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5. A fair and just transition

Luisa’s introduction:

At the heart of the EGD is the principle that the green **transition must be fair and just**, leaving no person and no place behind. The 8th Environmental Action Programme and related Council conclusions have underscored the need for a more rapid and effective implementation of the EGD agenda, emphasizing the importance of addressing the socio-economic and environmental challenges that hinder a just and inclusive transition. This requires addressing pressing social equity and inclusion concerns, such as energy and transport poverty, carbon inequality, and gender inequalities. A fair, inclusive, and ethical food system is also essential for ensuring that the benefits of the green transition are shared by all. Enabling conditions, such as education and skills development, and alternative wellbeing measures beyond GDP, are crucial for supporting a just transition. These key horizontal assets are discussed in the last part of this chapter.

* 1. Socio-economic risks and opportunities

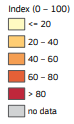
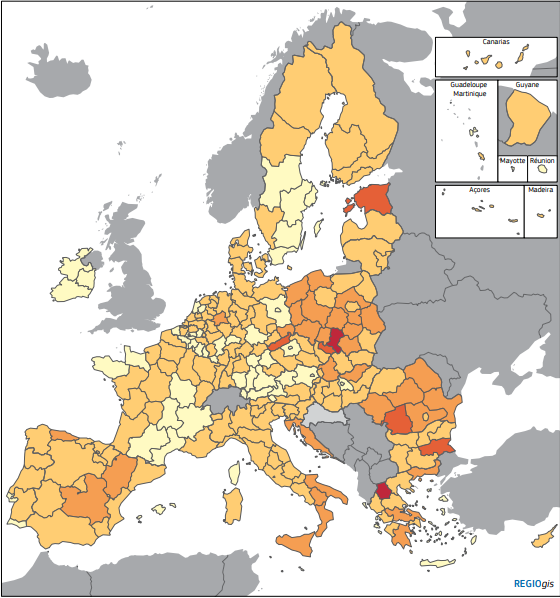
The green transition must be fair and just, leaving no person and no place behind: this principle is at the heart of the European Green Deal, and it is also the essence of the UN 2030 Agenda and its 17 Sustainable Development Goals (SDGs), fully embodied in the EU policies and objectives. The new Clean Industrial Deal further commits to a “just transition that delivers quality jobs and empowers people, building on their skills, while promoting social cohesion and equity across all regions” (ref.). Moreover, as recently stated in the Competitiveness Compass, social fairness and effective social policies are crucial for competitiveness, prosperity and security. A stronger Europe with higher level of productivity can ensure that the European social model remains affordable in the long term.

Achieving these goals requires deep transformations in our production and consumption systems in many areas (food, energy, transport and mobility etc.). The main challenge is to ensure fairness in the transformation process, assuring that everyone can equally benefit from the positive effects of the transition, and this needs to be supported by policies and funds. The Just Transition Mechanism, the Social Climate Fund are essential policy instruments for a fair and inclusive transition to a climate neutral EU, putting people first, and paying attention to regions, industries and workers who are facing the greatest challenges (notably, regions that are the most carbon-intensive or that rely heavily on fossil fuels), thus with a clear focus on some specific issues and target groups.

The consequences of climate change, pollution and environmental degradation may disproportionately affect vulnerable communities and disadvantaged groups, who frequently are the ones with lower share of the responsibility for generating these environmental issues (EEA 2022, EEA 2018, IPCC 2022). This includes notably low- and lower-middle income households, who spend a high share of their income in essential services such as energy, transport and housing, as well as micro, small and medium-sized enterprises (EC, 2020, Council recommendation, 2022). Therefore, it is essential to maintain high EGD ambitions while fostering greater solidarity and justice in pursuing of its objectives, to avoid that actions taken for example to mitigate and adapt to climate change will affect different social groups unequally.

Implementing the green transition have large impacts on business and employment, and these will vary by sector, occupation, region and country, implying job changes within sectors. For example, regions with strong economies, more innovation and knowledge-intensive services are better equipped for a green transition; economically diversified regions tend to have lower socio-economic risk, while those reliant on fossil fuels face higher risks (EC, 2024). Results of the CINTRAN project[[1]](#footnote-2) that examined the risks of territorial imbalances that could results from the green transition, identified 15 EU regions likely to be affected the most from the transition (**Figure 2**) (Vontrisi et al., 2024; CINTRAN, 2023).

**Figure 2.** Socio-economic risks associated with the green transition by NUTS 2 region

*Source*: Ninth report on economic, social and territorial cohesion (EC, 2024). Map elaborated by DG REGIO based on results of the [CINTRAN](https://coaltransitions.org/projects/cintran) project. *Note*: The ‘Socio-economic risk’ index measures the overall risk with respect to the socio-economic situation in a region, considering vulnerability, hazard and exposure. (Vontrisi et al., 2024).

According to a study from the JRC (Menyhert, 2022), the potential social consequences of increasing energy and consumer prices in the EU vary significantly **between and within Member** **States**, based on the structure of household expenditures. Low-income households spend considerably more on food and energy in relative terms, and are therefore particularly exposed and vulnerable to the effects on price changes. The social situation is especially problematic in Central and Eastern European countries, where large segments of the population devote the majority of their budget to essential items.

The **gender perspective** in the green transition should also be further strengthened, as several studies highlighting the different impacts and vulnerabilities to climate change between men and women, due to their different social roles, status, resources etc. Thus far, this aspects has been only partially addressed (ESO, 2024; Hefferman et al, 2022). Imbalances are also evident in the labor market: for example, recent studies from ILO found that of the nearly 20 million additional jobs possible in a sustainable energy transition by 2030, only 6 million jobs go to female workers (IRENA and ILO, 2023). A JRC study analysed the effects of the energy transition on women, shedding light on the often-overlooked impact of gender disparities in access to clean and affordable energy, highlighting the need for immediate action to bridge the gap and foster social resilience (Murauskaite-Bull et al., 2024). It emphasises the importance of inclusive policies to guarantee women’s active engagement and representation in the energy industry, not just as customers, but also in particular as decision-makers and innovators, with increased political and managerial engagement.

As recently highlighted also by the European Social Observatory (ESO, 2024), the EU framework for the just transition needs to be significantly broadened and made more effective, strengthening the link between the green transition and welfare policies, and also reinforcing the involvement of citizens and stakeholders.

The need of effective social policies is further enshrined by the new competitiveness strategy, when focusing on the urgency of promoting skills and quality jobs, while ensuring social fairness. The success of the transition towards a green and competitive Europe depends on the ability to acknowledge and address the concerns of the most vulnerable people, who may lose in the process. Ensuring a fair and just transition requires understanding of the challenges, the distributional impacts and risk of inequalities, including energy and transport poverty, carbon footprint and gender inequalities.

5.1.1 Energy poverty

Energy poverty [[2]](#footnote-3) is becoming a pressing issue for a socially inclusive clean energy transition in the EU, due to its impact on vulnerable populations (Menyhert, 2022)). After a decade of decline, energy poverty is on the rise again, particularly since 2021. More than 10% of the EU population struggled with inadequate home heating in 2023. Variations across regions and demographic groups illustrate the complexity of the issue. Low-income households are disproportionately affected, with some regions reporting that up to 55% of individuals are unable to meet their energy costs (Koukoufikis et al., 2024). This underscores the urgency for comprehensive policy measures that address both the symptoms and the root causes of energy poverty.

**Tackling energy poverty** has become specific policy priority in the legislative package Clean Energy for All Europeans, which was strengthened with the Recommendation on Energy Poverty (2020), issued as part of the Renovation Wave package and recently strengthened by a Second Recommendation on Energy Poverty (2023). Supporting the Clean Industrial Deal, the **Action Plan for Affordable Energy** will focus on decreasing energy costs for citizens, businesses, industry and communities across the EU, considering the needs of all people, including vulnerable groups.

**Energy efficiency of residential buildings** is a key determinant of energy poverty. The Energy Performance of Buildings Directive (EPBD) clearly included provisions to tackle energy poverty and mandates Member States to carefully design and implement financing schemes that not only incentivize building renovations but also include robust monitoring of social impacts to prevent any adverse effects on vulnerable populations.

A close analysis of recent EU climate and energy policy proposals reveals **four main layers of action** that relate to energy poverty: initiatives directly related to energy poverty and broader social aspects; energy performance of buildings; energy efficiency measures; and related climate and energy policies ([Vandyck, DellaValle et al. 2023](https://www.nature.com/articles/s41598-023-32705-2)).

Energy poverty is usually mainly caused by high energy prices, low income and energy inefficient housing. Therefore, **energy efficiency measures, funding mechanisms and targeted protection and support measures are frequently recognised as a way to mitigate energy poverty** (DellaValle et al. 2024). However, with the introduction of consensual indicators of energy poverty, individual behaviour has been considered as a fourth driver of energy poverty: **behaviour change strategies** are therefor additional channel not only to address energy poverty, but also to empower capacity to take an active role in the energy transition as *energy citizens* (DellaValle and Sareen, 2021).

The concept of ***energy citizenship***, which emphasizes the role of **citizens as active social and political participants in the energy transition**, is closely linked to addressing energy poverty, as its promotion helps to combat the energy injustices underlying energy poverty (DellaValle and Czako, 2022). To help policymakers elevate citizens from passive policy recipients to active and knowledgeable participants, behavioural insights are key. As an example, to involve citizens in policy development **"thinks" and "nudges plus"** can be used. *Thinks* are deliberative interventions where citizens engage in reflecting on issues and proposing solutions, such as through citizens' juries, assemblies, and participatory budgeting. *Nudges plus* combine the reflective aspect of thinks with nudges, resulting from a co-design process involving both citizens and local policymakers (Vandyck et al. 2023).

The energy poor can also be empowered to become energy citizens by engaging in **energy communities** (bottom-up initiatives of citizens that come together to produce, share, and manage their own renewable energy). This involvement allows them not only to take ownership of the energy they produce, thus promoting the so-called ***energy democracy***, but also to alleviate energy poverty, making energy bills more affordable (Koukoufikis et al. 2023).

While numerous measures to combat energy poverty exist, their effectiveness relies on accurately identifying the target group, e.g. the energy poor. The latest data from Eurostat show that approximately 40 million Europeans across all Member States, representing 10.6% of the Union population, were unable to keep their home adequately warm in 2023. That is a sharp increase since 2021 when 6,9% of the population were in the same situation (Energy Poverty Recommendation, 2023).

However, keeping one’s home adequately warm represents only one of the multiple dimensions underlying energy poverty. Energy poverty is, in fact, driven not only by economic factors, energy affordability and access, and housing quality, but also, amongst others, by geographical factors, path dependencies, existing inequalities (e.g. gender, marginalisation) and health factors (Sareen et al. 2020).

Because of this multidimensionality, measuring energy poverty remains thus challenging, and many EC initiatives and collaborations are in place to improve the identification and ways to address and support the energy-poor[[3]](#footnote-4).

Given the strong relationship between energy poverty and income, **income-support policies are essential** to tackle energy poverty situations, especially for households under the poverty line (Fulvimari et al. 2023). However, other type of policies may support the energy poor within the middle-income groups. This is the case of price caps, which reduce the burden of expenditures on energy goods (Amores et al. 2023), or structural interventions that step up energy efficiency by reducing the need of energy consumption. Finally, behavioural levers such as assisting consumers in setting goals for reducing energy consumption through apps and the implementation of educational campaigns to make investments choices that improve energy efficiency may also be effective in reducing the energy poverty, especially in the long-term.

Access to affordable energy is a cornerstone of the Clean Industrial Deal, and the Action Plan for Affordable Energy reaffirms the EU’s commitment to an inclusive energy transition where no individual or community is left behind. A key component of the strategy to ensure affordable housing is adopting a preventive approach to energy poverty by identifying households at risk. High rental expenditures are a significant risk factor for energy vulnerability (Della Valle, Maduta et al. 2024). This approach allows for targeted measures, such as rental interventions, and helps mitigate the risk of summer energy poverty, which is more prevalent in urban areas with higher rental rates.

5.1.2 Transport poverty

Transport poverty means the lack of available, affordable and accessible transport choices, hindering essential activities and participation in society.

The European Social Policy network (ESPN) report observes that the **irregular distribution of public transport networks** in EU Member States restricts accessibility to essential daily activities (e.g. travelling for work, education, healthcare, groceries and other similar vital trips) for low-income groups, with negative consequences (Baptista and Marlier, 2020). This may result in reduced mobility, giving up certain activities and thereby hindering professional and education opportunities, social exclusion, with negative consequences for health and wellbeing.

Dwelling and transport costs are also interconnected. Poorer households often move to suburban areas to lower housing expenses, but this can lead to higher travel costs and greater reliance on private cars. This car dependency exacerbates negative externalities in their communities and increases both transport and energy poverty.

Lower-income individuals, women, people with disabilities, the older people, and various marginalised groups are most affected by transport poverty. These groups often face higher transport costs, longer travel times, and limited mobility options, safety concerns, leading to greater social and economic disadvantages. Furthermore, as already discussed in chapter 3, the shift towards zero-emission vehicles (ZEV) is often not affordable to vulnerable households.

The consequences of transport poverty are extensive, including social exclusion, immobility, time poverty, community segregation, reduced educational opportunities, health inequalities, pollution, housing issues, discrimination, car dependency, and energy poverty due to local fuel prices.

Mejía and Murauskaite (2022) also identified some of the measures taken to address transport poverty which include social justice policies, gender mainstreaming, housing and sustainable mobility strategies, active mobility solutions, polycentricity and the concept of 15-minute cities, fighting isolation in remote areas as well as the digital divide. Many living areas across Europe, both urban and rural, are now being planned in a way that reduces as much as possible the negative consequences of transport. In this respect, the spatial arrangement of the built environment is vital to carrying out daily activities and accessing goods and services.

The new Clean Industrial Deal has announced a Sustainable Transport Investment Plan, to support specific renewable and low-carbon fuels for aviation and waterborne transport, and new rules facilitating the shift towards sustainable land transport modes.

5.1.3 Carbon inequality

Decarbonisation is at the core of the new EC priorities and the Clean Industrial Deal, but the transition must be fair and just, ensuring benefit to every region and person in the EU.

Carbon inequality refers to the **unequal distribution** of **carbon emissions** (or carbon footprint) and relative impacts across regions and on **different socio-economic groups**. Chancel (2022) estimated the global inequality of individual GHG emissions in 2019 and found that the **bottom 50% of the world population emitted 12%** of global emissions, whereas **the top 10% emitted 48%** of the total. Inequalities in carbon footprints remain large both between and within world regions. Inequality of carbon footprint between income groups is expanding across all regions, with a declining trend in the carbon footprint for developed economies, and increasing trend for developing countries across all income groups (Zheng et al., 2023).

For the European Union, an ongoing JRC research project on the **distributional aspects of the carbon and other environmental footprints of households[[4]](#footnote-5)** confirms large inequality in consumption footprints across different segments of the population (Ciccolini et al., 2024).

This study estimated that **the richest households in the EU have a footprint 1.79 times greater than the poorest households** . However, a **remarkable variation** exists across EU countries, reflecting differences in how consumption levels and compositions relate to environmental impact. Most countries lie below the EU average, as the latter is driven by a minority of countries composed of the most populated ones[[5]](#footnote-6).

The relationship between income and footprint can be due at the same time to **both unequal consumption level by different income groups and**, potentially, **different consumption patterns of poor versus rich income households**. Data suggests that **as income increases**, there is a trend towards a **higher consumption** **footprint in mobility**, household goods, and appliances, whereas the relative footprint for food and housing decreases.

Estimates of income-based inequality in the impact of consumption on **climate change**, show that the richest considerably distinguish themselves for their contribution to the **depletion of non-renewable finite resources as minerals and metals**. The footprint contribution of the top income earners is 2.50 times greater compared to the contribution of the bottom earners.

These data are pivotal to ensure a fair transition towards a modern, fair, efficient and sustainable economy. **Identifying the socio-economic and demographic groups** that are **contributing the most** to climate change and environmental degradation is key to ensure that burden of the policies needed for achieving climate neutrality​ is **distributed proportionally** in the population, so that those already contributing the least are not overcharged.

The decarbonisation of the energy supply can have an another important role in reducing carbon inequalities (Semieniuk and Yakovenko, 2020). **Changes in consumption patterns are** also **crucial** to move towards more sustainable consumption and lower impact on carbon emissions, even if behavioural changes are critical for the richest segment of the population, that is the one that impacts the most (Kenner, 2015). This might include both a reduction in the consumption level of more privileged groups and a change in the type of goods consumed.

Remarkably, a sole focus on carbon inequality might be insufficient, if one does not also address the underlying economic inequalities. On this point, **reductions in economic inequality** could lead to comparable reductions in carbon footprint disparities (Millward-Hopkins and Oswald, 2021).

5.1.4 The impact of carbon prices

The flipside of increasing carbon prices is their impact on households’ budgets. While this is an unintended consequence, the path of carbon price increases needs to be calibrated taking into account its distributional effects. Introducing carbon taxes, especially for fuels purchased by households for heating and private transport, are shown to be regressive and have the potential to increase energy poverty (Vandyck et al., 2022[[6]](#footnote-7); Vandyck et al., 2023[[7]](#footnote-8); Weitzel et al., 2023[[8]](#footnote-9)). Without counteracting measures, this has the potential to undermine support for climate policy (Klenert et al., 2018[[9]](#footnote-10)). The JRC analysed[[10]](#footnote-11) distributional impacts of the proposed revision of the Energy Taxation Directive (ETD) and Carbon Border Adjustment Mechanism(CBAM) reforms, combining its general equilibrium macroeconomic model for energy, climate and environment (JRC-GEM-E3) and its microsimulation model for tax and social benefits (EUROMOD). Results confirm that higher energy taxes lead to a shift towards greener energy use and investments in energy efficiency. In line with their intended purpose, the proposed ETD reform will reduce emissions associated with the use of energy, and fossil fuels in particular; while the introduction of CBAM will reduce carbon leakages. These changes are unlikely to have uniform impact across sectors and countries, however simulated price and wage changes are more pronounced in the transport sector, where fuel inputs represent an important component in overall production costs, especially in Central and Eastern European countries, Luxembourg (land and air transport), Malta (water transport), and Greece (air and water transport). At the same time, the same analysis indicates that ETD will have, in the short-term, negative but small welfare effects on households. These effects are however rather heterogeneous between and within countries. In particular, households at the bottom and the top of the income distribution are generally found to be the main losers (Amores et al., 2023[[11]](#footnote-12)). This is the result of a regressive "price effect" driven by the expected increase in consumer prices, that disproportionately affects low-income households; and a progressive "income effect " driven by the expected decrease in labour and capital income, which mostly affects mid- and top-income households.  The overall effect is inequality-increasing in some countries.

Revenues from carbon pricing policies could be used to compensate the most affected vulnerable groups, such as households in energy or transport poverty, so they are not left behind during the green transition. The Social Climate Fund (SCF), created alongside the ETS2, was designed to use revenues from the ETS2 to fund mitigation options helping households – thereby reducing their exposure to higher fuel prices, as well as direct transfers to households for a transitional period. It is important for Member States to design appropriate policies that target the right households, as energy poverty is a multi-faceted issue (Maier and Dreoni, 2024, Vandyck et al., 2022) and single indicators of energy poverty may be missing out on certain groups of the population (Menyhert, 2024[[12]](#footnote-13) and Maier and Dreoni, 2024[[13]](#footnote-14)). Member States’ plans should not only try to address the short-term pain of introducing the carbon pricing (i.e. by direct transfers), but also to tackle the root cause of the distributional issues and implement measures to reduce emissions of households affected through appropriate policies and support schemes[[14]](#footnote-15), e.g. to improve energy efficiency or to provide support to low-income households for replacing their heating systems. If not tackled in time, the problem will become larger in the longer run (i.e. beyond 2030 or 2040), when revenues from the ETS2 may eventually decline, as the tax base should in principle shrink should CO2 emissions be effectively reduced.

The recent energy crisis has evidenced the need to carefully design compensatory measures aimed at reducing the impact of higher energy prices. More specifically, the efficiency of compensatory measures to reduce the effects of higher energy prices can differ significantly. Amores et al. (2023)[[15]](#footnote-16) compared the (untargeted) price caps introduced in 2023 in Germany, the Netherlands and Austria with alternative hypothetical policies (targeted price caps and targeted and untargeted lump-sum benefits) with respect to their efficiency in attenuating the inequality and poverty increasing effects of surging energy prices. Their estimates show that price cap policies partly absorbed the negative distributional consequences of the inflationary shock and counteracted the increase in energy poverty. However, even after the implementation of price caps, the poorest households were still the most severely affected. In other words, price caps were not sufficient to offset their welfare losses. The authors find that simpler measures, such as targeted lump-sum cash transfers, would be more efficient in cushioning the inequality-increasing effects of inflation. Price caps, on the other hand, are more efficient in reducing energy poverty, given the non-negligible incidence of energy poverty in middle-income groups. In general, more targeted measures provide a better support to the vulnerable households; however, they may be more difficult to implement, especially at a short notice as was the case in the recent energy crisis.

5.1.5 Fair, inclusive and ethical food system

Ensuring everyone in the EU and the world has access to a nutritious diet in a sustainable way is one of the greatest challenges nowadays, and one of the most ambitious targets of the SDG framework (Borchardt et al., 2024). The **need for a paradigm shift towards sustainable food systems** is gaining recognition, as demonstrated by the growing number of initiatives implemented across the EU and worldwide (Barbero Vignola et al., 2024).

There is urgent need to **make the food system fair, healthy and environmentally-friendly** at the EU and global levels (SAPEA, 2023; Bock et al., 2022), as stated in the Farm to Fork Strategy (EC, 2020) and in other strategic EU policies, including the Biodiversity Strategy, the Bioeconomy Strategy, the Circular Economy action plan and the new European Industrial strategy.

The recent Vision for Agriculture and Food (cit.) encourages the agri-food system to be attractive, competitive, sustainable and fair for current and future generations. It reinforces the need for social sustainability, to foster fair living conditions in rural areas, protect the rights of workers, develop skills and attract more women and young people in agricultural professions.**Existing challenges** relate to various environmental, social and economic developments taking place in the EU and globally, which threaten the long-term viability and resilience of the food system in reducing its future capacity to face, respond and adapt to disturbances and shocks (Smith et al., 2019; UNFSS, 2021).

Climate change will further increase pressures on ecosystem services that support food system with negative effects on air, soil and water quality, and will also impact on primary production, with consequences on food security and nutrition of vulnerable groups in particular (Bezner Kerr et al., 2022). A cascade of impacts from climate change outside Europe may affect the price, quantity and quality of products, and consequently trade patterns. Increased prices for inputs, such as fertilisers and fossil energy, can cause production challenges and supply uncertainties, thus affecting food availability.

On the other hand, transitioning towards climate-friendly practices may lead to **increased costs for farmers and food producers**, which could impact food prices and, in turn, **food security** (Tchonkougang et al 2024; EEA, 2023; IPCC, 2022). Particularly vulnerable in accessing and affording sustainable food are low-income households, that usually purchase less expensive food products (Nes et al., 2023). Balancing environmental goals with economic viability and social equity is an ongoing challenge, which requires a multi-faceted approach, addressing the complex interplay of social, economic, and environmental factors.

**Research and innovatio**n play a key role in developing solutions that can facilitate food system transformation:[Food 2030](https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy/food-systems/food-2030_en) is the EU's **research and innovation policy framework** supporting the transition towards sustainable, healthy and inclusive food systems that respect planetary boundaries. It sets out 11 **pathways for action** where research and innovation can concretely deliver co-benefits related to nutrition, climate, circularity and communities, at multiple levels: from local to international (Bizzo et al., 2023).

Furthermore, an EU monitoring system has been recently set up to provide information on **progress** towards a fair, healthy and environmentally friendly food system in EU. It is built on a set of key indicators, encompassing all the dimensions of sustainability - environmental, economic and social (including health) [[16]](#footnote-17)[[1]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-US&rs=en-IE&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fe6f3b20461fc475a994101a2618ac555&wdorigin=TEAMS-MAGLEV.teamsSdk_ns.rwc&wdexp=TEAMS-TREATMENT&wdhostclicktime=1731597846521&wdenableroaming=1&mscc=1&hid=32D763A1-A03D-A000-61D7-4C95096AC04B.0&uih=sharepointcom&wdlcid=en-US&jsapi=1&jsapiver=v2&corrid=fb3736b1-100a-63bc-7b3b-3c15e0b7973c&usid=fb3736b1-100a-63bc-7b3b-3c15e0b7973c&newsession=1&sftc=1&uihit=docaspx&muv=1&cac=1&sams=1&mtf=1&sfp=1&sdp=1&hch=1&hwfh=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Feceuropaeu.sharepoint.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn1) (Toth et al., 2024).

A fair, inclusive, and ethical food system in the EU requires a comprehensive approach that addresses policy, stakeholder engagement, innovative business models, and sustainable practices. In this way the EU can promote a more equitable, environmentally sustainable, and socially responsible food system.

The new vision for Agriculture also envisions a Food Dialogue with the food system’s actors, including consumers, primary producers, industry, retailers, public authorities and civil society.

* 1. Beyond GDP measures

The integration of socio-ecological and wellbeing indicators in EU policy-making is key to monitor and foster a fair and just green transition (OSE, 2024) and to align with the SDG framework, which emphasizes the need “to develop **measurements of progress** on sustainable development **that complement gross domestic product (GDP)**” (SDG target 17.19). GDP is often used as the single indicator to measure economic progress. However, this metric is often criticised and has many shortcomings: it neglects to consider social, political, geopolitical or environmental values and in particular cannot address wellbeing of people, it takes into account increased production without considering where this comes from. Therefore, while GDP still remains the single most important economic indicator to measure the overall state of an economy, alternative measures that supplement GDP and that can evaluate countries’ long-term sustainability by taking into account the interplay between natural, social, and human capital are necessary (EP, 2023; DG RTD, 2024). This strategic shift is further underscored by the UN Secretary-General, who identifies “complementary measures to GDP” as a crucial step for accelerating the achievement of the SDGs and leaving no one behind (UN, 2023). This was pursued further in the recently adopted Pact for the Future[[17]](#footnote-18), which includes Action 53 committing to 'develop a framework on measures of progress on sustainable development to complement and go beyond gross domestic product’.

5.2.1 Measures of wellbeing

The OECD is leading efforts to develop indicators that **measure the wellbeing** of individuals, families, society, future generations and the planet, to help monitor societal progress and inform policy decisions across multiple dimensions. The 7th OECD World Forum held in November 2024 stressed the need of wellbeing approaches to jointly address the social, economic, and environmental challenges, and help ensure that the green and digital transitions are fair, just, and inclusive. Wellbeing indicators, grounded in multidimensional, people-focused frameworks, can help monitor the effects of specific policies and clarify trade-offs and positive synergies across different policy areas and different sectors of society. This is important not only for strengthening evidence-based policy making but also for supporting the public acceptance of necessary reforms, and building more cohesive and resilient societies. Their emphasis on future wellbeing establishes a link with the emerging strategy on intergenerational fairness[[18]](#footnote-19).

Several initiatives are addressing “beyond GDP” discussions aiming to develop a more comprehensive approach to measure prosperity and wellbeing, encompassing the effects of global challenges and policies on quality of life, health, living and working environments, inequalities, environmental sustainability, and intergenerational fairness (EP European Parliament, 2023; Terzi, 2021; Widuto, 2016). To complement the GDP metric, a range of alternative indicators have been developed and integrated into policy making, providing a more nuanced and multidimensional understanding of societal progress. Examples of this measures include the Human Development Index (UNDP, 2024), the Social Progress Index (Stern et al., 2024), the SDG index (Lafortune et al., 2018), and the ZOE’s compass (Barth et al., 2021), among others.

The European Union supports the initiatives and plays a key role in promoting the development and use of such indicators, presenting a **roadmap for transitioning beyond GDP in EU**, in the Communication adopted in 2009 and its follow up (European Commission, 2009; 2013). This commitment is further reinforced by the 8th Environmental Action Programme (8EAP), which emphasizes the need for a more holistic approach in EU policymaking to ensure a just transition, incorporating a summary dashboard that measures economic, social, and environmental progress beyond GDP.

Building on this momentum, the [Strategic Foresight Report](https://commission.europa.eu/document/download/ca1c61b7-e413-4877-970b-8ef619fc6b6c_en?filename=SFR-23-beautified-version_en_0.pdf) (EC, 2023) has announced the Commission’s plan to develop **Sustainable and Inclusive Wellbeing (SIWB)** metrics (Benczur et al., 2024), to progressively complement the use of GDP with wellbeing indicators in EU policymaking[[19]](#footnote-20). Such metrics help monitor progress towards the wellbeing of current and future generations, facilitating the communication of policy challenges. By adopting a people and planet-centred approach, the SIWB metrics represent a significant step towards a more balanced and inclusive understanding of societal progress in the EU. This has led to the development of a prototype multidimensional SIWB framework and indicator dashboard, which also guide the development of experimental augmented-GDP type metrics (a pilot example is presented in Benczur et al, 2023). The dashboard work also includes a version with a limited number of indicators (50), more suitable for broad communication purposes.

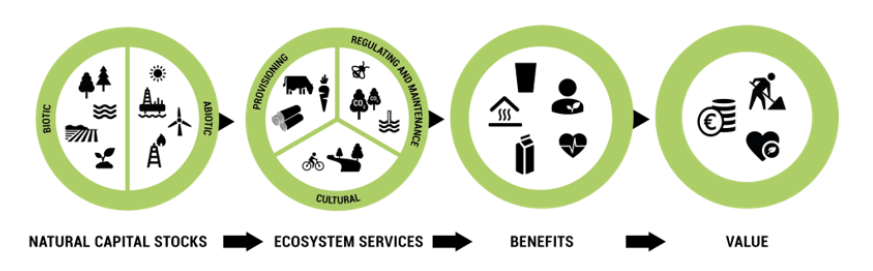
The preliminary analysis based on the dashboard of 50 indicators shows many differences in wellbeing levels and in its components across Member States, between regions and socioeconomic groups, which can be explained by a complex array of factors including economic conditions, social policies, healthcare systems, and cultural norms. This underlines the need for **targeted policy actions** to address existing inequalities, balancing economic objectives, social inclusivity, environmental sustainability, and long-term prosperity (cite second report).

Such metrics facilitate a deeper understanding of the complex relationships between economic, social, and environmental factors, ultimately informing evidence-based policy decisions that promote the wellbeing of all people of the current and future generations, and of the planet. By tracking the development of societal objectives, they can be fundamental to ensure that economic growth and productivity do not become a means but remain an end, to deliver on the Union’s ultimate objectives to promote peace, its values and the wellbeing of its people (Article 3(1) TEU).

5.2.2 Gross Ecosystem Product

The “beyond GDP” metrics may also include nature in the economic policy assessment..As said, the GDP does not fully capture nature’s contribution to the economy and wellbeing, and does not factor-in environmental impacts (Sen et al., 2010; Dasgupta, 2021). The latter is particularly important with a view of the present and projected future state of the environment, given that the global stock of ecosystems, for example wetlands, grasslands, and forests, is under increasing pressure from an expanding world population with rapidly changing consumption patterns (EEA, 2023). The benefits provided by ecosystem services, such as crop pollination, carbon sequestration, or water purification, are of great importance to any economy, both directly and indirectly. In reference to the above considerations, Ouyang et al. (2013) proposed and further developed (e.g. Ouyang et al. 2020) the concept of the **Gross Ecosystem Product** (GEP), which summarizes the **value that ecosystem services provide to the economy in monetary terms.**

**Figure 9.** Natural Capital Stock, Ecosystem services, Benefits and Value



*Source: van Alphen et al., 2024.*

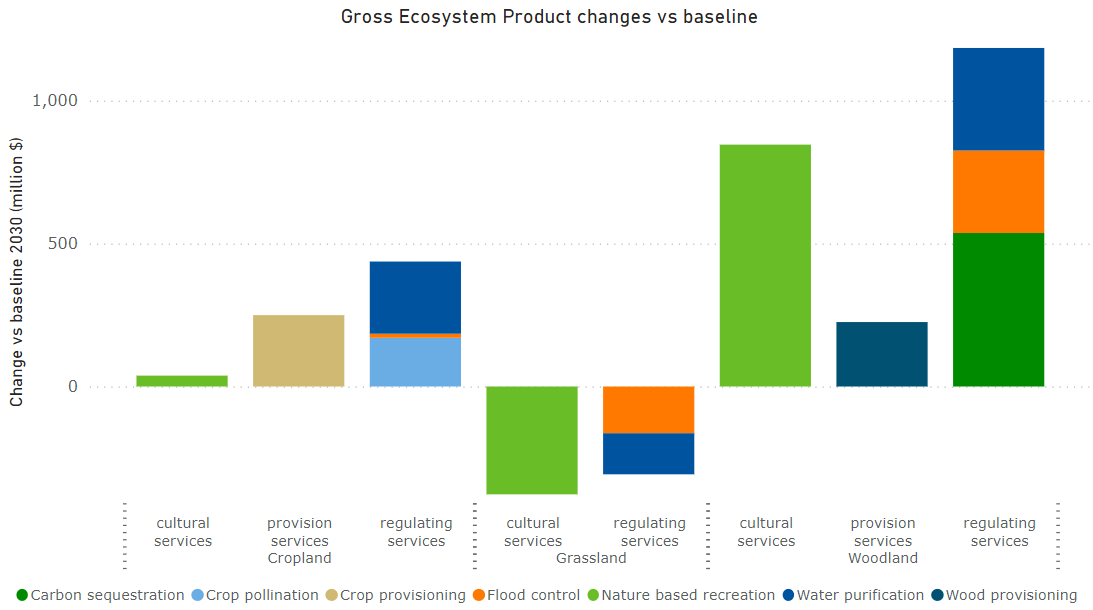
The concept of GEP is receiving increasing attention worldwide. In March 2021, the UN Statistical Committee approved a global standard on Ecosystem Accounting (EA) under the System of Environmental Economic Accounting (SEEA), which reflects the contribution of nature in measuring economic prosperity and human well-being (UN, 2021b). Since then, several countries have started developments related to its adoption and policy implementation (Comte et al., 2022). For instance, the Netherlands and Iceland have decided to reflect the value of ecosystem services in national accounts (de Jongh et al., 2021, Cook et al., 2022). China is the first country to implement the GEP and integrate the value of ecosystem services into decision-making processes alongside conventional macroeconomic indicators such as GDP (Ouyang et al. 2020; Zheng et al. 2023).

The strength of GEP lies largely in the fact that it can serve as a **complement to GDP measures.** By using the national accounts approach, it provides policymakers with a clear and intuitive indicator of the value of nature. The use of GEP alongside other macroeconomic indicators provides a more accurate picture of the impact of policies on the economy and on nature, to be included in the decision-making process. Analogous to GDP, GEP can be assessed not only as a single metric; an evaluation of the different components and related indicators is also useful. Trade-offs (and synergies) among different categories of ecosystem services, such as provisioning services, regulating services, and cultural services, are seen as one of the most important current sustainability issues and should be considered in decision-making (Bennett et al., 2023; Le et al., 2023).

Although the GEP has been already present in the environmental analyses for some time, it has not been applied yet in the macroeconomic modelling to assess the impacts of different policies. The JRC, together with Wageningen Economic Research, have recently developed a model that links ecosystem flows and their values to known macroeconomic indicators for nature inclusive decision-making. It enables forward-looking economic scenario studies on the relationship between macroeconomic indicatorsand GEP.

Built upon the Integrated Natural Capital Accounting (INCA) database on monetary value of ecosystem services, the new model allows for comparison of the impact of different policies on both GDP and GEP in the European Union. For example, in a scenario that assumes a significant change in consumption patterns, the results of preliminary simulations show that such an impact can significantly differ both between GDP and GEP and across particular ecosystem services. According to the simulation results, the altered consumption pattern has a very slight (yet positive) impact on GDP (+0.01%) in the EU in 2030 compared to the reference scenario. In contrast, the GEP index increases by 1.5%, or 2.3 billion euros compared to the reference scenario.

**Figure 4.** Policy scenario result EU 2030, Gross Ecosystem Product (GEP) absolute change versus baseline, in million Euro



*Source: Rokicki et al., 2024.*

* 1. Education and skills for the green transition

Achieving the goals of the **European Green Deal**  and the Clean Industrial Dealrequires a profound transformation of Europe’s economy and workforce, underpinned by a fair, inclusive, and competitive transition. This shift spans all dimensions of the green transition, requiring the development of **green skills** and the creation of jobs aligned with sustainability objectives. The workforce must be equipped with the knowledge, competencies, and adaptability needed to support this systemic change, from primary sectors to emerging industries. To increase competitiveness, the EU will focus on adult and lifelong learning, and up- and re-skilling, to ensure a good alignment with labour market demands. The **transition to sustainability** offers unparalleled opportunities to simultaneously address socio-economic and environmental challenges. Green skills encompass both technical abilities and cross-sectoral competencies, such as systems thinking and collaboration, which enable the workforce to meet the demands of rapidly evolving markets. As highlighted by recent assessments (European Commission, 2023), this transformation is expected to generate millions of jobs across all sectors of the green economy, particularly in roles requiring mid-level and high-level skills. Promoting skills and quality jobs while ensuring social fairness is also one of the horizontal enablers of the **EU Competitiveness Compass**, a reminder that the green transition has to also be a fair and competitive one for our economy and society.

The success of this transition hinges on addressing structural gaps in education and training. Existing EU frameworks, such as **GreenComp**, provide a shared reference for integrating sustainability competences, while financial instruments such as the **European Social Fund+**, **Youth Guarantee**, and **Erasmus+**, support re-skilling and up-skilling. Additionally, investments including the **EUR** **3 billion for sustainable school infrastructure** demonstrate the EU’s commitment to preparing future generations for the green economy. This commitment is reinforced by the **Clean Industrial Deal**, which prioritizes access to industry-needed skills and worker support during the transition. As part of this effort, the Commission will establish a **Union of Skills**, investing up to € 90 million from Erasmus+ in workforce training and quality job creation in strategic industries. The Union of Skills will include a STEM Education Strategic Plan, a Basic Skills Action Plan focused on school education, and a European Strategy for Vocational Education and Training while strengthening the European Universities Alliances. Additionally, mobility across the EU will improve with better recognition of skills and training, extending to skilled professionals from third countries.

This chapter explores the enablers and challenges of equipping Europe’s workforce for the green transition. By connecting skills development with the broader goals of a **clean, just, and competitive transition**, it highlights how education and training systems can adapt to meet evolving labour market needs, ensuring the effective implementation of the EGD and strengthening Europe’s socio-economic resilience. However, measuring the full impact of the green transition on the labour market remains challenging due to the limitations of the occupational framework typically used for such assessments[[1]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn2).

The energy sector as a catalyst for the green transition

The transition from brown to green jobs in the EU, driven by the European Green Deal, is expected to bring significant changes in the Member States’ labour markets. The energy transition, and related scale-up of EU net-zero technology manufacturing, will accelerate demand for workers with green skills. Skilled technical workers, already in persistent shortage, are in the high demand and labour shortages may hinder the energy transition if not addressed[[2]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn2).

**Jobs in clean energy technologies are growing faster than in the rest of the economy**[[3]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn3). This sector employs more than 2 million people in the EU[[4]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn4). Most of these jobs are in the renewable energy sector[[5]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn5) (mainly heat pump, solar and wind) and the manufacturing segment. However, this sector is marked by a high job vacancy rate, with 15% of companies in the area of manufacturing electric equipment reporting **labour shortages as the main factor limiting their production**[[6]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn6).

As the energy transition unfolds, structural mismatches[[7]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn7) can lead to persistent shortages in some of the technical skills and occupations, such as installers and repairers of electrical equipment and machinery mechanics[[8]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn8). The energy industry faces the double challenge of an aging workforce and the changing skills needs resulting from digitalisation[[9]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn9). In addition, the electricity sector is among the most affected by the demographic shift, due to the ageing population[[10]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn10) and the persistent underrepresentation of women. Gender disparities in scientific publications, particularly in STEM fields, also persist[[11]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn11). **Demand for trained and skilled technicians will remain high**, since 75% of the jobs created by the energy transition will be in these roles[[12]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn12).

The European Commission[[13]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn13) has recently concluded that most Member States have not set specific objectives or allocated funding to address the skills gaps necessary for implementing the NZIA[[14]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn14). Increasing the production of clean technologies will require further investment in skills, estimated to range from EUR 1.7 billion to EUR 4 billion[[15]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn15).

The raised climate ambition and accelerated deployment envisaged in the REPowerEU Plan could create up to 1 million additional jobs by 2030[[16]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn16). Some of the technical profiles needed are transferrable from the fossil fuel industry and other related sectors. The development of job-specific training programmes, including EU-wide certification and mutual recognition of skills, is crucial to facilitating sufficient labour supply. Nevertheless, the shortage in high-skilled occupations may create a bigger bottleneck as it takes longer to obtain the required educational credentials[[17]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn17). The clean energy and green economic transition are taking place parallel to and in the context of digitalisation. These simultaneously occurring global trends require education and skills responses from policy makers, companies and education institutions alike[[18]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn18).

As employment in high-pollution sectors declines and low-pollution sectors grow, economic disparities and poverty risks may rise, particularly for workers in fading industries. However, Member States' tax-benefit systems can help mitigate these effects by supporting those most affected by the transition, redistributing income, and offering social protection. These systems play a crucial role in ensuring the green job transition results in a more equitable distribution of economic outcomes across the EU, protecting vulnerable populations from the worst impacts[[19]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn19).The clean energy sector has the potential to bring back some of the industrial jobs that have been disappearing from Europe. Importantly, these jobs have an opportunity to fill the void in medium-skilled jobs as nearly 60% of job creation could fall into this category[[20]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftn20). Renewing societal trust in a labour market that creates life-long opportunities and security can turn the labour force from a bottleneck to a positive force in the transition to climate neutrality.

[[1]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref1) European Commission: Joint Research Centre, VILLANI, D., GONZALEZ VAZQUEZ, I. and FERNANDEZ MACIAS, E., Green Jobs. A critique of the occupational approach to measure the employment implications of the green transition, European Commission, Seville, 2025, JRC140967.

[[2]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref2) European Commission. Joint Research Centre. (2025). Clean Energy Technology Observatory, Overall strategic analysis of clean energy technology in the European Union: 2024. Publications Office. <https://doi.org/10.2760/3507717>

[[3]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref3) Kuokkanen, A., Skills for the energy transition in the changing labour market, European Commission, Petten, 2023, JRC135382.

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[[17]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref17) European Commission. 2023. Employment and Social Developments in Europe. Addressing labour shortages and skills gaps in the EU. Publications Office of the European Union: Luxembourg.

[[18]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref18) Czako, V., Employment in the Energy Sector, EUR 30186 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-18206-1, doi:10.2760/95180, JRC120302.

[[19]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref19) This evidence has been developed under AMEDI (Assessing and Monitoring Employment and Distributional Impacts of the Green Deal), a joint cooperation between the Directorate-General for Employment, Social Affairs and Inclusion (DG EMPL) and the Joint Research Centre (JRC) of the European Commission (see <https://ec.europa.eu/social/main.jsp?langId=en&catId=1588>)

[[20]](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-us&rs=en-gb&wopisrc=https%3A%2F%2Feceuropaeu.sharepoint.com%2Fteams%2FGRP-Shapinggreentransition-LeadershipTeamchannel%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F78885be5849a4c0fa9f190549f232024&wdenableroaming=1&mscc=1&hid=390e9784-530e-40e5-9186-504f381e9fbd.0&uih=teams&uiembed=1&wdlcid=en-us&jsapi=1&jsapiver=v2&corrid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&usid=4cc5653d-bd97-4de2-a2ec-f95d729e58a8&newsession=1&sftc=1&uihit=TeamsModern&muv=v1&accloop=1&sdr=6&scnd=1&sat=1&rat=1&sams=1&mtf=1&sfp=1&halh=1&hch=1&hmh=1&hwfh=1&hsth=1&sih=1&unh=1&onw=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fwww.microsoft365.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdhostclicktime=1739721398946&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush#_ftnref20) IRENA&ILO. 2022. Renewable energy and Jobs: Annual Review 2022.

Learning for the Green Transition

The 2023 Eurydice assessment of 39 European countries provides insights into how education systems currently support European Green Deal (EGD) implementation. While sustainability features prominently in all Member States' curricula, the assessment identifies areas where targeted improvement could accelerate progress (Eurydice, 2023). **Teacher preparation**, for instance, emerges as a key area of focus, with many educators expressing strong interest in sustainability topics but seeking additional support to teach them effectively.

Investing in professional development for sustainability education presents a significant opportunity for system-wide improvements. EU-level collaboration on certification standards could facilitate consistency in quality while supporting professional mobility across Member States (Eurydice, 2023). Additionally, aligning education outcomes with evolving labour market needs, particularly in technical fields, could help expand the workforce, especially in light of demographic shifts and gender imbalances.

The green transition has profound economic implications for the labour market. Recent analysis shows that nearly 60% of new jobs in the clean energy sector will require medium-level skills [[20]](#footnote-21), highlighting the need for a strategic approach to technical and vocational training. EU initiatives like the European Social Fund+, the Skills Agenda, and the Youth Guarantee provide comprehensive mechanisms for re-skilling and up-skilling, with a particular emphasis on green skills development. Ensuring the effective implementation of these programs will support workforce transitions while maintaining high quality standards (European Commission, 2023a). Additionally, the development of common certification approaches will strengthen workforce mobility across Member States while ensuring consistent quality standards.

In 2020, the European Commission introduced the ‘New Skills Agenda’ to foster sustainable competitiveness, social fairness, and resilience. This agenda set ambitious objectives for upskilling and reskilling workers over the next five years, ensuring that EU workers acquire the skills required to navigate the green transition. It also includes training for circular economy activities, such as design, materials sourcing, maintenance, repair, refurbishment, repurposing, and recycling. For example, new benchmarks under the Critical Raw Materials Act have created a demand for skills related to circularity and sustainability across various value chains. At the same time, there is a general lack of technical expertise, both in the public and private sectors, to develop and implement innovative circular solutions.

Investing in the development of skills within other areas such as the food chain workforce is equally critical. Fostering a skilled and adaptable workforce, along with promoting research and innovation in areas like sustainable agriculture and food technology, will be key to long-term success. These efforts will drive increased efficiency and productivity, benefiting all stakeholders.

Bridging the knowledge gap between consumers and the resources used to produce their food is essential. By fostering transparency and educating consumers on sustainable practices, informed choices can be made that support the overall health of the food system. By implementing these measures, the EU can create a food supply chain that is both economically viable and environmentally responsible, ensuring a secure and sustainable food future for all.

Similarly, it is vital to ensure that land ecosystem restoration is properly resourced with skilled professionals who can address the socio-ecological complexities of restoration projects. These professionals must be equipped with the knowledge, tools, and expertise to implement science-based restoration techniques, as well as monitor and evaluate progress effectively [[21]](#footnote-22).

EU Frameworks and financial support

The EU has established key frameworks and financial instruments to integrate sustainability competences into education and training systems. The GreenComp framework serves as the European competence framework for sustainability, offering common reference points for developing and assessing knowledge, skills, and attitudes on climate change and sustainable development (Bianchi et al., 2022). The Education for Climate Coalition facilitates practical implementation, while the enhanced Erasmus+ Programme (2021-2027) supports targeted actions through dedicated funding.

The European Commission, working through the European Investment Bank and structural funds, has mobilised EUR 3 billion for sustainable school infrastructure, demonstrating the EU's institutional commitment to transforming education systems for the green transition. To maximise the impact of these frameworks and instruments, strategic coordination is essential. Effective deployment of EU funding mechanisms, combined with systemic changes in educational institutions—from infrastructure improvements to curriculum development—can significantly amplify the impact of these investments. Member States that have successfully integrated sustainable education practices into their teaching, infrastructure, and assessment systems provide valuable evidence that this coordinated approach accelerates the development of green skills and competences.

The ongoing implementation of the EGD will benefit from continued attention to educational strategies. While robust frameworks exist through various EU initiatives, enhanced coordination could further support the evolving needs of the green economy. Aligning educational outcomes with green economy requirements strengthens both the implementation of the EGD and the goals of a just transition (European Commission, 2024). By building the long-term capacity of the education sector, the EU can ensure that the transition to a sustainable future creates opportunities that are accessible across all regions (Kuokkanen, 2023).

1. CINTRAN project ‘Carbon Intensive Regions in Transition’ - Unravelling the Challenges of Structural Change. <https://coaltransitions.org/projects/cintran> [↑](#footnote-ref-2)
2. Energy poverty is defined, in the 2023 Social Climate Fund regulation and the revised Energy Efficiency Directive, as 'a household's lack of access to essential energy services that provide basic levels and decent standards of living and health, including adequate heating, hot water, cooling, lighting, and energy to power appliances, in the relevant national context’. [↑](#footnote-ref-3)
3. Examples are the ISG on Energy Poverty and Vulnerable Consumers, the Covenant of Mayors and the European Advisory Energy Poverty Hub (EPAH). [↑](#footnote-ref-4)
4. DISCO(H) Project, - “Distributional assessment of the consumption footprint of households in the EU: addressing carbon and other environmental footprints”, financed through an administrative agreement between DG Employment and Social Affairs and the Joint Research Centre. <https://data.europa.eu/doi/10.2760/841471>. [↑](#footnote-ref-5)
5. The EU average is calculated as a population-weighted average of the country estimates. In this case, the average is driven by a minority of countries (Germany, France, Spain, Poland, Romania) that are among the six most populated ones (together with Italy) and represent altogether two thirds of the EU population excluding Italy. [↑](#footnote-ref-6)
6. Vandyck, T., Temursho, U., Landis, F., Klenert, D. and Weitzel, M. *Prices and Standards for Vertical and Horizontal Equity in Climate Policy.* SSRN working paper no. 4144282: https://papers.ssrn.com/sol3/   
   papers.cfm?abstract\_id=4144282 [↑](#footnote-ref-7)
7. <https://www.nature.com/articles/s41598-023-32705-2> [↑](#footnote-ref-8)
8. <https://www.sciencedirect.com/science/article/pii/S0921800922003214> [↑](#footnote-ref-9)
9. <https://www.nature.com/articles/s41558-018-0201-2> [↑](#footnote-ref-10)
10. ADD REFERENCE SWD(2021)641 and SWD(2021)643  [↑](#footnote-ref-11)
11. Amores, A., Maier, S., Ricci, M., *Taxing Households Energy Consumption in the EU: the Tax Burden and its Redistributive effect*. Energy Policy Vol. 182, November 2023. <https://doi.org/10.1016/j.enpol.2023.113721> [↑](#footnote-ref-12)
12. <https://www.sciencedirect.com/science/article/pii/S0301421524001800> [↑](#footnote-ref-13)
13. Maier, S. and Dreoni, I. *Who is “energy poor” in the EU?* JRC Working Papers on Taxation and Structural Reforms No 4/2024.  [↑](#footnote-ref-14)
14. See also section 4.2.2 in European Commission. *European and Social Developments in Europe 2020*. 15 September 2020. https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8342&furtherPubs=yes [↑](#footnote-ref-15)
15. Amores, A.F., Christl, M., De Agostini, P., De Poli, S. and Maier, S., *Limiting Prices or Transferring Money? An ex ante assessment of alternative measures to cope with the hike in energy prices.* European Commission, 2023. JRC134801 [↑](#footnote-ref-16)
16. See EU Food System Monitoring Dashboard: <https://datam.jrc.ec.europa.eu/datam/mashup/EU_FOOD_SYSTEM_MONITORING/index.html> [↑](#footnote-ref-17)
17. <https://www.un.org/en/summit-of-the-future/pact-for-the-future> [↑](#footnote-ref-18)
18. Intergenerational fairness is part of the new political priorities. It has also been strongly advocated by the beyond GDP research community, for example, Hoekstra et al. (2024). [↑](#footnote-ref-19)
19. For more information on this initiative see the renewed Commission website [Beyond GDP: delivering sustainable and inclusive wellbeing - European Commission](https://joint-research-centre.ec.europa.eu/scientific-activities-z/beyond-gdp-delivering-sustainable-and-inclusive-wellbeing_en). [↑](#footnote-ref-20)
20. IRENA&ILO. 2022. Renewable energy and Jobs: Annual Review 2022 [↑](#footnote-ref-21)
21. [1] Cortina-Segarra, J., García-Sánchez, I., Grace, M., Andrés, P., Baker, S., Bullock, C., Decleer, K., Dicks, L.V., Fisher, J.L., Frouz, J., Klimkowska, A., Kyriazopoulos, A.P., Moreno-Mateos, D., Rodríguez-González, P.M., Sarkki, S. and Ventocilla, J.L. (2021), Barriers to ecological restoration in Europe: expert perspectives. Restor Ecol, 29: e13346. https://doi.org/10.1111/rec.13346 [↑](#footnote-ref-22)