the most discussed theme. Skills development is shown as a way to give diverse population groups access to the benefits of these transitions while minimising the social costs.
- However, evidence suggests that the green and digital transitions are outpacing the changes and participation rates in education and training.
- The impacts of the green transition on skills are less understood, and there is less agreement about what a green job or green skills constitute.

ii. Labour shifts across sectors, including job displacement and creation

- Early discussions about job automation raised alarms about massive displacements; but recent debates have shifted the focus to skills and the increasing polarisation of work in favour of higher-skilled jobs.
- Labour shifts from the green transition are expected to be lower and more localised than those from the digital transition.
- There is some expectation that green mid-skill jobs will partly offset the decrease in mid-skill occupations driven by the digital transition.

iii. Reconfiguring the workplace and work relationships

- The debate mostly centres on the changes in the workplace, work patterns and work relations driven by the digital transition. Opportunities arising from these new configurations include work flexibility and autonomy, reduced entry barriers, flatter organisational structures and e-activism.
- Risks are also acknowledged, including precarious work conditions, increased work intensity and stress, digitally enabled surveillance, data extraction, deepening power asymmetries and undermining the role of social dialogue actors.
- Collective agreements are increasingly including clauses about technology adoption and green transitions. Key aspects include the right to disconnect, health and safety, reskilling and upskilling.

iv. New risks and opportunities in occupational health and safety

- As the workplace evolves, workers are increasingly exposed to new machines, equipment and materials.
- In the context of the twin transitions, the discussion focuses on the potential of digital technologies to reduce workers' exposure to hazardous substances and physical workloads in green jobs.
- However, the combined physical and psychosocial impacts of these transitions may affect workers, including increased cognitive workload and exposure to new materials and processes.

v. Inclusion and exclusion dynamics

- The digital transition discussion focuses on job displacement and polarisation in favour of higher-skilled workers, employers and larger companies.
- In comparison, the discussion about the impacts of the green transition centres on the risk of deepening regional inequalities, particularly in carbon-intensive regions already lagging behind.
- However, similar job polarisation is expected from both transitions, with higher-skilled workers benefiting most from both transitions and low- and medium-skilled workers facing negative impacts.

This section examines the key themes identified from the review of 101 policy documents, focusing on how the observed and anticipated impacts of the digital and green transitions, and their interactions, are addressed in relation to working life. Five key themes emerged:

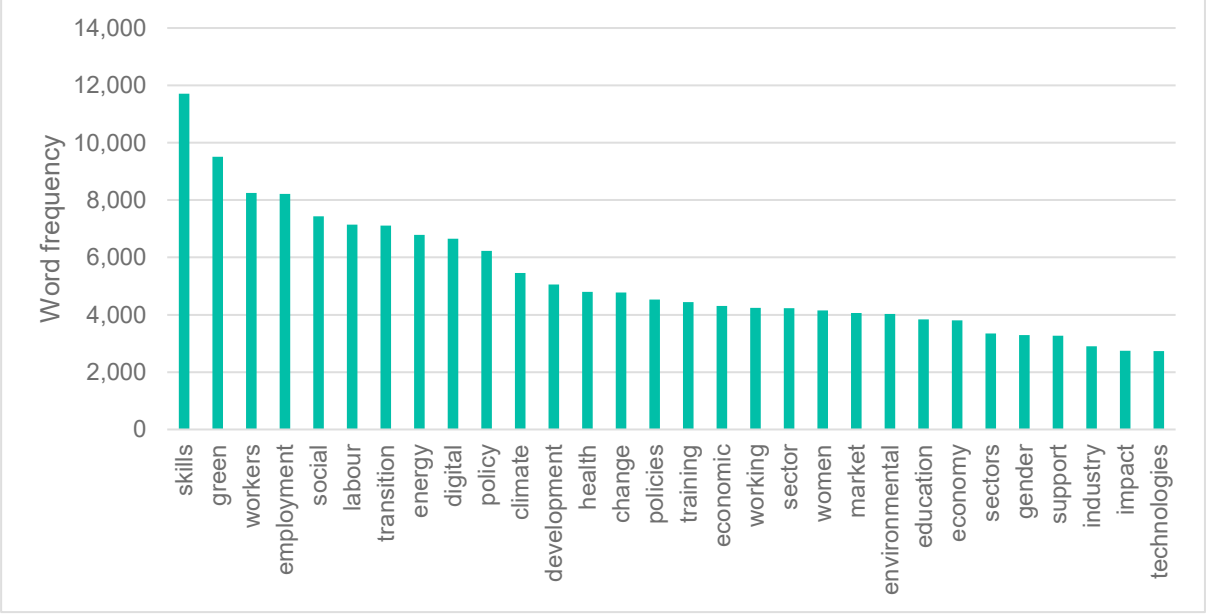
i. Evolving skills demands
ii. Labour shifts across sectors, including job displacement and creation
iii. Reconfiguration of the workplace and work relationships
iv. New risks and opportunities in occupational health and safety
v. Inclusion and exclusion dynamics

2.1 Evolving skills demands

Skills are the most discussed theme in the discourse about digital and green transitions in the context of working life (Figure 3). Of the 101 documents reviewed, 93 address this theme, with mentions ranging from 1 to 1,417 times. Skills are highlighted as both barriers and enablers of these transitions.

Overall, evidence suggests that the green and digital transitions are outpacing the changes and participation rates in education and training.[25] This mismatch was exacerbated by the COVID-19 pandemic, which accelerated the digital transition. Data from 40 emerging and developed economies indicates that skills shortages increased from 55% of employers in 2019 to 75% in 2022.[26]

FIGURE 3: TOP 30 MOST FREQUENT WORDS IN REVIEWED DOCUMENTS



Note: Frequency varies from 11,704 for skills to 2,738 for technologies.

Source: Author, based on the review of 101 documents; see references list.

[25] OECD (2023). *Skills for a resilient green and digital.*
[26] OECD (2023). *Retaining talent at all ages.*

Skills development is seen as a way to give diverse population groups access to the benefits of these transitions while minimising the social costs. For instance, the ILO asserts:

> A just transition requires that education and training are considered essential for all individuals at all stages of their lives, contribute to reap the job creation benefits and minimize the burdens of transition to carbon neutrality.[27]

International organisations have also highlighted how the digital transition is driving the demand for information and communication technology (ICT) professionals, including software developers, programmers, data scientists and data engineers, and social media managers. In sectors such as manufacturing, knowledge of automation and the internet of things is increasingly important.[28] As the use of artificial intelligence (AI) grows, so does the demand for AI specialists. In particular, the share of postings requiring AI skills over the 2019–22 period was found to be much higher in professional activities, ICT and manufacturing.[29]

The impacts of the green transition on skills are less understood, and there is less agreement on what a green job or green skills constitute. Classifications are usually based on an output or a process perspective. From an output perspective, it means identifying companies and sectors that produce goods and services that are environmentally friendly. In comparison, a process perspective focuses on identifying activities that seek to improve the environmental impact of companies.[30]

Rather than new jobs and roles, the green transition is expected to require reskilling or upskilling within existing occupations. New and emerging green occupations are considered less likely to appear.[31] Similarly to the digital transition, changes in the demand for green skills are expected to manifest primarily in mid-skill levels. Relevant skills groups for the green transition include science and engineering (including ICT), building and related trades, operation management, and business intelligence and data analysis.[32,33]

The classification of European Skills, Competences, Qualifications and Occupations (ESCO) identifies 591 green skills based on relevant competencies and knowledge. These include practical abilities, such as installing heat pumps and training staff to reduce food waste, and theoretical knowledge, such as developing energy-saving concepts, conducting environment-related research and analysing environmental impacts.[34] Nearly half of the skills listed are related to operating, installing and maintaining engineering and technology systems to manage materials and energy. These are followed by energy-related skills, such as knowledge related to clean energy, and waste-disposal skills. Figure 4 presents the results of automatic coding of the top 10 categories of green skills identified by ESCO.

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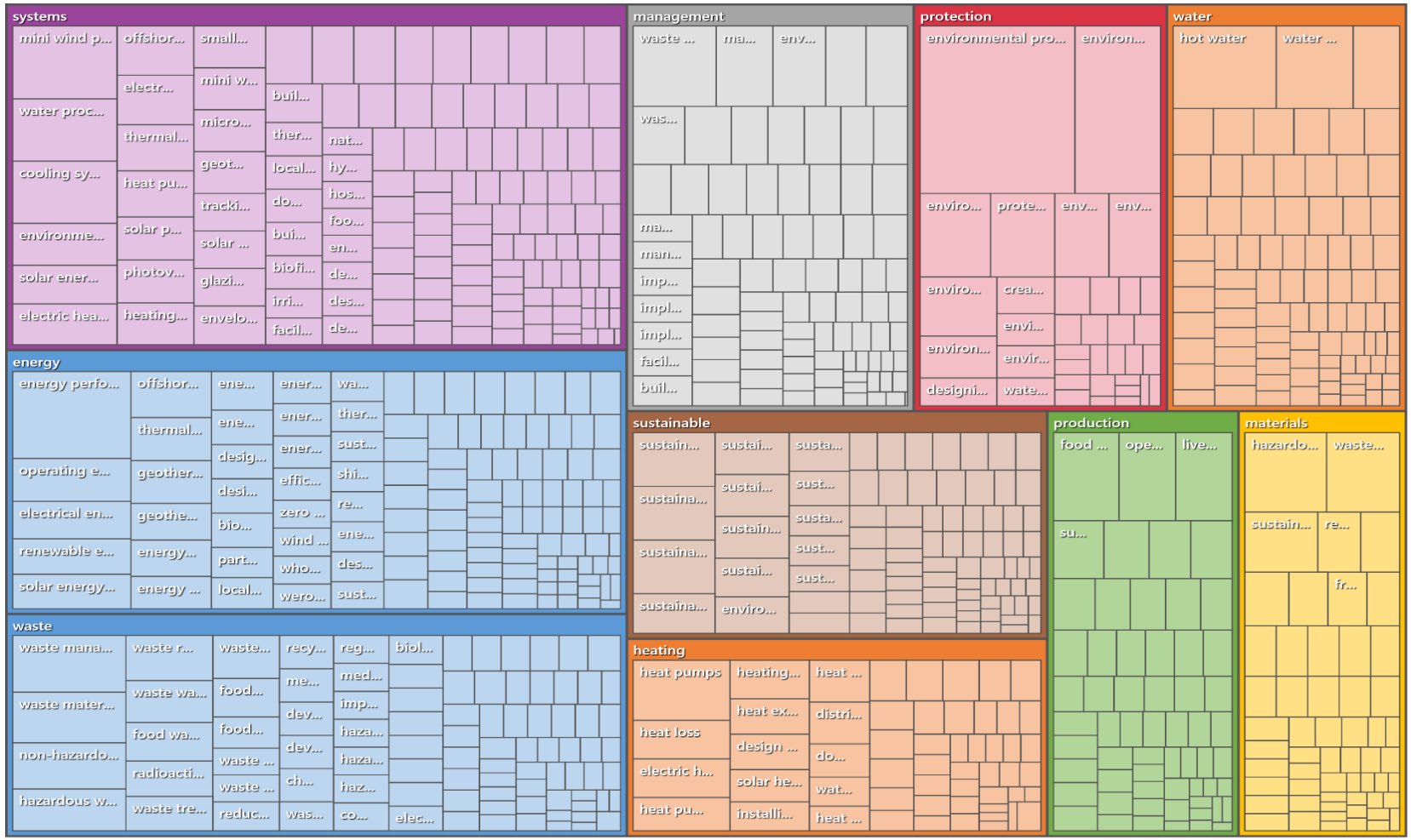
[27] ILO (2022). *Skills Development for a Just Transition*, p. 4.
[28] OECD (2022). *Skills for the Digital Transition: Assessing Recent Trends Using Big Data*.
[29] OECD (2023). *OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition*.
[30] Eurofound (2023). *Impact of climate change and climate policies on living conditions, working conditions, employment and social dialogue: A conceptual framework*.
[31] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement.*
[32] European Commission (2023). *Gender balance in energy*.
[33] Cedefop (2021). *The green employment and skills transformation: insights from a European Green Deal skills forecast scenario.*
[34] ESCO (2024). Use ESCO. Download.

FIGURE 4: TOP 10 CATEGORIES OF GREEN SKILLS FROM ESCO



Source: Author's analysis based on ESCO (2024). Autocoding of skills categories using NVivo 12 Plus.

It is also emphasised that new jobs and changes in existing jobs will require a combination of technical, socio-emotional, communication and metacognitive skills. As work environments and skills demands continue to evolve, workers will need to adapt to the new circumstances. This will require creative and systemic thinking, critical thinking (including on ethical implications), resilience, climate-change awareness, collaboration, problem-solving and self-assessment, among other skills.[35]

2.2 Labour shifts

The digital and green transitions are both creating and displacing jobs. These labour shifts are discussed in 24 of the 101 documents reviewed. Early discussions on job automation raised alarms about massive displacements; but recent debates have moderated these narratives, shifting the focus to skills[36] and the increasing polarisation of work in favour of higher-skilled jobs.[37,38]

In comparison, labour shifts from the green transition are expected to be lower and more localised than those from the digital transition. Net impacts are expected to depend on the reliance of sectors and regions on carbon-intensive activities and their capacity to take advantage of the opportunities created by the green transition.[39] The discussion centres on how sectors and regions highly dependent on coal mining and fossil-fuel-based energy are more likely to be negatively impacted, while new jobs are likely to be created in different sectors and regions, such as renewable energy and waste and water management.[40,41]

Within Europe, for instance, negative employment effects are more likely in certain Central and Eastern European countries and regions, where a relatively high proportion of workers remain employed in extractive industries. In contrast, positive employment effects are anticipated in Southern European countries, such as Spain and Italy, as well as other regions with significant natural resources conducive to clean energy production.[42]

As discussed in the previous section, while the effects of the green transition on skills are expected to occur within existing occupations,[43] in practice “green jobs” are usually defined in terms of sectors or industries that are “green”, such as agriculture, water supply and waste management, and electricity (including the renewable energy sector).

Although there is uncertainty about how the interaction between the green and digital transitions will shift the distribution of jobs, and this has barely been addressed by international organisations, there are indications that the main impact may be a higher demand for both digital and green skills across the board. Nonetheless, as changes in the demand for green skills are expected to manifest primarily in mid-skill levels, there is some expectation that green mid-skill jobs will partly offset the decrease in mid-skill occupations driven by the digital transition.[44]

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[35] OECD (2023). *OECD Skills Outlook 2023.*
[36] Cedefop (2022). *Setting Europe on course for a human digital transition.*
[37] Cedefop (2021). *Digital greener and more resilient.*
[38] OECD (2018). *Good jobs for all.*
[39] Eurofound (2023). *Fit for 55 climate package: Impact on EU employment by 2030*.
[40] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Op cit.*
[41] ILO (2019). *Skills for a greener future.*
[42] Eurofound (2023). *Fit for 55 climate package: Impact on EU employment by 2030*.
[43] Bednorz, J, Sadauskaitė, A, et al (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[44] ILO (2019). *Skills for a greener future.*

2.3 Reconfiguring the workplace and work relationships

Among international organisations, the debate about reconfiguring the workplace, work patterns and work relationships centres on the digital transition, while the impacts of the green and twin transitions have received less attention. Of the 101 documents reviewed, 18 discuss the impacts of the digital transition on the workplace, work patterns and work relations, while only 4 address this theme for the green transition and only 3 for the interaction between the 2 transitions.

In terms of the workplace, the debate focuses on how digital technologies enable this to take different forms, including telework,[45] hybrid work[46] and platform work.[47] These new configurations are portrayed as offering both opportunities and risks. For instance, it is highlighted that workers in platform markets may benefit from low entry barriers and developing new skills, flexibility and autonomy,[48,49] while telework offers opportunities for more flexible organisation, labour inclusion, reduced travel and lower environmental impact.[50] There is also some discussion about the virtualisation of relations and how ICT technologies used in management could lead to flatter organisational structures with fewer middle-management posts.[51]

However, international organisations also recognise the risks of these new work arrangements. Themes emphasised in this respect include concerns about precarious work conditions, the boundaries of contractual working time,[52] digitally enabled surveillance and algorithmic management – the use of algorithms to allocate tasks, monitor and evaluate workers' performance and behaviour, and other organisational functions.[53] It is acknowledged that these changes can undermine workers' autonomy and job control, increase the burdens of unpaid platform-related work, increase work intensity and stress, facilitate data extraction and infringement of data privacy, and ultimately deepen power asymmetries between employers and employees.[54,55,56,57,58,59]

On this theme, EU-OSHA has also warned that although the General Data Protection Regulation (GDPR) may provide a valid legal basis to ensure fundamental data rights for workers, in practice the imbalance of power and explicit consent in contracts limit the applicability of the GDPR in the working context.[60]

Algorithmic management has received special attention, as AI systems are increasingly used to guide recruitment, monitor workloads and define remuneration rates, among other tasks.[61] Some of the issues discussed include how it can undermine the role of social dialogue actors, such as

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[45] Telework is a sub-category of remote work involving ICTs, usually performed from home or, more rarely, in out-of-the-home-based office spaces dedicated to teleworking (EU-OSHA, 2023, p. 1).
[46] Hybrid work is a combination of telework and work at the employer's premises (EU OSHA, 2023, p. 1).
[47] Platform work encompasses a broad range of activities that have in common the use of online platforms to connect the demand and supply of particular services (OECD, 2020, p. 5).
[48] OECD (2020). *Regulating platform work.*
[49] Eurofound (2020). *New forms of employment: 2020 update*.
[50] EC (2021). *The European Pillar of Social Rights*.
[51] EU-OSHA (2018). *Foresight on new and emerging occupational safety and health risks associated with digitalisation by 2025*.
[52] EC (2021). *The European Pillar of Social Rights*.
[53] EU-OSHA (2024). *Digital Platform.*
[54] EC (2021). *The European Pillar of Social Rights*.
[55] EU-OSHA (2023). *Surveillance and Monitoring.*
[56] EU-OSHA (2018). *Foresight on new and emerging occupational safety and health risks associated with digitalisation by 2025*.
[57] EU-OSHA (2024). *Worker management through AI*.
[58] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[59] Eurofound (2020). *New forms of employment: 2020 update*.
[60] EU-OSHA (2023). *Surveillance and Monitoring.*
[61] EC (2021). *The European Pillar of Social Rights*.

trade unions and work councils, as it is often difficult for a flexible and dispersed workforce to organise and pursue collective action.[62,63]

The OECD, for instance, has highlighted how trade union density has declined across OECD countries – from 33% (on average) in 1975 to 16% in 2019 – and how workers with non-standard forms of work are 50% less likely to be unionised than standard workers.[64]

Nonetheless, the ILO discusses how digital technologies have been leveraged by social actors to stimulate membership and dialogue, organising online campaigns and the creation of e-groups of activists, although these initiatives are in their early stages.[65]

The impacts on collective action are also discussed in the context of the interaction between the digital and green transitions, as this becomes more challenging in sectors most exposed to the negative effects of "greening", such as mining.[66] However, Eurofound and the EC have also highlighted examples of how collective agreements are including clauses related to technology adoption and green transitions (see Box 2.1).

Eurofound has identified collective agreements addressing aspects related to digitalisation in around half of Member States. Key domains include the right to disconnect, employment conditions in telework, health and safety, reskilling and upskilling.[67] In the case of the green and twin transitions, some developments include an increase in telework and a reduction in working time (including the 4-day working week), with progress seen in Austria, Denmark and Finland.[68,69]

[62] Ibid.
[63] EU-OSHA (2024). *Worker management through AI*.
[64] OECD (2022). *Shaping the transition AI and social dialogue.*
[65] ILO (2016). *The future of work*.
[66] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[67] Eurofound (2022). *Reinforcing social dialogue in the context of the move towards the green and digital transitions*.
[68] Eurofound (2024). *Job quality side of climate change*.
[69] Eurofound (2022). *Moving with the times: Emerging practices and provisions in collective bargaining*.

BOX 2.1. COLLECTIVE AGREEMENTS IN THE DIGITAL AND GREEN TRANSITIONS

In the context of the green and digital transitions and their interactions, collective agreements play a key role in ensuring that the workforce is adequately prepared and protected. These agreements, negotiated between employers and trade unions, address the multifaceted challenges and opportunities presented by the shift to more sustainable and technologically enabled workplaces. The following examples illustrate how collective agreements are being used to navigate the complexities of the green and digital transitions.

Digital transition

Examples of collective agreements with clauses related to technology adoption include:

- In Slovakia collective agreements in the steel, metallurgy and mining industry have included clauses aimed at avoiding redundancies as a result of technology adoption by retraining or reskilling employees and reassigning them to different roles.
- In Denmark the collective agreement for the transport sector acknowledges the changes the sector will experience as a result of automation and introducing self-driving vehicles; it provides supplementary employee training.
- In Germany the "compass for digitalisation" developed by IG Metall, a metalworkers' union, is used by workers' councils to guide the digital transition process considering workers' interests.

Green transition

Examples of collective agreements with clauses related to the green transition include the following:

- In Germany the coal phase-out act focuses on restructuring the German coal and mining sectors and establishes state compensation for workers made redundant and aged 58 or older, for a maximum of 5 years and at the level of their pension.
- In Sweden two national agreements were signed between the Confederation of Blue-collar Workers (Landorganisation, LO-SE), the Council of Negotiation PTK for White-collar Workers, and the Confederation of Swedish Employers (Svenskt Näringslivet). These agreements give workers, employed or between jobs, the right to financial support for shorter or longer training courses to develop green skills.
- In the Netherlands the Royal Dutch Touring Club (ANWB) collective agreement stipulates that employees will receive compensation not only when they travel for work but also when they work from home. ANWB's hybrid scheme is designed to reward workers, through higher compensation, for environmentally friendly decisions about travelling (or not) for work.

Source: EC (2023). *Fair Green Transition*; EP (2022). *Unionisation and the twin transition*; Eurofound (2023). *Living and working in Europe 2022*; Eurofound (2022). *Moving with the times*.

2.4 New risks and opportunities for occupational health and safety

As the workplace evolves, workers are increasingly exposed to new machines, equipment and materials, prompting increased discussion among international organisations about the positive and negative implications of these changes for occupational health and safety (OSH). Of the 101 documents reviewed, 10 addressed OSH issues in the context of the digital transition, 7 in the green transition context, and 2 in the context of the interaction between transitions.

In the context of the digital transition, key issues discussed include: increasing cognitive workloads due to changing job requirements; risks from interactions with robots and other digital technologies (including ergonomic issues); more sedentary lifestyles; stress from the lack of transparency in the use of data and algorithms; stress induced by performance monitoring; risks from integrating old and new technologies and systems; and negative impacts on mental health because of blurred work/life boundaries and lone working.[70,71,72,73] On a positive note, digital technologies can relieve workers from unhealthy, hazardous, physically strenuous, routine or repetitive tasks, and help to monitor and predict OSH problems.[74]

A significant concern is the precarity of platform work. Issues discussed include: lower training levels; working in various private settings; loss of peer support; short-notice work requests with penalties for non-availability; time pressure and rapid pace of work; continuous real-time evaluation and performance rating; irregular hours; insecure income; payment by task rather than time spent seeking work; lack of social entitlements such as sick and holiday pay; poor worker representation; and unclear responsibilities for OSH.[75]

In the context of the green transition, highlighted issues include: risks from climate change; increased risks from repeated recycling processes; risks from the decommission and demolition of facilities; ergonomic issues related to changes in processes and systems; and chemical hazards from new materials and processes.[76,77] A theme particularly addressed by the ILO and Eurofound is how climate change is impacting work through heat stress, predominantly in sectors such as agriculture, environmental goods and services, construction, emergency repair work, transport, tourism, and sports and manufacturing, where facilities are not properly regulated.[78,79,80]

On a positive note, the ILO notes the green transition's potential to improve OSH by reducing workers' exposure to heat and noise through energy efficiency; safer and "greener" transportation

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[70] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[71] EU-OSHA (2018). *Foresight on new and emerging occupational safety and health risks associated with digitalisation by 2025*.
[72] EU-OSHA (2024). Worker Management through AI.
[73] Eurofound (2020). *New forms of employment: 2020 update*.
[74] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[75] EU-OSHA (2018). *Foresight on new and emerging occupational safety and health risks associated with digitalisation by 2025*.
[76] EU-OSHA (2021). *Foresight Study on the Circular Economy and its effects on Occupational Safety and Health*.
[77] EU-OSHA (2023). *Foresight Study on the Circular Economy and its effects on Occupational Safety and Health: Process and key findings*.
[78] ILO (2019). *Heat Stress.*
[79] Eurofound (2023). *Impact of climate change and climate policies on living conditions, working conditions, employment and social dialogue: A conceptual framework*.
[80] Eurofound (2024). *Job quality side of climate change*.

modes; and the transition to green, safer and decent jobs.[81] Eurofound also highlights how the green transition can be an "opportunity to reinvent work and improve job quality".[82]

Regarding the interaction between the green and digital transitions, the discussion centres on the potential of digital technologies to reduce workers' exposure to hazardous substances and physical workloads in green jobs.[83,84] However, the interaction between the two transitions may also compound the physical and psychosocial impacts, such as increasing cognitive workload and exposure to new materials and processes. Table 2 summarises the key risks and opportunities for OSH identified from the document review.

TABLE 2: DEFINITIONS OF INCLUSION

	Digital transition	Green transition	Twin transition
Opportunities	• relieves workers from hazardous work and physical workloads • monitoring and predicting OSH problems	• reinvents work • improves safety • improves job quality	• reducing workers' exposure to hazardous substances and physical workloads in green jobs
Risks	• increasing cognitive workloads • risks from interactions with robots and other digital technologies • more sedentary lifestyles • stress induced by performance monitoring • risks from integrating old and new technologies and systems • impacts on mental health because of blurred work/life boundaries and lone working • precarity of platform work	• climate-change impacts • risks from repeated recycling processes and the decommissioning and demolition of facilities • ergonomic issues related to changes in processes and systems • chemical hazards from new materials and processes	• compound physical and psychosocial impacts (not explicit from the review)

Source: Author based on the document review.

[81] ILO (2023). *Occupational safety and health in a just transition*.
[82] Eurofound (2024). *Job quality side of climate change*.
[83] ILO (2023). *Occupational safety and health in a just transition*.
[84] EU-OSHA (2023). *Foresight Study on the Circular Economy and its effects on Occupational Safety and Health: Process and key findings*.

2.5 Inclusion and exclusion dynamics

International organisations are expressing concerns about the potential impacts on equality and inclusion from the digital and green transitions and their interactions. Of the 101 documents reviewed, 74 address these concerns, although organisations differ in their understanding of inclusion.

Both the EC and the ILO use the term “just transition” with some nuances. The EC emphasises the role of skills as an enabler of inclusion and mitigating negative impacts, while the ILO focuses on decent jobs and enabling everyone to contribute and benefit from the transition. In comparison, the OECD discusses successful participation in the labour market and well-functioning markets (Table 3).

Changes in organisations’ narratives over time were also apparent. For instance, the OECD 2018 Jobs Strategy, *Good jobs for all in a Changing World of Work*, discusses an evolution from the 2006 strategy involving a greater emphasis on job quality and inclusiveness:

> The main message of the new OECD Jobs Strategy is that while policies to support flexibility in product and labour markets are needed for growth, they are not sufficient to simultaneously deliver good outcomes in terms of job quantity, job quality and inclusiveness. This also requires policies and institutions to promote job quality and inclusiveness, which are often more effective when supported by the social partners. In this sense, the new OECD Jobs Strategy represents a significant evolution from the 2006 strategy, and even more from the original 1994 strategy. It is based on new evidence that shows that countries with policies and institutions that promote job quality, job quantity and greater inclusiveness perform better than countries where the focus of policy is predominantly on enhancing (or preserving) market flexibility. In other words, it is necessary to combine policies that encourage economic growth with policies and work practices agreed by the social partners that foster inclusiveness and protect workers.[85]

[85] OECD (2018). *Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy*. OECD Publishing, Paris. https://doi.org/10.1787/9789264308817-en

TABLE 3: DEFINITIONS OF INCLUSION

Organisation and source	Definition (quotes from documents)
European Commission (EC) **EC (2018). *Digital Skills and Jobs Coalition, p. 1***	"Europe must ensure that its citizens and its labour force have the appropriate digital skills to live and work in the new digital era. No one must be left behind."
European Commission (EC) **EC (2021). *Just Transition Fund, p. 2***	"In order to be successful and socially acceptable for all, the transition has to be fair and inclusive. Therefore, the Union, Member States and their regions must take into account its social, economic and environmental implications from the outset, and deploy all possible instruments to mitigate adverse consequences."
International Labour Organization (ILO) **ILO (2023). *Social protection for a just transition*, p. 7**	"A just transition is a policy and operational framework (including a set of principles, processes and practices that produces plans, policies, investments and concrete measures) designed to move to net zero, green and decent jobs, the eradication of poverty, the enjoyment of the human right to social protection and thriving and resilient communities. This includes ensuring adequate (social) protection against risks and impacts from the transition and climate change, actively promoting the "greening" of the economy while achieving social objectives and leaving no one behind – by enabling everyone to contribute to and benefit from the transition to a sustainable economy and society."
Organisation for Economic Co-operation and Development (OECD) **OECD (2018). *Good jobs for all*, p. 47.**	"The OECD defines labour market inclusiveness as 'ensuring equal opportunities to succeed in the labour market'."
Organisation for Economic Co-operation and Development (OECD) **OECD (2016). *New markets and new jobs,* p. 4.**	"The benefits from digital technologies will spread to all only if markets work well. If competition in product markets is low, productivity gains may not translate into lower prices, higher demand and more jobs. If nominal wages are not sufficiently flexible, some workers may receive higher real wages while others become unemployed. Therefore, without appropriate labour market regulations and effective competition policies, digital technologies may end up having large distributional effects and widen the income gap between different groups of people."

Source: Author.

Overall, the discussion of inclusion in the digital transition emphasises workplace accessibility and removing barriers to employment, whereas the green transition adopts a broader perspective, addressing social justice and regional impacts.

The digital transition discussion focuses on job displacement and polarisation in favour of higher-skilled workers, employers and larger companies.[86,87] In comparison, the discussion about the impacts of the green transition centres on the risk of deepening regional inequalities, particularly in carbon-intensive regions already lagging behind.[88,89,90] However, similar job polarisation is expected, with higher-skilled workers benefiting most and low- and medium-skilled workers facing negative impacts.[91]

[86] OECD (2018). *Good jobs for all*.
[87] ILO (2016). *The future of work*.
[88] OECD (2023). *Job creation and local economic development*.
[89] EC (2022). *Ensuring a fair transition towards climate neutrality*.
[90] EC (2022). *Territorial Just Transition Plans*.
[91] OECD (2023). *Job creation and local economic development*.

Disadvantaged population groups identified in these transitions include people with disabilities, young people, elderly people, those from socio-economically disadvantaged backgrounds, low-skilled workers and women.[92,93,94,95,96] However, little attention is given to how these different identities interact, compounding exclusionary mechanisms. The ILO is an exception, recognising how gender intersects with characteristics such as race, ethnicity, age, disability and migration status.[97]

The ILO notes that barriers people with disabilities face include affordability and access to the internet and ICTs, non-inclusive digital tools, employers avoiding workplace accessibility obligations by promoting remote work, and limited access to digital skills.[98] Young people face higher unemployment rates,[99] while elderly people may have less access to skills development and experience labour discrimination.[100]

In terms of gender, there is an emphasis on how both the positive and negative impacts of the green transition are more likely to occur in men-dominated sectors, such as mining, engineering, construction and energy. Women are less likely to benefit from the new opportunities, as they are under-represented in the fields and sectors relevant to green jobs.[101,102,103,104,105] For instance, UNIDO highlights how "women are underrepresented in the energy industry workforce, in ministerial positions in the field of energy and are rarely considered as key stakeholders for energy initiatives".[106]

In comparison, although impacts vary by context, the digital transition is observed and expected to affect both men- and women-dominated sectors, such as manufacturing, food and beverage service activities and retail trade.[107] However, since women are under-represented in ICT fields, they are less likely to benefit from the digital transition.[108,109] Discussions also highlight gender and ethnic bias in digital technologies, which can reinforce gender norms and deepen inequalities.[110,111,112]

Although limited, discussions about the interaction between the digital and green transitions indicate that, without policy action, existing disparities may deepen, intensifying labour market

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[92] ILO (2018). *An inclusive digital economy*.
[93] EC (2022). *Territorial Just Transition Plans*.
[94] OECD (2023). *OECD Skills Outlook 2023*.
[95] EC (2023). *Fair Green Transition*.
[96] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[97] ILO (2022). *Gender equality labour and a just transition for all.*
[98] ILO (2018). *An inclusive digital economy*.
[99] EC (2022). *Territorial Just Transition Plans*.
[100] OECD (2023). *Retaining talent at all ages*.
[101] EC (2023). *Fair Green Transition*.
[102] Cedefop (2021). *The green employment and skills*.
[103] EC (2023). *Gender balance in energy*.
[104] ILO (2018). *Greening with Jobs*.
[105] ILO (2019). *Skills for a greener future*.
[106] UNIDO (2023). *Gender energy transition*, p. 2
[107] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[108] EU-OSHA (2023). *Smart digital monitoring systems for occupational safety and health: Inclusion and diversity at the workplace*.
[109] ILO (2023). Digital Employment Diagnostic Guidelines.
[110] UNIDO (2023). *Gender, Digital Transformation, and Artificial Intelligence.*
[111] EU-OSHA (2023). *Smart digital monitoring systems for occupational safety and health: Inclusion and diversity at the workplace*.
[112] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.

segregation. However, international organisations also recognise the potential of these transitions to enhance inclusivity.

For example, telework and hybrid work are presented as options for individuals returning to work after long absences due to sick leave or those with long-term health conditions.[113] Their role in facilitating women's labour participation is also emphasised.[114,115] However, concerns are raised about the extent to which it may increase their time poverty, contribute to women's work precarity and reinforce traditional gender roles.[116,117,118,119]

OSH monitoring solutions are discussed as ways to make tasks and jobs accessible to workers with specific needs while preventing negative health.[120] However, concerns about potential data misuse for discrimination remain.[121]

Although less attention is given to the potential of the green transition to foster social inclusion, the ILO, EC and Eurofound highlight its role in improving job quality, providing affordable and environmentally sustainable energy, which is particularly relevant for rural populations, and offering affordable and sustainable goods and services.[122,123,124,125] Discussions also identify opportunities for disadvantaged groups to better participate in labour markets through the "twinning" effect, addressing the skills supply and demand mismatch exacerbated by the digital and green transitions.[126]

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[113] EU-OSHA (2023). *Hybrid work: New opportunities and challenges for occupational safety and health*.
[114] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement.*
[115] EU-OSHA (2024). *Exploring the gender dimension of telework: Implications for occupational safety and health*.
[116] UNIDO (2023). *Gender, Digital Transformation, and Artificial Intelligence.*
[117] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement.*
[118] EU-OSHA (2023). *Hybrid work: New opportunities and challenges for occupational safety and health*.
[119] EU-OSHA (2024). *Exploring the gender dimension of telework: Implications for occupational safety and health*.
[120] EU-OSHA (2023). *Smart digital monitoring systems for occupational safety and health: Inclusion and diversity at the workplace*.
[121] Ibid.
[122] ILO (2015). *Guidelines for a just transition towards environmentally sustainable economies and societies for all.*
[123] EC (2022). *Ensuring a fair transition towards climate neutrality.*
[124] ILO (2022). *Gender equality labour and a just transition for all*.
[125] Eurofound (2024). *Job quality side of climate change*.
[126] ILO (2018). *An inclusive digital economy for people with disabilities.*

3. Policies for inclusive and sustainable transitions

Key messages

Four key areas of policy action were identified as fostering inclusive and sustainable transitions:

i. *Understanding observable and potential impacts.* Analysis and capacity development to enhance our understanding of both the observable and potential effects. Examples of policy instruments are:
   - systematic labour market and skills monitoring
   - foresight analysis
   - sector- and occupation-specific gender-disaggregated data
   - distributional impact assessments

ii. *Addressing challenges and opportunities.* Direct support to address the challenges and opportunities faced by individuals, households and businesses. Examples of policies in this area are:
   - active labour market policies
   - skills development
   - entrepreneurship and business support (including for social enterprises)
   - social protection

iii. *Ensuring initiatives include diverse voices.* Social dialogue to ensure that all stakeholders' voices are heard. Examples of initiatives are:
   - skills and advisory councils
   - framework agreements
   - collective agreements
   - best-practice sharing

iv. *Creating an enabling environment.* Developing and updating infrastructure, regulations and policy frameworks to create an enabling environment for inclusive and sustainable transitions. Examples of policy instruments are:
   - standards and regulations
   - investment in infrastructure
   - policy coordination
   - policy frameworks
   - sustainable and inclusive incentives

International organisations recognise the need for decisive government action and collaboration among employers, workers, trade unions and the government to ensure that the digital and green transitions foster an inclusive and sustainable future. The uncertainty and complexity involved in these transitions and their interactions (DGTT) call for a comprehensive policy mix. Based on the document review, four key areas of policy action were identified (Table 4):

i. Analysis and capacity development to enhance our understanding of both the observable and potential effects
ii. Direct support to address the challenges and opportunities faced by individuals, households, and businesses
iii. Social dialogue to ensure all stakeholders' voices are heard
iv. Developing and updating infrastructure, regulations and policy frameworks to create an enabling environment for inclusive and sustainable transitions.

TABLE 4: POLICY AREAS FOR INCLUSIVE AND SUSTAINABLE DGTT

Policy	Rationale	Type of instrument
Understanding observable and potential impacts		
Labour market intelligence	Anticipate skills needs and the population groups most affected	• Systematic labour market and skills monitoring • Foresight analysis • Sector- and occupation-specific gender-disaggregated data • Distributional impact assessments
Addressing the challenges and opportunities of individuals, households and businesses		
Active labour market policies	Facilitate job transitions while supporting individuals' engagement in the labour market	• Apprenticeship support • Public employment services (labour market information, job search and matching assistance, career counselling, hiring practices advice) • Skills development for employability • Reskilling and upskilling incentives • Wage subsidies • Self-employment support and entrepreneurship promotion • Awareness-raising campaigns and training on workplace bias • Programmes targeted at young, elderly workers, women, people with disabilities and other under-represented groups • Gender-transformative and disability-inclusive approaches
Skills development	Ensure workers have the right skills to prosper in the digital and green transitions	• Support schemes for apprenticeships • On-the-job training programmes, including paid traineeships and job shadowing schemes • Voucher training programmes and other forms of financial support • Investment in education and training systems • Lifelong learning systems, including universal entitlements • Updating curricula and adapting education and training systems to a changing landscape • Establishing specific bodies to develop green and digital skills • Including workers and trade unions in the design of programmes • Retraining programmes • Leveraging online and other digital learning applications • Career guidance • Developing worker-centred adult learning systems • Programmes targeted at young, elderly workers, women, people with disabilities and other under-represented groups • Gender-transformative and disability-inclusive approaches
Entrepreneurship and business support (including for social enterprises)	Enhance economic diversification and stimulate the creation of quality jobs	• SME support for capital investment (grants, loans, equity) • Advisory services • Investments in industrial facilities • (Green) public procurement • Programmes targeted at young people, women, people with disabilities and other under-represented groups • Gender-transformative and disability-inclusive approaches

Policy	Rationale	Type of instrument
Social protection	Provide income replacement and prevent poverty and vulnerability as a result of the transitions	• Cash transfer programmes • Public employment programmes • Payments for ecosystem services • Unemployment insurance • Redundancy and bankruptcy compensation • Early retirement • Adapting social security schemes to cover workers on non-standard labour contracts • Gender-transformative and disability-inclusive approaches • New models of welfare provision, including universal basic income programmes and universal basic services programmes
Ensuring initiatives include diverse voices		
Social dialogue	Include diverse voices in the design and implementation of initiatives enabling the digital and green transitions, and counter power imbalances	• Consultations • Skills and advisory councils • Framework agreements • Collective agreements • Best-practice sharing
Creating an enabling environment		
Standards and regulations	Facilitate transitions while protecting workers	• Workplace risk assessments • Flexible working regulation • Updating and enforcing OSH and social security regulation • Leveraging OSH monitoring solutions to increase the accessibility of some occupations • Accessibility regulations and guidelines • Regulating the use of AI in the workplace • Training and awareness-raising campaigns on new standards and regulation for both employers and workers • Regulation on the use of algorithms in the workplace • Ethical frameworks • International collaboration when developing regulations and guidelines, including standards harmonisation
Investment in infrastructure	Address regional inequalities	• Social infrastructure (health, child- and elderly-care facilities) • Training centres • Telecommunications infrastructure
Policy coordination	Bridge the gap between environmental, technology, skills and inclusion policies	• Coordination mechanisms across ministries and from local to transnational levels • Capacity building
Policy frameworks	Address the specific features of regions and sectors and set a just transition vision for them	• Sectoral strategies • Sectoral social dialogue • Place-based transition strategies • Local coalitions
Sustainable and inclusive incentives	Change business and household incentives towards sustainable and inclusive production and social reproduction	• Using alternative measures to GDP growth, such as indicators of human development to monitor countries' progress • Accounting for the impact of transition policies on third countries • Global partnerships • Supporting changes in lifestyle and patterns of consumption • Prioritising social innovation

Source: Author, based on the document review, see references list.

International organisations underscore the importance of employment diagnostics, skills assessments and foresight analysis to enhance the government's understanding of how the DGTT are reshaping labour markets, identifying which population groups are negatively impacted, and

how.[127,128,129] The OECD, for instance, stresses the need for assessments that are sufficiently disaggregated at the occupational, sectoral and regional level.[130,131] Similarly, Cedefop provides comprehensive evidence of labour market trends and skills needs, as discussed in Section 2.1.

However, these organisations also acknowledge, to some extent, the uncertainty involved in these transitions and the limitations of such analysis. For example, in its *Skills for the Digital Transition* report, the OECD states that: "From a policy making standpoint, it is very difficult to precisely predict how new technologies might transform existing specific jobs and as such, the extent of potential raising inequalities."[132]

Active labour market policies (ALMPs) are among the most frequently cited instruments to help individuals navigate the challenges posed by the DGTT. The aim of ALMPs is to facilitate job transitions while supporting individuals' continued engagement in the labour market.[133] Examples include: apprenticeship support, public employment services, skills development, wage subsidies, reskilling and upskilling incentives, wage subsidies, and self-employment support and entrepreneurship promotion. For instance, the government of Slovenia provides wage subsidies to incentivise hiring unemployed people in green jobs (Box 3.1).

BOX 3.1. SLOVENIA: WAGE SUBSIDIES FOR GREEN JOBS

In Slovenia the Ministry of the Environment and Spatial Planning, through its Climate Change Fund, launched a pilot employment incentive scheme called Green Jobs. The programme offers employment subsidies to employers who hire unemployed individuals for permanent green jobs.

Approach

The scheme provides funding to enterprises operating in green or greening sectors. Employers receive a subsidy of €340 per month for 2 years, amounting to €8,160 per employee, for hiring unemployed individuals in full-time green jobs. To qualify for the subsidy, employers must offer permanent employment contracts. Employers can receive up to ten wage subsidies, depending on the number of green jobs created.

Challenges

A key challenge encountered during the project was the absence of a widely accepted definition of a green job. This was addressed by engaging a range of stakeholders to create a definition of "greenness" based on four key criteria: (i) occupation and activity, (ii) workplace activities, (iii) certificates and qualifications needed and (iv) production and services.

Source: ILO (2023). *The role of active labour market policies for a just transition*; OECD (2023). *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*.

[127] OECD (2023). Skills for a resilient green and digital.
[128] ILO (2023). Digital Employment Guidelines.
[129] EC (2022). Ensuring a fair transition towards climate neutrality.
[130] OECD (2023). *Job creation and local economic development*.
[131] OECD (2023). Skills for a resilient green and digital transition.
[132] OECD (2022). *Skills for the Digital Transition. Assessing Recent Trends Using Big Data*, p. 19.
[133] ILO (2023). *The role of active labour market policies for a just transition*.

As discussed in Section 2.1, changes in skills requirements are one of the most discussed themes in the DGTT debate. Reflecting this, skills development is one of the most frequently referenced policy areas among international organisations. Considering the fast pace and uncertainty of skills changes, short-term courses, apprenticeships and other on-the-job training programmes are highlighted for their flexibility and adaptability.[134] Lifelong learning approaches and the role of digital learning applications are also emphasised, as skills are expected to continue evolving.[135]

Entrepreneurship and business support, particularly in regions negatively impacted by the DGTT, are presented as opportunities for economic diversification while ensuring the creation of decent green jobs.[136] The role of social enterprises is noted, as they are typically driven by societal objectives.[137] Examples of these policy measures include support for capital investment, advisory services, investments in industrial facilities, and public procurement. In the EU, for example, the Just Transition Mechanism includes a range of measures designed to support businesses (see Box B.1 in Annex B).

As highlighted in Section 2.5, international organisations have identified that certain population groups are more vulnerable to the negative impacts of the DGTT and are less likely to benefit from their opportunities. To ensure that direct support programmes are inclusive, international organisations recommend establishing initiatives targeted at young and elderly workers, women, people with disabilities and other under-represented groups, as well as adopting gender-transformative and disability-inclusive approaches.

A gender-transformative approach involves implementing measures that reduce gender disparities and actively challenge and reshape gender norms and stereotypes.[138] Box 3.2 shows how Spain's Just Transition Strategy has adopted a gender perspective.

Disability-inclusive approaches focus on eliminating the barriers that prevent people with disabilities from participating fully in the DGTT, while also addressing both current and potential negative impacts on this population group.[139] Despite the importance of these approaches, international organisations have warned that vulnerable groups remain significantly under-represented in most skills development programmes,[140] with only a small number of these programmes adopting inclusive practices.[141,142]

Given the uncertainty of the impacts of the DGTT, international organisations have included social protection in their core policy recommendations, recognising it as an essential complement to ALMPs. Social protection refers to interventions aimed at reducing and preventing poverty and vulnerability, and it can take the form of contributory schemes (social insurance) and non-contributory tax-financed schemes, in cash or kind.[143] Examples include cash transfers (including universal basic income programmes), public employment programmes, payments for ecosystem

[134] Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*.
[135] ILO (2019). *Work for a brighter future*.
[136] EC (2021). *Just Transition Fund*.
[137] EC (2022). *Ensuring a fair transition towards climate neutrality*.
[138] ILO (2022). *Gender equality labour and a just transition for all*.
[139] ONCE and ILO (2023). *Making the green transition inclusive for persons with disabilities*.
[140] ILO (2019). *Skills for a greener future*: *a global view*.
[141] ILO (2022). *Skills Development for a Just Transition.*
[142] EC (2023). *Gender balance in energy*.
[143] ILO (2023). *Social protection for a just transition*.

services, unemployment insurance, early retirement schemes, and the universal provision of basic services (including housing, transport, health and social care).[144]

BOX 3.2. SPAIN: A GENDER PERSPECTIVE IN THE NATIONAL JUST TRANSITION STRATEGY

Spain's Just Transition Strategy exemplifies integrating a gender perspective into green transition policies. Designed to maximise the social benefits of the ecological transition, while mitigating its negative impacts, the strategy recognises the need to address gender disparities. For further details on this strategy, see Box 3.4.

The strategy underscores the importance of ensuring women can fully benefit from the opportunities created by the green transition. Among its strategic objectives are measures aimed at reducing gender inequalities during the ecological transition. For example, it includes a provision to promote integrating women into green economy employment through gender mainstreaming. The strategy also mandates collecting and using gender-disaggregated data to monitor sectoral trends and progress in the ecological transition.

Additionally, the strategy prioritises supporting the creation of green jobs in rural areas, with a focus on fostering youth and women's employment and entrepreneurship.

In 2021 Spain's Ministry of Equality, through the Women's Institute and the Institute for Just Transition, formalised a collaboration protocol. This protocol facilitates joint actions to promote women's entrepreneurship and improve their employability and working conditions in regions affected by the energy transition. It also highlights women's active and equal contributions as agents of change in driving a just and inclusive transition.

Source: ILO (2022). *Gender equality, labour and a just transition for all.*

Social protection is one of the four ILO pillars of decent work, alongside employment, fundamental rights and principles at work, and social dialogue.[145] Social dialogue, understood as all types of negotiation, consultation or information sharing among representatives of governments, employers and workers, or between employers and workers,[146] is portrayed by international organisations as essential to ensuring inclusive DGTT. Examples of social dialogue mechanisms are consultations, skills and advisory councils, and framework and collective agreements.

The ILO defines five dimensions for social dialogue institutions to be inclusive:

i. They should include representatives of workers' and employers' organisations on an equal footing.
ii. They should ensure balanced representation of its constituent members.
iii. Membership should reflect the diversity of society, with a balanced number of women and men and other population groups.
iv. Member organisations should represent their constituencies and strive to expand membership to include informal and vulnerable parts of the economy.

[144] Eurofound (2023). *The transition to a climate-neutral economy: Exploring the socioeconomic impacts*.
[145] ILO (2023). *Social protection for a just transition*.
[146] ILO (2022). *The Role of Social Dialogue and Tripartism in a Just Transition towards Environmentally Sustainable Economies and Societies for All*, p. 3.

v. They should address issues concerning a broad spectrum of employers and workers, including marginalised and excluded groups.[147]

Box 3.3 presents an example from the Coal Community Transition Fund in Alberta, Canada, on how ALMPs, social protection and social dialogue mechanisms are being used to support workers impacted by the phase-out of coal in the electricity system.

BOX 3.3. CANADA: COAL WORKFORCE TRANSITION PROGRAM

Alberta was one of Canada's most carbon-intensive provinces, with coal providing nearly 55% of its electricity in 2017. However, as part of its climate-change strategy, the Government of Alberta announced plans to phase out coal power plants by 2030.

Approach

To mitigate the impact on workers as coal is phased out, the provincial government established the Coal Workforce Transition Program in 2018. This programme offers career counselling services and financial assistance for re-employment, retirement and training.

Career counselling services support workers in their job search, assisting with writing cover letters and résumés and preparing for interviews. Additionally, they guide workers towards publicly funded retraining programmes. For instance, the Coal and Electricity Transition Tuition (CETT) Voucher offers up to CA$12,000 to help workers pursue post-secondary education and retrain for new careers.

The programme also provides financial support to alleviate income loss during the job search, up to CA$5,000 for relocation expenses, and a relief grant covering up to 75% of earnings for workers aged 53 and older who are nearing retirement.

Lessons learned

A key strength of Alberta's approach was establishing Alberta's Climate Change Advisory Panel and the Coal Transition Coalition. These bodies ensure that the voices of unions, farmers, Indigenous communities, academia, public health advocates, environmental NGOs and industry representatives are considered. However, the delay between announcing Alberta's coal phase-out and the consultative process led to unease and discontent among coal workers and communities. Another limitation is the uncertainty surrounding long-term resources.

Source: Government of Alberta (2024). *Support for Albertans affected by coal phase out*; OECD (2023). *Job creation and local economic development;* World Resources Institute (2021). *Alberta, Canada: Supporting Both Workers and Communities to Ensure a Just Transition*.

International organisations also address policy measures aimed at fostering an enabling environment for inclusive DGTT. These measures encompass standards and regulations, investments in infrastructure, policy coordination, policy frameworks and rethinking measures to monitor country progress.

[147] Ibid., p. 8

Standards and regulations are identified as crucial tools for facilitating and accelerating the DGTT and mitigating the risks faced by workers, such as those related to OSH and the precarisation of work.[148] Investments in infrastructure are discussed as a way to reduce regional inequalities. This discussion includes care and social infrastructure, such as education and training centres, health clinics, and child- and elderly-care facilities,[149] as well as connectivity infrastructure, including ICT.[150]

International organisations highlight weak coordination across the different agencies involved in the DGTT, and their impacts on the labour market at sub-national, national and supra-national policy spheres.[151,152,153] This issue is particularly pronounced in the context of green transitions:

> Skills and labour market policies need to keep up and be well-aligned with environmental regulations. So far, environmental policies, which drive the demand for green skills, have typically been developed in isolation from skills and labour market policies, which drive the supply of skills (…)
>
> Alignment of environmental and labour market policies requires effective collaboration across ministries. In most countries, the part of the government responsible for stimulating green skills demand is separate from the part responsible for skills and labour market policies that influence supply. Weak connections between these bodies are a common feature of institutional setups. As a result, environmental policies are often designed in isolation from skills and labour market policies, and do not take into consideration skills availability and labour market implications (Cedefop, 2019[13]). To ensure that supply and demand policies go hand-in-hand, ministries and bodies responsible for both policy areas need to work closely together.[154]

In terms of international coordination, and in the context of the digital transition, the OECD explains:

> An international approach to regulations and guidelines may be particularly apt for platform work performed digitally (and potentially connecting workers and clients across the world) for issues such as how to ensure an adequate wage and working conditions. It may simultaneously reduce the burden for global platform operators to comply with different regulations across all of the countries where they operate while reducing the risk of a race to the bottom as countries compete to relax regulation in order to grow platform work.[155]

Considering the policy mix needed to support inclusive DGTT, policy frameworks offer an opportunity to present different policy measures in a coherent and integrated manner. As the impacts of the green transition are expected to be localised in specific regions and sectors, international organisations also emphasise the importance of sector- and region-specific

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[148] UNIDO (2021). *Standards and digital transformation*.
[149] EC (2021). *Just Transition Fund.*
[150] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.
[151] Cedefop (2019). *Skills for green jobs: 2018 update. European synthesis report*
[152] OECD (2023). *Job creation and local economic development*.
[153] Cedefop and OECD (2015). *Green skills and innovation for inclusive growth*.
[154] OECD (2023). *Job creation and local economic development*, pp. 124-126.
[155] OECD (2020). *Regulating platform work*, p. 17

frameworks.[156,157] Box 3.4 presents the example of Spain's Just Transition Strategy, which provides coherence to the different measures in place to support a green just transition.

BOX 3.4. SPAIN: JUST TRANSITION STRATEGY

In February 2019 the government of Spain unveiled the Energy and Climate Strategic Framework, outlining a roadmap for decarbonising its economy. This framework is built on three key pillars: (i) the Climate Change Law, (ii) the National Integrated Plan for Energy and Climate, and (iii) the Just Transition Strategy (JTS).

The JTS is described as a "solidarity-based support strategy" aimed at ensuring that all people and regions benefit from the ecological transition, leaving no one behind. The JTS was set to be implemented from January 2020 to December 2024.

Public consultation

Drafting the JTS involved public consultations between February and April 2019, engaging stakeholders such as those affected by mining closures, NGOs, trade unions, businesses, autonomous communities and local entities.

Policy areas

The JTS includes a comprehensive assessment of the key employment challenges facing the Spanish economy, the environmental impact of various economic activities, and projections of the expected impact of the green transition across specific sectors and regions. It outlines 11 strategic objectives and 8 policy areas, including:

- support for the green transition of economic activities
- support for strategic industrial sectors
- measures to reduce inequality and support consumers
- reactivation measures
- active labour policies for green employment and social protection
- developing green skills
- research, development and innovation
- enhancing knowledge of the ecological transition's impact on employment

Governance

To implement the JTS, Just Transition Agreements will be established, involving collaboration between the central government, local administrations, the business sector, trade unions, educational organisations and NGOs. Additionally, the government has restructured a former ministry to create the Institute for a Just Transition and an advisory council to support this.

Source: Government of Spain (2020). *Just Transition Strategy*.

[156] OECD (2023). *Job creation and local economic development*, pp. 124–126.
[157] Bednorz, J. and Sadauskaitė, A. et al. (2022). *Unionisation and the twin transition. Good practices in collective action and employee involvement*.

Some organisations underscore the importance of reshaping business incentive structures to encourage longer-term investment approaches. For example, the ILO advocates new metrics of national progress that consider the distributional aspects of growth, the value of unpaid work and the broader costs associated with economic activity.[158] Similarly, both the EC[159] and ILO[160] have called for approaches that account for the impacts of economic activity and just transition initiatives in third countries. Eurofound has also emphasised the importance of prioritising social innovation and providing the public with information and support to facilitate changes in lifestyles and consumption patterns.[161] These narratives, however, are not prevalent across the documents reviewed.

[158] ILO (2019). *Work for a brighter future*.
[159] EC (2022). *Ensuring a fair transition towards climate neutrality*.
[160] ILO (2022). *Sectoral Policies for a Just Transition.*
[161] Eurofound (2023). *The transition to a climate-neutral economy: Exploring the socioeconomic impacts*.

4. Moving forward: opportunities for inclusive and sustainable working lives

Key messages

This concluding section discusses the dominant and alternative narratives surrounding the digital and green transitions in the context of working life. Drawing on both the policy review and key informant interviews, six key opportunity areas were identified:

i. *Skills vs structural barriers*
   Skills are a central theme in discussions about the digital and green transitions, and their interactions (DGTT), often seen as tools for inclusion and mitigating negative impacts. However, overemphasising skills risks neglecting the structural barriers that sustain inequalities, including marginalising under-represented groups in labour markets and policy-making processes.

ii. *Preventing inequalities vs transforming societies and economies*
   The prevailing discourse focuses on upskilling, reskilling and implementing social protection measures to mitigate inequalities, rather than harnessing the transformative potential of the DGTT to drive systemic change. A more ambitious and forward-looking approach could position the DGTT as catalysts for societal and economic transformation.

iii. *Business as usual vs creating new economic models*
   Current discussions emphasise supporting workers and businesses in adapting to and leveraging the opportunities created by the DGTT, with insufficient focus on how the existing economic model perpetuates climate change and social inequalities. Alternative frameworks may include reshaping business incentive structures and adopting more comprehensive metrics of progress that reflect the value of unpaid work and distributional impacts of economic growth.

iv. *Just transitions vs global justice and solidarity*
   Justice and inclusion are frequently framed within the context of national or regional boundaries, neglecting the broader global dimensions of inclusion and social justice. A global justice and solidarity perspective underscores the unequal distribution of the costs and benefits of these transitions, particularly the disproportionate burden on developing countries.

v. *Controlled futures vs navigating uncertainty*
   The prevailing discourse focuses on expert-led risk assessment and impact prediction as a way to address the knowledge gaps on the DGTT and their effects. In comparison, navigating uncertainty requires adaptive systems rooted in local action, co-produced knowledge and commitments to solidarity and care.

vi. *Twin transitions vs systemic understanding*
   The term “twin transitions” is often used technocratically, emphasising digital facilitation of the green transition, while overlooking their distinct characteristics and heterogeneous impacts. A more nuanced approach would consider the differences between these transitions, and their interplay with context-specific characteristics and other socio-economic transformations, such as demographic shifts and increasing inequality.

This final section discusses the dominant and alternative narratives surrounding the digital and green transitions in the context of working life. The discussion draws on both the policy review and key informant interviews. Drawing on the Pathways Approach,[162] the section examines how dominant narratives influence policy action and discusses ways to broaden the discourse and embrace more diverse and inclusive perspectives.

The Pathways Approach adopts a systems perspective and incorporates a reflexive dimension, recognising that analysis and research are shaped by the ways in which different actors frame a system. These framings often become embedded within the narratives constructed around a particular problem or issue. Within this approach, narratives are understood as stories that "often start with a particular framing of a system and its dynamics, and suggest particular ways in which these should develop or transform to bring about a particular set of outcomes".[163]

Narratives are significant because those promoted by the most influential actors – referred to as dominant narratives – are frequently used to legitimise specific pathways of intervention and system change. In contrast, alternative narratives, often originating from less privileged actors, tend to be marginalised.

In applying the Pathways Approach to the policy review, alongside insights drawn from key informant interviews, dominant narratives are identified as the more prominent discourses within policy documents. Alternative narratives are defined as themes that were less visible, or absent in some cases, in these policy documents but emerged through interviews or in the academic literature. Six domains of dominant and alternative narratives have been identified:

i. Skills vs structural barriers
ii. Preventing inequalities vs transforming societies and economies
iii. Business as usual vs creating new economic models
iv. Just transitions vs global justice and solidarity
v. Controlled futures vs navigating uncertainty
vi. Twin transitions vs a systemic understanding

i. Skills vs structural barriers

As highlighted in this report, skills emerged as one of the most frequently addressed themes in the reviewed documents, and they were a recurring theme in the interviews. Skills are presented as an enabler of inclusion and mitigating negative impacts. While there is no doubt that skills mismatches are among the most pressing challenges in the digital, green and twin transitions (DGTT), overemphasising skills risks overlooking the broader structural barriers that perpetuate social and economic inequalities.

Structural barriers to participating in the benefits of the green and digital transitions may include discriminatory gender or age norms, non-inclusive infrastructure and technologies, and inadequate

[162] Leach, M., Stirling, A. and Scoones, I. (2010). *Dynamic sustainabilities: technology, environment, social justice*. Bristol, Taylor & Francis.
[163] Leach, M., Stirling, A. and Scoones, I. (2010). *Op. cit*. p. 45.

social systems.[164,165] In addition, under-represented groups in fields relevant for the digital and green transitions are often marginalised, not only in the labour market but also in consultation and policy-making processes, exacerbating their exclusion.[166]

ii. Preventing inequalities vs transforming societies and economies

Concerns about the observed and anticipated deepening of inequalities emerged clearly from the policy review. While some documents highlight the opportunities that the DGTT offer for economic and social inclusion, the overall discourse focuses on upskilling and reskilling and implementing social protection measures to prevent further inequality. Although establishing safety nets for those at risk of losing their livelihoods is vital, an overly risk-averse approach to the DGTT may limit the transformative potential of these transitions.

By adopting a more ambitious and proactive stance, policymakers could leverage the DGTT to drive societal and economic transformation, fostering a more inclusive and sustainable future. While narratives advocating this approach were identified, particularly in publications by Eurofound and the ILO, they remain underexplored among the organisations examined.

iii. Business as usual vs creating new economic models

The discussion about the DGTT in the context of working life tends to centre on how to support workers and businesses to adapt and seize the opportunities these transitions create. Yet, there is limited focus on how the current economic model has contributed to climate change and the inequalities both within and between countries. Governments face the dual challenge of tackling the current cost of living crisis while addressing increasing inequalities and capital concentration, exacerbated partly by the dominance of major digital corporations[167] and land-grabbing processes linked to the green transition.[168]

Organisations such as the ILO, EC and UNIDO highlight, to varying degrees, the need to reshape business incentive structures. The ILO, in particular, advocates new metrics of national progress that consider the distributional aspects of growth, the value of unpaid work and the broader costs associated with economic activity. These narratives, however, are not prevalent across the documents reviewed.

iv. Just transitions vs global justice and solidarity

Terms such as justice and inclusion are frequently used in the discourses around the green transition; but they appear less prominently in discourses around the digital transition, where the focus tends to be on work displacement and skills. When justice and inclusion are addressed, they are often framed in terms of justice within countries or within the EU, in the case of European organisations. While some European organisations engage in discussions about the impacts on and relationships with "third countries", these considerations remain marginal. An exception among

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[164] European Commission (2023b). *Gender Balance in the R&I Field to Improve the Role of Women in the Energy Transition*.
[165] UNIDO (2023). *Gender, Digital Transformation, and Artificial Intelligence*.
[166] Newell, P., Srivastava, S., Naess, L. O., Torres Contreras, G. A. and Price, R. (2021). Toward transformative climate justice: An emerging research agenda. *Wiley Interdisciplinary Reviews: Climate Change*, 12(6): e733. https://doi.org/10.1002/wcc.733
[167] Sadowski, J. (2020). The internet of landlords: Digital platforms and new mechanisms of rentier capitalism. *Antipode*, 52(2): 562–580.
[168] Fairhead, J., Leach, M. and Scoones, I. (2012). Green Grabbing: a new appropriation of nature? *Journal of Peasant Studies*, 39(2): 237–261, DOI: 10.1080/03066150.2012.671770

international organisations is UNIDO, which emphasises the importance of balancing the interests of industrialised, developing and emerging countries, and technology sovereignty.[169]

A decolonial perspective on global justice and solidarity is crucial for ensuring truly just transitions. This perspective acknowledges the disproportionate impacts of greenhouse gas emissions from advanced economies on the livelihoods of people in developing countries – many of whom have always lived in ways that align with principles of environmental sustainability.[170] In addition, developing countries are being relegated to an inequitable role as providers of the raw materials and labour that sustain both green and digital transitions, often at the expense of their own ecological and social wellbeing.[171]

v. Controlled futures vs navigating uncertainty

The document review and interviews reveal a limited understanding of the observed and potential impacts of the DGTT, particularly the green transition and its interplay with the digital one. International organisations emphasise the importance of employment diagnostics, skills assessments and foresight analysis to enhance understanding of how the DGTT are reshaping labour markets. While advancing our knowledge of these transitions is vital for creating informed policies, it is equally crucial to acknowledge the limitations of our understanding, and thus the uncertainty surrounding the DGTT.

In this context we understand uncertainty as the limitations of our knowledge about outcomes and their likelihoods rather than a description of the world.[172] Although international organisations exhibit recognition of this uncertainty, it occupies a peripheral position in the discourse. For example, the term “predict” appears in 58 of the 101 documents reviewed, occurring between 1 and 23 times, while the term “forecast” is found in 46 documents, with frequencies ranging from 1 to 148 instances. In contrast, the term “uncertainty” appears in 43 documents, with occurrences ranging from 1 to 11 times.[173]

Drawing on Ian Scoones’ work on uncertainty,[174] we face a choice: to “open up” to the opportunities presented by uncertainty or to “close down” by focusing on risk and control. Moving beyond conventional risk management requires embracing uncertainty through processes characterised by improvisation and experimentation. This approach should include diverse perspectives and co-produce knowledge. It also involves developing systems anchored in local and collective action, alongside a commitment to solidarity, mutual support and care. As Scoones asserts:

> This is therefore not a moment for managed “transition”, one amenable to standard technocratic, expert-led approaches to policy, where the parameters are known and techno-utopian, modernist visions of salvation can be realized. Instead, it is a time of more fundamental “transformation”.[175]

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[169] UNIDO (2024). *Industrial Development Report 2024*.
[170] Newell, P., Srivastava, S., Naess, L. O., Torres Contreras, G. A. and Price, R. (2021). Toward transformative climate justice: An emerging research agenda. *Wiley Interdisciplinary Reviews: Climate Change*, 12(6), e733. https://doi.org/10.1002/wcc.733
[171] Nirmal, P. and Rocheleau, D. (2019). Decolonizing degrowth in the post-development convergence: Questions, experiences, and proposals from two Indigenous territories. *Environment and Planning E: Nature and Space*, 2(3): 465–492.
[172] Scoones, I. (2024). *Navigating Uncertainty: Radical Rethinking for a Turbulent World*. Polity Press, Cambridge.
[173] In these three cases stemmed words (e.g. predicting, forecasted, uncertain, etc.) were included.
[174] Scoones, I. (2024). *Navigating Uncertainty: Radical Rethinking for a Turbulent World*. Polity Press, Cambridge.
[175] Scoones, I. (2024). *Op cit., p. 152.*

vi. Twin transitions vs a systemic understanding

The interplay between the digital and green transitions has received limited attention among international organisations. Most insights into the observed and potential impacts of the so-called "twin transitions" emerge from analyses of separate discourses on the digital and green transitions, rather than specific discourses of their interactions. Moreover, the term "twin transitions" is often used from a technocratic, solutionist perspective, focusing on how digital technologies can facilitate green transitions.

Insights from the interviews raised a critical question: Is the term "twin transitions" meaningful or useful? While there are some shared characteristics – such as their influence on shifting skills demands – these transitions are far from being true "twins". They differ significantly in their nature, drivers, impacts and the ways they are conceptualised and portrayed. Additionally, overemphasising their interactions risks obscuring a broader, systemic understanding of the transformations underway. This includes their interplay with other significant socio-economic changes, such as demographic shifts and widening inequalities.

A more nuanced approach is needed – one that recognises the substantial differences across and within regions, sectors and population groups. Such an approach would move beyond the technocratic framing to address the complex, interconnected nature of these transformations and their implications for inclusive and sustainable futures.[176]

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Annex A. Interview participants

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2. Annick Starren, Senior Project Manager, European Agency for Safety and Health at Work
3. Antoine Dechezlepetre, Senior Economist, Productivity, Innovation and Entrepreneurship Division, Directorate for Science, Technology and Innovation, Organisation for Economic Co-operation and Development
4. Aurelia Patrizia Calabrò, Director, Division of Gender Equality and the Empowerment of Women, United Nations Industrial Development Organization
5. Carmen Schuber, Gender Expert, Division of Gender Equality and the Empowerment of Women, United Nations Industrial Development Organization
6. Representative from the Work Income Equity Unit, International Labour Organization
7. Cecilia Ugaz Estrada, Deputy to the Director General and Managing Director of the Directorate of Strategic Planning, Programming and Policy, United Nations Industrial Development Organization
8. Jorge Cabrita, Senior Research Manager, European Foundation for the Improvement of Living and Working Conditions
9. Frank Siebern-Thomas, European Commission, Fair and Green Digital Transitions Unit
10. Linda Kunertova, European Commission, Fair and Green Digital Transitions Unit
11. Marcelo Cuautle Segovia, Project Manager, Employment and Labour Market Policies, International Labour Organization
12. Maria Abreu, Land Economy, University of Cambridge
13. Mihai Palimariciuc, European Commission, Fair and Green Digital Transitions Unit
14. Nadia Vilahur, Project Manager, European Agency for Safety and Health at Work
15. Prof Veronica Martinez, Sussex University Business School. Sidney Sussex College, University of Cambridge

Annex B. The European Union policy landscape

This annex outlines key policies shaping the digital, green and twin transitions (DGTT) in the European Union (EU), and in associated and third countries. While these policies have been explored in earlier sections of the report, their significance in shaping policies at both national and subnational levels warrants further attention. This section describes some of the most relevant economic and social strategies, frameworks and initiatives.

At the core of the EU vision is the *European Green Deal*, which sets out the overarching ambition to make the EU climate-neutral by 2050, while transforming it into a sustainable, fairer and more prosperous society.[177] This agenda is supported by key policy frameworks, such as the *European Climate Law* adopted in 2021, which sets out the binding objective of climate neutrality by 2050.[178]

To achieve these targets, the European Commission (EC) proposed the *Fit for 55* legislative package, which introduces measures to reduce greenhouse gas emissions by at least 55% by 2030. The package is a set of proposals to revise and update EU legislation and to put in place new initiatives with the aim of ensuring EU policies are in line with the climate goals agreed by the Council and the European Parliament (EP).[179]

While the focus of the package is on greenhouse gas emissions, it integrates socio-economic dimensions by addressing how carbon pricing and regulatory changes will impact households and workers. It introduces compensatory measures, such as the Social Climate Fund, designed to support low-income households and workers who may face higher energy costs or job losses.[180]

As part of the *Fit for 55* package, the EC issued a *Council Recommendation* guiding Member States on how best to address the social and labour dimensions of the green transition. This recommendation provides detailed guidance on implementing social, employment and related policies to manage the challenges posed by the green transition. It also establishes a framework for cooperation at EU level, promoting a coordinated approach to these issues. Examples of measures discussed in the *Council Recommendation* include:

- Providing access to inclusive education, training and lifelong learning
- Ensuring the effective implementation and enforcement of existing rules on working conditions
- Strengthening public employment services to support labour market transitions and skills intelligence, as well as labour inspectorates to safeguard working conditions
- Developing up-to-date labour market and skills intelligence and foresight
- Fostering the use of socially responsible public procurement standards
- Promoting entrepreneurship, including social enterprises (financial, training and advisory support)

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- Supporting apprenticeship programmes
- Assessing and, where applicable, adapting social protection systems and social inclusion policies
- Ensuring the provision and sustainable financing of high-quality, affordable and accessible social, health and long-term care services
- Improving risk-awareness, risk-reduction and risk-transfer solutions
- Involving social partners at national, regional and local levels in all stages of policy-making, and
- Targeting the most affected groups, particularly those furthest away from the labour market.[181]

Additionally, the *Council Recommendation* highlights the urgency for Member States to "develop clearer strategies and objectives through a cross-cutting approach to identify and measure the social, employment and skills consequences and other distributional impacts of the energy transition and give proper consideration on how to address these challenges".[182]

It also encourages Member States to align their strategies with the *European Skills Agenda* and to set up partnerships under the *Pact for Skills*.[183] The *European Skills Agenda* outlines delivering "a bold agenda for jobs"[184] to strengthen sustainable competitiveness, ensure social fairness and build resilience. The agenda covers five building blocks, with the first being to foster collective action through a *Pact for Skills*, which brings together private and public stakeholders who have committed to four principles:

i. Promoting a culture of lifelong learning for all
ii. Building strong skill partnerships
iii. Monitoring skill supply/demand and anticipating skill needs, and
iv. Working against discrimination and for gender equality and equal opportunities.[185]

Members of the pact benefit from access to insights on upskilling and reskilling requirements, guidance on suitable funding instruments to enhance adult skills in their regions and countries, and networking opportunities.

The Just Transition Mechanism (JTM), introduced in 2020, is another key policy addressing the distributional impacts of the green transition. It is described as "a key tool to ensure that the transition towards a climate-neutral economy happens in a fair way, leaving no one behind". It focuses on regions that may be most impacted by the green transition and are the most carbon-intensive or heavily reliant on fossil-fuel employment. The JTM operates through three primary instruments: (i) the Just Transition Fund, (ii) the InvestEU "Just Transition" scheme and (iii) the Public Sector Loan Facility (Box B.1).[186]

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[181] EC (2021). *Proposal for a Council Recommendation on ensuring a fair transition towards climate neutrality*. Strasbourg, COM(2021) 801 final.
[182] Ibid, p. 4.
[183] Ibid.
[184] EC (2020). *European Skills Agenda for Sustainable Competitiveness, Social Fairness and Resilience.* p. 3.
[185] EC (2024). *Pact for Skills*.
[186] EC (n.d.). *The Just Transition Mechanism: making sure no one is left behind.*

BOX B.1. THE EU: THE JUST TRANSITION MECHANISM

In the EU the JTM is one of the policy mechanisms that addresses the social and economic effects of the green transition. With a budget of approximately €55 billion for the 2021–27 period, it provides targeted financial support to help the regions and communities most affected by the shift towards a low-carbon economy.

While all Member States are eligible for support, the JTM prioritises regions that are particularly carbon-intensive or heavily dependent on fossil-fuel industries. To access this support, Member States must prepare Territorial Just Transition Plans, covering the period up to 2030. These plans identify the territories most in need of assistance and outline strategies to address the associated social, economic and environmental challenges.

The JTM operates through three primary instruments: (i) the Just Transition Fund, (ii) the InvestEU "Just Transition" scheme and (iii) the Public Sector Loan Facility.

The Just Transition Fund

The Just Transition Fund aims to mitigate the socio-economic costs associated with the climate transition by supporting the economic diversification and reconversion of affected regions. Supported activities include: productive investments in small and medium-sized enterprises; the creation of new firms; research and innovation; environmental rehabilitation; clean energy initiatives; upskilling and reskilling workers; job-search assistance; and active inclusion programmes for jobseekers. Additionally, the fund supports transforming existing carbon-intensive installations when such investments lead to significant emission reductions and job protection. The fund makes available a total of €19.7 billion in support.

The InvestEU programme

The InvestEU programme provides the EU with long-term funding by leveraging private and public funds to support top policy priorities, such as the green and digital transitions, innovation and social investments and skills. The InvestEU programme has three components:

- *InvestEU Fund*. Aims to mobilise more than €372 billion of public and private investment through an EU budget guarantee of €26.2 billion that backs the investment of implementing partners such as the European Investment Bank Group and other financial institutions.
- *InvestEU Advisory Hub.* Offers advisory support and technical assistance.
- *InvestEU Portal.* Connects investors and project promoters on a single EU-wide platform.

Public-sector loan facility

This instrument is designed to support public entities in financing projects that do not generate enough revenue to be commercially viable. Eligible projects typically include investments in various public infrastructures, such as energy and transport systems, district heating networks, energy efficiency measures and social infrastructure. It makes available a total of €18.5 billion in public investment.

Source: EC. *InvestEU Programme*; *Just Transition funding sources*; *The Just Transition Mechanism: making sure no one is left behind*.

Other relevant funds managed by the EC include: the European Regional Development Fund (ERDF), the Cohesion Fund, and the European Social Fund Plus. The ERDF and the Cohesion Fund are financial instruments with a territorial focus, aimed at promoting economic and social cohesion across EU regions. These funds support a range of activities, including infrastructure development, applied research and innovation, and productive investments in SMEs. In the context of the green transition, their regulation emphasises inclusion primarily through addressing energy poverty. And in the context of the digital transition, the focus is on ensuring participation in the opportunities created by this transition.

> In order to grasp the opportunities from the digital age, the ERDF should contribute to the development of an inclusive digital society where citizens, research organisations, businesses and public administrations take full advantage of the opportunities that digitalisation offers.[187]

They also highlight the role of the social economy and skills development in inclusion:

> In order to promote social innovation and inclusive access to high quality employment, the ERDF should support “social economy” entities such as cooperatives, mutual societies, non-profit associations and social enterprises.
>
> In order to strengthen the preparedness for distance and online education and training in a socially inclusive manner, the ERDF should, in its task of improving equal access to inclusive and quality services in education, training and lifelong learning, in particular contribute to fostering resilience for distance and online learning.

The *European Social Fund Plus (ESF+)* supports initiatives in areas including social inclusion, education and skills, and employment. The ESF+ is one of the implementation mechanisms of the

[187] EC (2021). *Regulation (EU) 2021/1058 of the European Parliament and of the Council of 24 June 2021 on the European Regional Development Fund and on the Cohesion Fund*.

European Pillar of Social Rights, which provides a framework involving 20 principles and rights considered essential for fair and well-functioning labour markets and welfare systems. The green and digital transitions are discussed as key challenges and opportunities in this document.[188]

In this context the *European Employment and Social Rights Forum* and *European Semester* are platforms that promote communication and coordination among actors. In 2023 the forum brought together policymakers and stakeholders from academia, business and civil society to discuss the impact of AI on the world of work.[189] Meanwhile, the *European Semester* is an annual exercise that coordinates the EU's economic and social policies. During the semester, EU Member States align their budgetary and economic policies with the objectives and rules agreed upon at EU level.[190]

Several other strategies and programmes contribute to a fair green transition. The updated European Industrial Strategy emphasises both the green and the twin transitions, the crucial role of skills, and European leadership in these areas. For instance, it states that:

> The global race on the twin transitions will increasingly be based on frontier science and mastering deep technologies. The next era of industry will be one where the physical, digital and biological worlds are coming together. If Europe wants to lead the twin transitions, the industrial strategy has to be an industrial innovation strategy at heart.[191]

Similarly, Horizon Europe supports research and innovation in digital technologies that enable the green transition, such as automation, smart grids and digital solutions for energy efficiency.[192]

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[188] EC (2021). *The European Pillar of Social Rights Action Plan*. Luxemburg. European Union.
[189] EC (2023). *European Employment & Social Rights Forum 2023: How is Artificial Intelligence shaping work?*
[190] EC (2024). *The European Semester*.
[191] EC (2020). *A New Industrial Strategy for Europe. Brussels.*
[192] EC (2024). Bio-intelligent manufacturing industries (Made in Europe Partnership). Calls for proposals.

Annex C. Norway

This annex examines how the digital, green and twin transitions (DGTT) are framed in Norwegian policy documents. The documents reviewed include the *Green Industrial Initiative, Norway's Battery Strategy, the National Digitalisation Strategy 2024-2030*, *The transition to low emissions. Climate policy choices towards 2050* report, the *Outlook on the skills needs in Norway* and the *Challenges for the Green Transition in the Labour Market* report by the Norwegian Committee on Skill Needs. These documents provide insights into how Norway envisions and plans for the transition towards a sustainable and digital future.

Our analysis focuses on the differing definitions of the DGTT across these policy frameworks, as well as the observed and anticipated changes in working life that arise from these shifts. Particular attention is paid to the role of skills development, where the Norwegian model of social dialogue and tripartite cooperation is highlighted as both a strength and a challenge in ensuring an inclusive transition. Furthermore, we examine the policy priorities and instruments outlined in these documents, and the extent to which Norway's strategies align with, and are shaped by, its relationship with the EU and global partners.

C.1 Understanding and vision of the transitions

Differences across agencies were identified in how transitions are defined. For instance, *The transition to low emissions* report underscores the statutory target for Norway to be a low-emission society by 2050 and states the imperative for a fair transition:

> The transition to a low-emission society must be as fair as possible, both because a just society is an end in itself and because it will make the transition easier.[193]

The *Norwegian Committee on Skill Needs (Kompetansebehovsutvalget)* defines the green transitions as "activities that help to reduce the climate and environmental footprint of individuals, businesses and society in general, in order to realise a low-emission society while preserving biodiversity".[194]

In comparison, the *Green Industrial Initiative 2.0* has a narrower scope, focusing on developing a "green industry". Its introduction states:

> The main objective of our industrial policy is to facilitate the greatest possible overall value creation in the Norwegian economy, which means that all commercial activities must be socially, environmentally and economically sustainable, and not affect Earth's tolerance limit. The task of industrial policy is not to manage resources, but to ensure that profitable enterprises and jobs can be created and continue to create value for society. Transitioning to a low-emission society will require a lot from enterprises and society at large, and our industrial policy must contribute to ensuring a highly adaptable economy.[195]

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[193] The 2050 Climate Change Committee (2023). *The transition to low emissions. Climate policy choices towards 2050*. English Edition, p. 83.
[194] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo.
[195] Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*., p. 13.

The *Green Industrial Initiative* emphasises leveraging natural resources and innovation to boost productivity and value creation, while avoiding negative impacts on living standards. For instance, the first iteration of this document sets out the following vision:

> The goal is to make Norway a green industrial and energy giant based on our natural resources, knowledge environments, industrial expertise and historical advantages.[196]

Meanwhile, the second iteration states:

> We will rely on increased productivity and value creation in the Norwegian economy to maintain current living standards and to be able to finance the welfare state in the future.[197]

> The Government wants Norwegian industry to be a leader in Industry 4.0 and will therefore consider schemes to bring about promising projects in the field of automation and digitalisation of industry, including the possible creation of a national Industry 4.0 programme.[198]

These documents also define visions for each of their priority areas for Norway to achieve climate goals while becoming a world leader in these industries and technologies. Similarly, *Norway's battery strategy* defines the following vision:

> The Government's vision is that Norway will develop a complete and profitable battery value chain, stretching from sustainable mineral extraction to battery recycling. Norway will be an attractive host country for profitable activity along the entire battery value chain and attract major battery investments and giga factories.[199]

The *National Digitalisation Strategy 2024-2030* states:

> Norway is one of the most digitalised countries in the world, and with this strategy, the government is laying the foundation for us to become the best. Not because digitalisation is a goal in itself, but because it is the tool we need to unlock new opportunities and address many of the major challenges we face as a society.[200]

The interaction between the green and digital transitions tends to be highlighted in terms of how digital technologies can aid the green transition. Specific opportunities discussed include: new forms of learning; improving and developing new products, processes, systems and business models; supply chain transparency and information sharing; circular economy; reducing labour costs; and reducing the pressure of labour shortages through automation.

The policy documents examined also highlight the uncertainty involved in these transitions. These discuss uncertainties about the rate of growth in new energy industries, technology development, future skills demands, future energy demands and international framework conditions.

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[196] Norwegian Ministry of Trade, Industry and Fisheries (2022a). *The Green Industrial Initiative. Roadmap*, p. 7.
[197] Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*., p. 26.
[198] Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*., p. 84.
[199] Norwegian Ministry of Trade, Industry and Fisheries (2022b). *Norway"s battery strategy*, p. 12.
[200] Norwegian Ministry of Digitalisation and Administration (2024). *The digital Norway of the future. National digitalisation strategy 2024–2030*, p. 1.

C.2 Observed and expected changes in working life

The reviewed policy documents explore both observed and anticipated changes resulting from the green transition and its intersection with the digital transition. A key observed shift is the increasingly blurred distinction between manual workers and office staff. For example, the *Green Industrial Initiative* notes:

> Today, highly qualified skilled workers often perform work that foremen, planners and engineers did in the past – and engineers participate in direct production. The changes that are coming in technology and the green transition will reinforce this development.[201]

These distinctions are projected to become even less pronounced in the future. A key policy implication of this shift is reconsidering the distinctions between skilled and professional employees in collective agreements. In 2022 an important agreement was reached between the Federation of Norwegian Industries and the United Federation of Trade Unions. The goal is to expand the Industry Agreement to include previously excluded office positions, such as engineers, technicians, programmers, inspectors and supervisors.[202]

Anticipated changes discussed in the documents include shifts in industrial structures, occupational composition and job content. These changes may result in job losses for some, while others may encounter new demands in their roles or take on new roles. However, there is some expectation that the transition will mainly take place within jobs in existing industries. These developments are

[201] Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*., p. 87.
[202] Norwegian Ministry of Trade, Industry and Fisheries (2024). *Op. cit.*

also considered in the context of an ageing population and the expected impacts on the working-age demographic.

Skills are highlighted as both enablers and barriers to the green transition. On the one hand, skills are presented as a crucial mechanism for individuals to participate in the labour market and benefit from the transitions. On the other hand, a shortage of skills is identified as a key factor that could hinder progress, slow down the transitions and increase social inequalities.

The Norwegian Committee on Skill Needs discusses how, while skills may be understood primarily in terms of productivity and profitability, from society's perspective skills can also be linked to goals such as fair distribution, a clean environment, high employment and well-functioning democracy and working life. The committee also highlights that, for individuals, skills are important in terms of earning power, personal development, health, social participation and influence.[203]

The committee distinguishes between three broad types of green competency:

- **Basic skills for the green transition.** This includes the skills relevant to managing and driving change, social and emotional competencies, completed upper-secondary education, and sustainability literacy.[204]
- **Occupational and subject-specific sustainability skills.** This includes expertise related to calculating impacts on the climate and the environment, understanding the importance of reducing climate and environmental footprints, and an individual's role in this, and other expertise such as understanding the circular economy and relevant regulations.
- **Digital skills.** This includes proficiency in the use of digital technologies and their applications for the green transition.[205]

Skills shortages are expected to intensify. The *Outlook on Skills Needs in Norway* highlights key challenges, noting that few people in Norway pursue studies in science compared to fields such as health, social care and teaching. Meanwhile, the largest labour shortages are evident in the health and social sectors, construction and certain parts of manufacturing, engineering and IT.[206]

The transition to low emissions report also underscores the demand for skilled workers in technology and trades, teachers in sought-after skills, social and emotional skills, and workers with an understanding of climate change and related environmental challenges.

Nonetheless, there is also recognition of the uncertainty in these transitions, particularly the green transition. The *Outlook on Skills Needs in Norway* highlights that: "In the longer term, there is greater uncertainty about the kind of competence needed for the green transition and to maintain a highly productive and competitive business sector." Meanwhile, the *Challenges for the Green Transition in the Labour Market* report, by the Norwegian Committee on Skill Needs, underscores:

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[203] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo.
[204] Competence that enables people to include sustainable values in their behaviour and act in a way that restores and preserves the ecosystem and contributes to justice (GreenComp in Kompetansebehovsutvalget, 2023).
[205] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo.
[206] Government of Norway (2023). Report No 14 to the Storting (2022–2023). *Outlook on the skills needs in Norway.*

> The Norwegian labour market is in continuous transition. On the one hand, [the] green transition can be understood as yet another transition that working life and society are facing, similar to the transition associated with automation. However, the committee believes that [the] green transition differs from other transitions in that it is broader, faster and more characterised by uncertainty.[207]

C.3 Discussion about inclusion and exclusion dynamics

Overall, the dynamics of inclusion and exclusion in the workforce are primarily discussed in terms of labour market participation. An exception is *The transition to low emissions* report, which underscores the Sami culture and rights, and the opportunities relating to the societal changes needed for the green transition:

> In Norway, consideration for Sami interests must weigh heavily in the transition to a low-emission society. Sami society has historical rights to land and stewards a culture that has been dependent on nature for thousands of years. Climate change is also a threat to traditional Sami cultural practices. Everyone must contribute to the climate transition, but society at large has a particular responsibility to ensure that the necessary transition takes into account Sami culture and rights.[208]

> Transitioning to low emissions will also provide new opportunities for value creation, development of society and a better everyday life. Climate action is often discussed primarily in terms of costs or dilemmas, yet the major societal changes that will be required to eliminate virtually all emissions for good also provide great opportunities.[209]

The *Outlook on Skills Needs in Norway* highlights both the social costs and benefits of inclusion in the labour market:

> Inequality and exclusion are among the major challenges of our time. Being excluded from working life presents significant social and economic challenges for individuals. For society, exclusion also creates several negative consequences and places demands on significant human and economic resources. Increased employment provides corresponding societal benefits and increased fiscal flexibility. Although measures to integrate more people into the labour market will involve increased public spending on various initiatives, integration will also generate tax revenues and reduce welfare expenses.[210]

Similarly, the *Green Industrial Initiative* emphasises the following:

> We must ensure that more people enter the labour market and that the business sector has the skills it needs, and that the proportion of non-employed people and young people who are excluded from work, education and training is reduced.[211]

Skills are portrayed as a key enabler of labour market participation, and disparities in access to skills development are highlighted as factors that can reinforce existing inequalities. The

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[207] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo, p. 22.
[208] The 2050 Climate Change Committee (2023). *The transition to low emissions. Climate policy choices towards 2050*. English Edition, p. 30.
[209] The 2050 Climate Change Committee (2023). *Op. cit.*, p. 31.
[210] Government of Norway (2023). Report No 14 to the Storting (2022–2023). *Outlook on the skills needs in Norway.*, p. 1
[211] Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*, p. 26.

Challenges for the Green Transition in the Labour Market report, by the Norwegian Committee on Skill Needs, underscores that skills development remains low among workers with limited formal education, those in sectors with low unionisation rates, and in industries most vulnerable to changes driven by the green transition.[212]

The Norwegian model, based on three mutually reinforcing pillars (economic governance, public welfare and an organised labour market), is recognised as both an enabler of quality jobs and a potential barrier for individuals with low skills or health issues in accessing the labour market:

> The (Norwegian) model is characterised by the individual employee enjoying a high degree of freedom, trust and responsibility, a generally high level of education in the population, a social safety net for everyone and a regional profile that entails close links between educational institutions and businesses, welfare and infrastructure in the whole country.[213]
>
> A relatively compressed wage structure has important consequences for companies' investments in technology and expertise. In a labour market with relatively high wages, even for workers with little education, it will be more profitable to replace this type of labour with machines and other technology than in labour markets where wage levels are lower. The Norwegian model therefore contributes to a high level of awareness of innovation, development, dissemination and use of new technology and labour-saving machines among Norwegian companies. At the same time, it can mean that those with low skills and/or health problems find it difficult to enter the labour market and stay there. The thresholds into Norwegian working life are higher for people with low skills and productivity than in labour markets where there are more jobs with low pay and low skill requirements.[214]

In this context the Norwegian Committee on Skill Needs acknowledges the critical role of public welfare, publicly funded education and a well-developed student finance system in fostering access to quality employment and supporting social mobility.[215]

Additionally, the committee notes the geographical disparities in how the green transition and the emergence of green opportunities are unfolding. It emphasises that the burdens and benefits of the transition are likely to be unevenly distributed across groups, industries, regions and countries. However, the committee asserts its commitment to a fair transition, recognising the importance of regional and national frameworks, policy instruments and social dialogue in creating a more level playing field.[216]

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[212] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo.
[213] Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*, p. 38.
[214] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo, p. 8.
[215] Based on automated English translation of Kompetansebehovsutvalget (2023). *Utfordringer for grønn omstilling i arbeidslivet*. Oslo.
[216] Ibid.

C.4 Priorities and policy instruments

The second iteration of the *Green Industrial Initiative* identifies nine priority areas[217] considered key for developing an emission-free energy system and society:

i. Offshore wind power
ii. Batteries
iii. Hydrogen
iv. Carbon capture and storage
v. Process industry (materials and semi-finished products)
vi. Manufacturing
vii. Solar industry
viii. Maritime industry
ix. Forestry and the timber industry and other bioeconomy sectors

In addition, different policy instruments are discussed in the documents reviewed, and key instruments related to working life include:

- Broad competence reform for working life based on tripartite cooperation
- Tripartite industry programme for competence development, a collaboration between the government and social partners with the aim of increasing participation in skills development in selected industries (see Box C.1)
- Including sustainability content in curricula from early childhood education
- Strengthening the understanding of skills needs through business surveys, experimental job advert data and cooperation with education stakeholders
- Regional competence pilots to enhance collaboration between education institutions and businesses
- Tax deductions, loans and scholarships for skills development
- Initiatives to increase recruitment in STEM fields in education and work, including under-represented groups such as girls and women – examples include the *STEM for the Future project*, which includes strengthening science and technology subjects in schools, and the *national project Girls and Technology*, which provides information on STEM opportunities
- Supporting lifelong learning by providing incentives for on-work training and developing continuing education by universities
- Facilitating flexible education across the country, including through online education and training programmes
- Strengthening teachers' professional digital competence
- Cooperation between county municipalities and the Labour and Welfare Administration to facilitate the qualification of people outside the labour market
- Establishing a Green Industry Council chaired by the Minister of Trade and Industry, with the participation of social partners, industry actors, the environmental movement and research and development actors
- Establishing the Group of Ministers for the Green Industrial Initiative
- Setting a 30% target for green public procurement, and

[217] This represents an addition of two priority areas compared with the first version of the initiative.

- Continued support for the Green Platform scheme, created in 2020, which provides funding for enterprises and research institutes engaged in green growth and restructuring driven by research and innovation.

BOX C.1. THE TRIPARTITE INDUSTRY PROGRAMME FOR COMPETENCE DEVELOPMENT

The tripartite industry programme for competence development supports workers' employability and addresses businesses' skills gaps. It is part of the *Lære hele livet [Lifelong learning*] educational reform and was established with the objective of increasing participation in continuing and further education, especially among employees with few formal skills.

The programme operates on a cost-sharing basis, where the state funds education and training across all levels, while companies and individual employees contribute their time. The available courses are short and flexible, enabling participants to complete them alongside their work commitments. Industry determines the training needs and identifies the most relevant courses.

Initially, the tripartite industry programme was aimed at the municipal health and care sector and the manufacturing and construction industries. Funding was first granted in 2019, and the training options were scheduled to be established in the spring of 2020. The programme was re-launched in 2022 and expanded to other fields, including batteries, offshore wind, hydrogen and carbon capture and storage.

Through this programme, several vocational colleges have received support to develop vocational training for the battery industry. Other relevant training areas include offshore wind, hydrogen and carbon capture and storage. The tripartite industry programme is managed by the Norwegian Directorate for Higher Education and Skills on behalf of the Ministry of Education and Research.

Source: Fafo (2022). *Evaluation of the tripartite industry programme for competence development*; Norwegian Ministry of Trade, Industry and Fisheries (2024). *The Green Industrial Initiative. Roadmap 2.0*.

C.5 European Union and global relationships

Across the documents examined, there is clear alignment between the priorities and policies of Norway and the EU, and an emphasis on building partnerships. For example, *The transition to low emissions* report highlights how "policy development in the EU is relevant to Norway, including on topics that are not part of the EEA Agreement".[218]

References to EU policies include various digital regulations: DIGITAL (2021–27), the European Green Deal, the Critical Raw Materials Act, the Net Zero Industry Act, the European Battery Alliance, and the Emissions Trading System.

Considering heightened geopolitical tensions, the *Green Industrial Initiative* also underscores the importance of partnerships with specific countries and other regions to develop value chains, research collaboration and access to new markets. These include Sweden, Finland, Denmark, Germany, the UK, South Korea, Indonesia, Canada, Mexico and Turkey.

The transition to low emissions report also mentions the relevance of considering Norway's contribution to a low-emission society globally, considering, for example, the greenhouse gas emissions from exports and imports, and how the Norwegian experience may inform policy-making in other contexts.

[218] The 2050 Climate Change Committee (2023). *The transition to low emissions. Climate policy choices towards 2050*. English Edition, p. 134.

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This report examines the policy dimension of the digital and green transitions, and their interactions in the context of working life. Drawing on a review of documents from nine European and international organisations, alongside insights from key informant interviews and a policy webinar, the report identifies opportunities to drive more inclusive and sustainable transitions. This report is part of the JustTransform: Enabling a sustainable, just, and inclusive green and digital transformation research project, led by the Western Norway Research Institute (Vestlandsforsking), in collaboration with Cambridge Industrial Innovation Policy and NORCE.

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