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Skilling for the green transition

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What is the green transition?

The green transition is a process towards a new development model that ensures environmentally sustainable and fairer societies. It is a necessity to address the human-induced climate change emergency, environmental degradation (water, land, forests, atmosphere) as well as the loss of biodiversity[1]. The policies to tackle climate change must also build resilience and mitigate inequality and unfairness in our societies, which is why green transition strategies include a policy mix aimed at effective climate action and a just and fair transition into a thriving and clean economy, 'leaving nobody behind'.

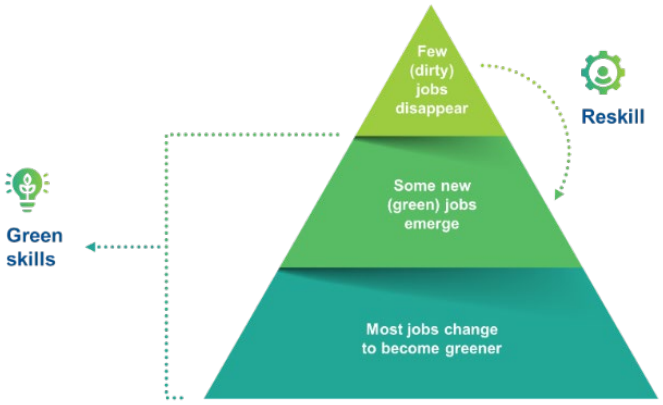
The transition entails fundamental changes, not only in key production and consumption systems such as energy, transport, agriculture, and food, but also infrastructure, societal values and politics. Moreover, it emphasises the need for a global shift towards a humane and fair economic system, with healthy ecosystems, healthcare, public services, education, and culture at its heart.

This transition implies a transformation of all economic activities and sectors – as well as lifestyles – to significantly limit CO_2 and other greenhouse gas (GHG) emissions, as well as restore and protect the environment and ultimately shift to a circular economy that uses resources efficiently to avoid waste and pollution, and that is decoupled from carbon. This transformation, similarly to any societal change, can only be achieved through a whole-of-society mobilisation (citizens, companies, civil society organisations, supra-national, national and subnational authorities, financial community, international organisations, media), with actors taking responsibility, contributing and collaborating towards a shared model of environmental sustainability and social fairness as well as ensuring resilient economies.

The green transition has effectively been launched in most countries in and around Europe by means of international agreements (e.g. Paris Agreement and UN follow-up actions through the Community of Partners – COPs – meetings and the Agenda 2030 with its Sustainable Development Goals – SDGs), European policies, such as the European Green Deal (EGD) and its package of policy initiatives, as well as national policies supported by civil society movements and technological innovation. Most relevant strategies recognise and support the developmental potential of clean economies (often as part of the post-covid recovery or the objective to limit dependence for importing countries). Inaction is undeniably the costliest path, with climate change already negatively affecting economies and labour markets globally[2], and costing an estimated EUR 100 billion per year in Europe by 2050[3]. However, the social and financial efforts required for the green transition are not to be underestimated (USD 3.5 trillion per year globally to reach net zero by 2050[4], according to research by McKinsey). Climate finances, pro-environmental fiscal regulations, education for sustainability and many other incentives are needed to mobilise actors (governments, businesses, communities, citizens) in order to take environmental responsibility, innovate and benefit from emerging opportunities (various scenarios[5] show EGD implementation will grow employment rates). Moreover, the green transition requires a whole-of-government

[1] for a detailed analysis of the current environmental challenge see IPCC (2022): Summary for Policymakers [H.-O. Pörtner, et.al. (eds.)]. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner et.al. (eds.)]. Cambridge University Press. In Press.
[2] ILO (2018): The employment impact of climate change adaptation. Input Document for the G20 Climate Sustainability Working Group International Labour Office – Geneva.
[3] COACCH (2018): The Economic Cost of Climate Change in Europe: Synthesis Report on State of Knowledge and Key Research Gaps. Policy brief by the COACCH project. Editors: Paul Watkiss, Jenny Troeltzsch, Katriona McGlade.
[4] McKinsey (2021): The economic transformation: What would change in the net-zero transition https://www.mckinsey.com/business-functions/sustainability/our-insights/the-economic-transformation-what-would-change-in-the-net-zero-transition?cid=eml-web
[5] Cedefop (2021): *The green employment and skills transformation: insights from a European Green Deal skills forecast scenario*. Luxembourg: Publications Office of the European Union, http://data.europa.eu/doi/10.2801/112540

approach to ensure policy coherence and



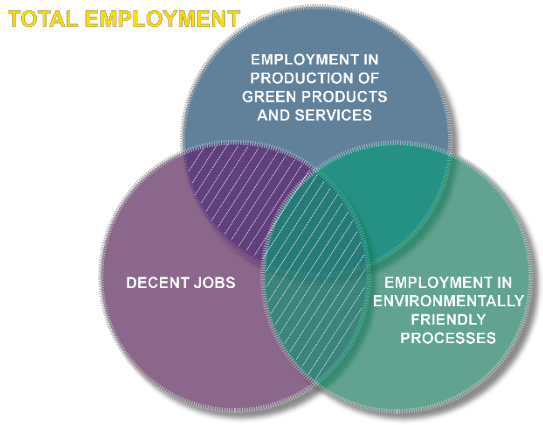
mutually reinforcing actions across different policy areas to shift economic sectors away from GHG emissions and promote circular low emissions industries.

The significant benefits of green economy activities can be described as both macroeconomic (e.g., investment in new technologies, greater productivity) and microeconomic (e.g., regulations, taxes, income growth, job growth)[6]. With regard to ETF's work, which focuses on the latter, the green transition and the requirement to generate green competences rely on the efficient functioning of lifelong learning systems.

What are green jobs

'Green' jobs – namely *decent* jobs for the production of goods and services or the introduction of technologies and processes that protect, preserve and restore the environment – continue to grow, driven by regulation, technological change, or new business practices. But as all sectors are (sometimes timidly) gradually becoming less polluting and more resource-efficient, the bulk of the green transition impact is expected to be on the greening of traditional jobs and occupations (e.g. farmers, mechanics, bankers, etc.)[7].

Figure 1 - Green jobs, adapted from ILO, 2020



Green economy activities and technologies have different effects on different occupations. Accordingly, some experts argue it is essential to move beyond simply applying a broad label such as 'green'. Thus, a more prudent approach is to focus on the 'greening' of occupations, which is defined as follows: the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements.

Figure 2 - greening jobs, ETF

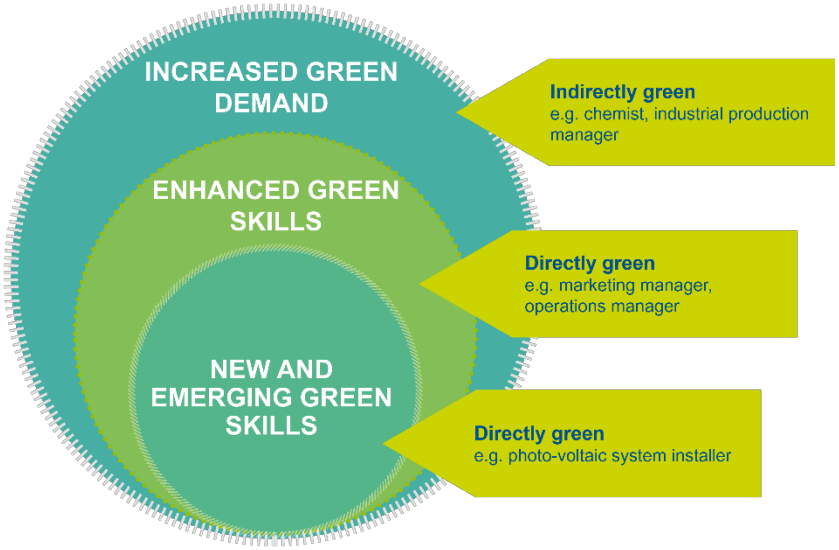
One of the first classifications of green jobs has been a taxonomy developed by the US database O*NET, which the European Commission adapted to the European context in 2019. According to this classification, there are three categories of green jobs: (1) Green Increased Demand jobs are existing jobs expected to be in high demand due to greening, but do not require significant changes in tasks, skills or knowledge (indirect

[6] UN-DESA, UNEP and UNCTAD (2011): *The Transition to a Green Economy: Benefits, Challenges and Risks from a Sustainable Development Perspective.* Report by a Panel of Experts* to Second Preparatory Committee Meeting for United Nations Conference on Sustainable Development Prepared under the direction of: Division for Sustainable Development.
[7] ILO (2019): *Skills for a greener future: a global view*. International Labour Office: Geneva.

green); (2) Green Enhanced Skills jobs are existing jobs that require substantial changes in tasks, skills and knowledge; (3) Green New and Emerging jobs are unique jobs created to meet the new needs of the green economy.[8] Additionally, the EC also lists Green Rival Jobs (non-green jobs that are 'similar' to one of the three 'green' job categories and are likely to be affected by the greening of the economy), as well as other Non-Green Jobs which are less likely to be affected (e.g. lawyer or doctor). However, following our assumption that all jobs will become green in the future, the first category is most relevant to ETF.

Figure 3 - green jobs taxonomy according to the EC

The green transition therefore requires specific skill sets that people have to acquire from the lowest to the highest levels of education. Shifting towards greener economies and fairer societies also requires significant workforce reallocations (i.e. volume) and occupational adaptations (i.e. skills) as sectors take turns to decarbonise their operations and shift into circular economy models. This has vital implications for jobs and skills and, in particular, the need for significant reskilling and upskilling. Indeed, although the net impact on job creation and employment depends on each country's main economic activities and the chosen policy mix, there is ample evidence that many occupations are becoming 'greener' and that sectoral reallocation of employment is increasingly taking place throughout the world[9], most visibly where energy production is shifted away from fossil fuel and coal power in particular, but all sectors are affected (see figure 4 for one set of projections). ETF's own Future of Work studies offer ample evidence that the digital and green transitions have started years ago.

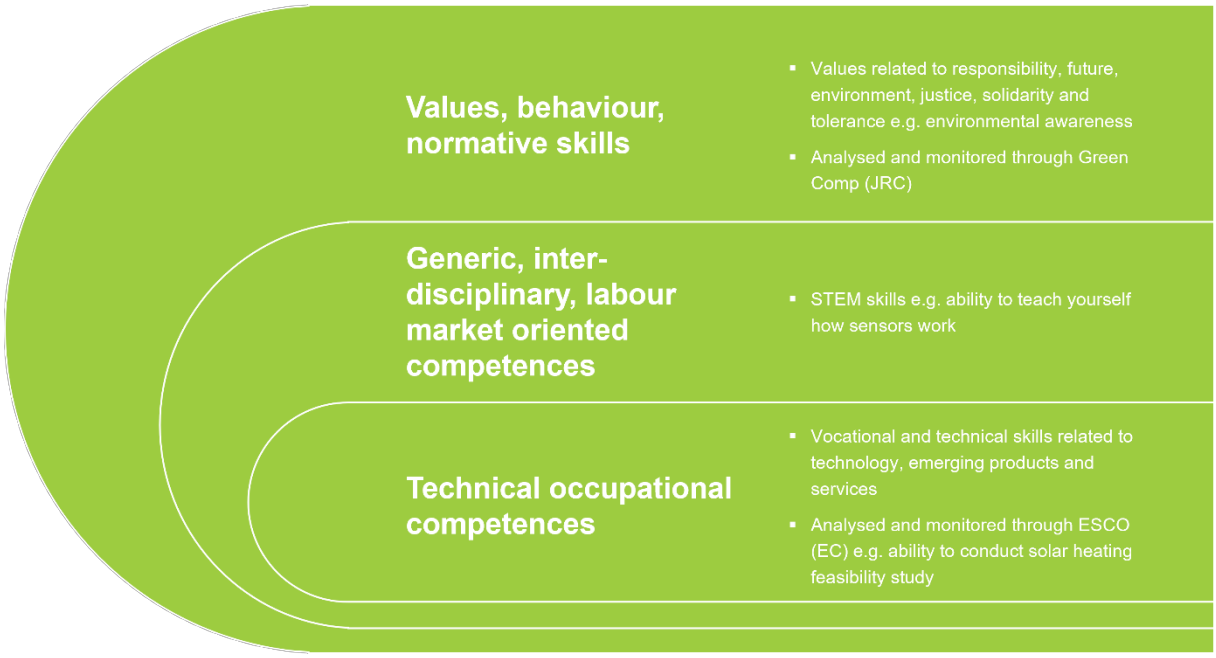


So what are green skills?

In essence, green skills are about both (i) technical knowledge and skills that enable professionals to effectively use green technologies and processes (i.e. resource-efficient technologies or processes that reduce waste and minimise the environmental impact of human action); and (ii) transversal skills, as well as knowledge, values and attitudes that help them take pro-environmental decisions in their work and lives. These overall green skills are already being introduced in training systems globally.

[8] European Commission, Directorate-General for Employment, Social Affairs and Inclusion (2019): *Employment and social developments in Europe 2019 : sustainable growth for all : choices for the future of Social Europe*, Publications Office, https://data.europa.eu/doi/10.2767/305832

[9] Gass et al (2021) – International Institute for Sustainable Development (IISD): Employment, Economic, and Social Consequences of the Transition to an Ecologically Sustainable Economy in Developing Countries. GIZ: Eschborn.



- With regard to technical or labour market relevant skills needed for the green transition, the European Classification of Occupations, Skills and Competences (ESCO) recently published a new taxonomy that sets 571 ESCO skills and knowledge concepts labelled as green. These include 381 skills, 185 knowledge concepts; and 5 transversal skills. This framework serves to analyse the technical green skills in ETF research.
- Moreover, as digitalisation now affects all aspects of life and technological innovation, digital literacy and skills (particularly STEM) are also considered as important ingredients of the competence package that citizens must acquire to 'understand sustainability challenges, to be aware of their relevance to the surrounding realities, and to take action for change'. ETF's work on future skills complements the body of evidence in demonstrating that the greening of jobs often requires higher technical knowledge and skills (e.g. low-skilled farmers who need to use precision irrigation software). This poses an immediate obstacle to women, given their lower representation across countries in STEM disciplines and programmes (only 22% of energy jobs are taken by women globally).
- As regards transversal skills, achieving the green transition requires changes in values and attitudes that set environmental objectives and social fairness at the center of human (and economic) action. This change can only happen if a critical proportion of citizens develop green competences[10] to stimulate a collective shift towards responsible consumption and circular production patterns, and more generally sustainable lifestyles.
- The ETF's work relies on the JRC's definition of 'green competences', which can be broken down into four areas: 1) embodying sustainability values, 2) embracing complexity in sustainability, 3) envisioning sustainable futures and 4) acting for sustainability. Each of these areas comprises three further competences, such as valuing sustainability, critical thinking, adaptability and political agency.

[10] This paper follows the Council Recommendation of 22 May 2018 on key competences for lifelong learning in defining 'competence' as a set of knowledge, skills and attitudes (EU Document C:2018:189:TOC).

Figure 4: GreenComp (adapted from JRC (2022)

In the 'GreenComp' framework, the term 'competences' serves as an umbrella term for skills, knowledge and attitudes. However, according to a JRC literature review, the terms 'green competences' and 'green skills' are used interchangeably in many academic studies and official documents related to employment[11]. The term 'competence' also has disputed nuances, including when translated into other languages. For this reason, it has been progressively substituted in international discourses by a broader idea of skills. The ETF accordingly interprets 'green skills' in an encompassing sense, including not only technical (or 'occupation-specific') skills, but also knowledge and attitudes. Skills can thus be defined as the ability to apply knowledge and know-how to complete tasks and solve work-related problems.

The Green Transition in the EU neighbourhood

The green transition is a global endeavour and concerns all countries, as all regions of the world are impacted by climate change, irrespective of their GHG emissions. According to the most recent IPCC report[12] of February 2022, droughts and severe weather events already affect many parts of the world (including Europe and its neighbourhood), and their effect will increase over time, which already influences economies and their labour markets, as reported by the Future of Work studies[13]. Transition economies commonly produce less pollution, and have increasingly voiced demands for additional international support to address a crisis that was caused by advanced economies, a key discussion point at the COP26.

Many of the partner countries (PCs) are characterised by limited economic diversification and mining, including the extraction of coal and other natural resources, and rely heavily on sectors vulnerable to climate change such as agriculture. This gives

[11] Bianchi, G. (2020): Sustainability competences, EUR 30555 EN, Publications Office of the European Union, Luxembourg.
[12] IPCC (2022): Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. In Press.
[13] https://www.etf.europa.eu/en/projects-campaigns/projects/skills-demand-analysis

rise to industries employing more low-skilled persons with lower wages, who are more at risk of layoffs.

In terms of international commitments, all ETF partner countries have ratified both the UNFCCC (now known as UN Climate Change) and the Paris declaration and have submitted their NDCs with ambitious, albeit sometimes superficial, decarbonisation objectives spanning over the next two decades[14]. Their national developmental strategies also resemble the dimensions of the European Green Deal, as adapted to their specific context and often focusing on energy transition. The external dimension of the EGD aims to accelerate transition in the EU neighbourhood region through financial assistance and trade agreements to converge towards collective adaptation and mitigation options.

Through its diverse networks, including the ETF Network for Excellence (ENE), field studies and country assessments, the ETF has observed that in most PCs, the education and training systems have already taken steps to 'green' their programmes (integration of sustainability in learning outcomes) and campuses (shift to renewable energy sources)[15]. The issue of sustainability has clearly penetrated the political discourse and now features prominently in all national development programmes and most economic sector visions. Several countries use the EGD language but emphasise the fair transition mechanisms to a larger degree that in the EU documents, making social and economic elements a priority in their strategies to achieve the SDGs (e.g. Albania, Algeria). Some countries have already taken concrete steps to establish networks of VET providers specialised in green technology (e.g. IFMERE in Morocco). As regards educational systems, various countries (e.g. Serbia, Morocco, Uzbekistan) have adopted new learning programmes for emerging green jobs and have enhanced sustainability components in primary and secondary curricula. In some cases, significant funding is provided by ERASMUS+ (e.g. the Engine project aiming to develop renewable energy engineering curricula at the Tirana Polytechnic university). What remains is the implementation, as education providers are often limited by the absence of national adaptation (e.g. it can be difficult to modernise a training programme when the corresponding qualification and occupational profile have not been updated or when resources have not been allocated for teacher training).

There is also a clear call from young people in Eastern Europe to learn more and engage in mitigation measures against climate change UNICEF ETF 2021)[16], as they question the status quo and claim to overwhelmingly learn about the subject not at school, but through informal education. Despite these observations, according to a 2021 global survey[17], people in Eastern Europe are, on average, less concerned about climate change than those in Western and Southern Europe. While 72% of people in Europe climate change is a 'very serious' threat, only 65% feel the same way in Eastern Europe. This figure is even slightly lower for Northern Africa (64%) . This illustrates part of the challenge countries face when it comes to the necessary paradigm shift to advance the green transition and ensure education and training systems are able to prime and power the change.

[14] With the exception of Libya, which only ratified the UNFCCC.
[15] https://www.etf.europa.eu/en/news-and-events/events/building-lifelong-learning-systems-skills-green-and-inclusive-societies
[16] United Nations Children's Fund (UNICEF) and European Training Foundation (ETF) (2021): Building a Resilient Generation in Central Asia and Europe: Youth views on lifelong learning.
[17] https://www.undp.org/publications/peoples-climate-vote

Relevant EU policies and initiatives related to sustainability, employment and education

In the recent past, the EU shaped its education, training and skills policies with ambitious visions and allocated resources for specific actions dedicated to the (twin) green and digital transitions.

The Commission Communication on Achieving the European Education Area by 2025 (Sept. 2020)[18] sets out the two transitions within the six areas of cooperation between Member States. Specifically related to the green transition, it highlights 'the need to enable a profound change in peoples' behaviour and skills, starting in the education systems and institutions as catalysts' and calling for 'changing behaviour, boosting skills for the green economy, fostering new sustainable education and training infrastructure' as well as 'investments in education and training to increase the number of professionals who work towards a climate-neutral and resource-efficient economy' and 'integrating environmental sustainability perspectives across natural and human sciences, and supporting shifts in skills, methods, processes and cultures'.

Furthermore, the Council recommendation on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience (Nov. 2020)[19] highlights the role of VET as a driver for innovation and growth, supporting the digital and green transitions. It also calls for the adaptation of VET provision for the acquisition of green skills for both young people and adults.

This was followed by the European Skills Agenda for Sustainable competitiveness, Social Fairness and Resilience (June 2021)[20], which is aligned with the EGD objectives and identifies areas to support Member States to address the skilling requirements of the green transition: e.g. 'Action 6: skills to support the twin transition'. Actions specifically related to the green transition include the following:

- Defining a taxonomy of skills for the green transition, to allow statistical monitoring of the greening of a profession (and the associated occupational profile).
- Agreeing with Member States a set of indicators to allow the monitoring and statistical analysis of developments in green skills.
- Developing a European competence framework on education for climate change, environmental issues, clean energy transition and sustainable development, which sets out the different levels of green competences.
- Supporting the development of a core set of green skills for the labour market to guide training across the economy with a view to creating a generation of climate-, environment- and health-conscious professionals and green economic operators.
- Helping to integrate environmental and climate considerations into school, higher education, vocational education and training, as well as professional training.

In June 2022, the Council also adopted a Recommendation on learning for environmental sustainability. The aim is to support Member States, schools, higher education institutions, non-governmental organisations and all education providers in equipping learners with understanding and skills on sustainability, climate change and the environment[21]. Moreover, in July 2022 the Council also adopted a set of recommendations to address social and labour aspects of the fair transition towards climate neutrality with concrete help to Member States to ensure the green transition is fair and leaves no one behind and the commitment to promote both quality employment (and job-to-job transitions, providing for the meaningful involvement of workers) as well as access to

[18] Communication from the Commission on achieving the European Education Area by 2025, COM/2020/625 final.
[19] Council Recommendation of 24 November 2020 on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience: C_2020417EN.01000101.xml (europa.eu)
[20] Communication from the Commission on European Skills Agenda for sustainable competitiveness, social fairness and resilience, COM/2020/274 final.
[21] https://education.ec.europa.eu/focus-topics/green-education/learning-for-environmental-sustainability

quality education and training (promoting equal opportunities and stimulating adult participation in lifelong learning, including skills needed for the green transition).

The importance of skills, education, training and lifelong learning is also highlighted in a number of EU greening policies, such as the Circular Economy Action Plan[22] and the EU Biodiversity Strategy for 2030[23].

Complementing policy action, concrete initiatives are launched by the European Commission to mobilise actors and expertise sharing for the 'greening' of education systems, e.g. the Education for Climate Coalition, a flagship initiative of the European Education Area by 2025 and essential part of the EGD by establishing a community of practice for a comprehensive approach to environmental sustainability education.

In addition, other initiatives and programmes, including the Pact for Skills, Erasmus + and European Solidarity Corps programmes have integrated sustainability and links with the EGD, giving priority to climate-neutral means of cooperation and incentives for carbon-free mobility.

Moreover, the Commission promotes the greening of education infrastructure through the InvestEU programme[24] to enable Member States to finance the development of digital and physical infrastructures development for education and training that reduce emissions and energy waste.

At a more technical level, new frameworks have been developed in 2022 to support Member States in greening their education and training systems. The Joint Research Centre (JRC) has released the European Framework for education for sustainability (GreenComp, 2022)[25] which offers a basis 'for learning for environmental sustainability that can be applied in any learning context'.

The EU classification of European Skills, Competences, Qualifications and Occupations (ESCO) has been reviewed and now distinguishes over 500 green skills and knowledge concepts, from designing wind turbines to advising on sustainable solutions and educating on sustainable tourism[26]. This shows how relevant policies linked to the EGD go well beyond declarative intentions and already enact operational advances.

See https://europa.eu/climate-pact/about/priority-topics/green-skills_en for a more in-depth presentation of EU policies and instruments

Policy issues

The skilling requirements to maintain and accelerate the green transition raise a number of key policy issues.

Adequate and timely supply of skills

Governments and economic actors must ensure the timely supply of green skills to meet growing demand in terms of volume and competences. Ample evidence regarding growth in green skills and green jobs has been available for several years[27], but skills gaps and shortages also hinder the greening of economic activities across sectors throughout the EU neighbourhood, as demonstrated by the ETF's work. To reverse this trend and to ensure that green skills become a catalytic asset rather than an impediment for further progress, countries need to align their skills development systems to their sector greening objectives and low-carbon commitments. This requires responsive and agile training systems led by reliable skills anticipation mechanisms, constant adaptation of qualifications and learning outcomes, effective private sector engagement, as well as trained educators, carbon neutral and resilient infrastructures and

[22] Communication from the Commission: A new Circular Economy Action Plan for a cleaner and more competitive Europe, COM/2020/98 final
[23] Communication From The Commission: EU Biodiversity Strategy for 2030 - Bringing nature back into our lives, COM/2020/380 final
[24] https://europa.eu/investeu/
[25] Bianchi et al (2022): GreenComp The European sustainability competence framework, Punie, Y. and Bacigalupo, M. (ed.), EUR 30955 EN, Publications Office of the European Union: Luxembourg.
[26] https://esco.ec.europa.eu/en/news/green-skills-and-knowledge-concepts-labelling-esco-classification
[27] Cedefop (2022): The green employment and skills transformation : insights from a European Green Deal skills forecast scenario, Publications Office of the European Union. https://data.europa.eu/doi/10.2801/112540)

advanced career guidance services for learners of all ages. Preliminary evidence shows that the nomination of a sustainability officer at the level of the provider facilitates the coordination of an organisational shift towards sustainability and resilience. Recent developments (2022), such as the publication of the GreenComp and the new taxonomy (classification system) of skills for the green transition in ESCO, both bring needed applicability and clarity on 'greening' skills development, from pre-school to adult learning. Moreover, a growing body of evidence shows which sectors are likely to grow faster as the transition progresses (e.g. agriculture, construction, energy, waste management, etc.)

Policymakers must establish roadmaps to prepare the workforce for the green transition by taking a skills-based approach to opportunity, adopt a progressive outlook to green upskilling and reskilling, while investing in programmes to ensure green-skilling is accessible to diverse groups. In sum, employment and skills must be considered at the start of policy design since it is the labour force which drives the transformation.

Buy-in and action from the public and private actors

Public and private actors must ensure public buy-in for the implementation of greening policies as well as address the gap between citizens' awareness and responsibility on the one hand and their behaviours as consumers and producers on the other. Research shows that educated individuals are more likely to take pro-environmental decisions, but this varies widely on context and there is no systematic correlation between environmental awareness and behaviour[28]. This entails a concerted effort for citizen education (the GreenComp plays a key role here) as well as behavioural incentives such as regulation, taxation, but most importantly, education (in all its width) to appropriate and uphold the paradigm shift. Opinion surveys throughout the world (as complemented by the ETF's work, e.g. youth perception on greening in the Eastern partnership) show that a critical proportion of citizens (particularly youth who appreciate that climate change will impact them most) are increasingly knowledgeable and expect government action, yet much more needs to be done to align reduced consumption and decarbonising milestones with lifestyle expectations.

Similarly, it is necessary to mobilise the private sector to decarbonise their operations, take responsibility for their negative externalities and shift towards more sustainable if not circular economic activities. Much more demanding EU sustainability reporting standards will be published during 2022; this will oblige large firms to report on their sustainability in a comparable manner and determine their eligibility for public support programmes. The obvious examples of inaction include fossil fuel and global fashion firms (e.g. British Petroleum or Zara). However, some larger corporations, SMEs or start-ups for technological green innovation are already switching towards greener activities driven by values, consumer preferences, regulations or financial incentives (e.g. the Egyptian Company for Solid Waste Recycling (ECARU)), which recycles biomass, while municipal solid waste is considered a front runner by Forbes. Specifically, as reported by the Future of Skills ETF studies, in the EU neighbourhood, a significant number of companies, in particular SMEs, struggle to fully benefit from the green transition and have insufficient resources to train their employees and invest in green tech. Embryonic evidence shows that the shift is more likely to be policy driven as opposed to market driven, therefore incentives such as access to sustainable finance, favourable tax policies, subsidies, technology transfer, coaching through all aspects of sustainable business development and adequate training opportunities for staff are key elements for companies to both benefit and contribute. In this context, the mobilisation of intermediaries (e.g. sector skills councils, business associations, industry associations, chambers) as well as business networks at national and international level needs to be prioritised in all relevant policies in order to improve the coordination and articulation of very complex policy objectives that affect each sector (and their actors) differently. This links to the reskilling needs of declining industries.

[28] Borgonovi et al. (Forthcoming), The environmental sustainability competence toolbox: From leaving a better planet for our children to leaving better children for our planet, OECD Publishing.

Finally, governments must support this societal shift by establishing long-term clarity for investors and coherent public support measures related to training and green technology. The ETF monitors and reports on significant positive advances in this area (e.g. Morocco adopted clear renewable energy strategies, including the establishment of 5 training centres).

Meeting ambitious sustainability targets requires a bold, whole-of-society approach sustained by long-term government commitment in full appreciation that the green transition is first and foremost a human capital issue and that sector decarbonisation requires a coordinated allocation of human resources in both volume and skills.

Ensuring inclusive transition to a green economy

As if the climate crisis were not a sufficiently difficult issue to address, 'fair transition' ambitions make the goals even more difficult to reach.

Achieving net zero carbon by 2050 is meaningless if inequality and social exclusion (and other issues addressed by the SDGs) keep growing. A green economy must also be fair and inclusive, in contrast to current linear models which generate both pollution and inequality. Given that the green transition has a positive impact on net employment creation (certain sectors show moderate decline, others show significant growth) and can support labour market integration for the unemployed, it is fundamental to enact inclusive policies for young people, women and low-skilled workers. To this end, targeted and integrated recruitment policies, employment programmes and information campaigns are needed to ease employment and career transitions for graduates, professionals and all job seekers. For now, globally women are kept out of the energy transition employment growth, and individuals from vulnerable backgrounds are much less likely to get green jobs[29].

Governments need to adopt measures which address both the employment and social aspects of climate, energy and environmental policies, in line with the UN SDGs and the Paris Agreement, which refer to the imperatives of a fair transition of the workforce and the creation of decent work and quality jobs. This means transforming the environmental challenge into a societal shift towards employment opportunities so that the transition is fair and leaves no one behind.

Moreover, decision makers need to address the risks of the green transition related to the loss of jobs in 'non-green' (sometimes called brown) activities and in particular for vulnerable workers. Today, the emphasis is placed on people engaged in fossil fuel extraction and the automotive sector, as they are the first ones affected by climate regulations. But eventually, workers and trainees in other sectors will be affected as decarbonisation progresses in each sector. This phenomenon will differ widely throughout regions and economic sectors, but it can be mitigated through the adoption of a policy mix that ensures that affected workers are given full consideration and feature at the heart of education, training (up and re-skilling, lifelong learning) and social protection policies that support graduates and workers to navigate and remain active despite the changing labour market. The engagement of all institutional actors is a key governance need for success.

Finally, renewable energy production projects are often led by foreign investors, whereas local employment needs are not systematically considered right from the design phase. Strategic design of clean energy transitions by governments can minimise negative employment disruptions and maximise opportunities for new, good quality jobs across regions by aligning with existing strengths, infrastructure and skill sets, promoting innovation and identifying opportunities in new and emerging areas. Establishing clear and transparent long-term transition strategies will help stimulate and de-risk private investment in clean sectors to support job creation.

[29] IEA (2021), Women in senior management roles at energy firms remains stubbornly low, but efforts to improve gender diversity are moving apace, IEA, Paris https://www.iea.org/commentaries/women-in-senior-management-roles-at-energy-firms-remains-stubbornly-low-but-efforts-to-improve-gender-diversity-are-moving-apace

Conclusions:

Enabling education and training to drive the green transition

In order to further advance the green transition, citizens need lifelong and lifewide learning[30], which in turn requires a system change tackling all aspects of learning. This has fundamental implications for education and training systems, including modernising teaching and learning practices, rethinking the organisation of provision, ensuring mechanisms for the validation of skills that people develop throughout their lives as well as promoting partnerships among different actors.

In particular, formal education and training systems must ensure that, from early childhood up until graduation and across all types of education, all learners are adequately prepared for life and jobs in a green economy labour market. This implies adapting the curricula of most subjects, the pedagogical approaches and learning environments (workplace, training centres, virtual space and any other social space) as well as most assessment mechanisms. This learner-centred approach also implies professional development of teachers and trainers to modernise their methods as well as promote sustainability values in teaching and learning processes. Beyond formal education, in order to offer all citizens the necessary skills for the green transition, there is a need to also mobilise non-formal and informal learning, optimising the potential of all learning environments. Ensuring access to lifelong and lifewide learning opportunities requires higher public and private sector investments in both formal and non-formal education[31].

Vocational education and training (VET) plays a major role in the availability of green skills ensuring young people and adults acquire both the technical/occupational skills and, more generally, the transversal competences to live and work in more resource-efficient and less polluting societies. This is particularly true in a context of growing demand for post-secondary VET, since the greening of occupations incorporates more technical knowledge, especially of a higher level. The direct implication is that new training programmes and new qualifications need to be introduced for emerging green jobs (e.g. energy auditor, solar panel technician), but also that especially existing training programmes for traditional qualifications need to be reviewed, with a specific integration of green skills among their learning outcomes. Consequentially, occupational standards for existing qualifications also need updating, to make sure that, for instance, plumbers also learn about heat pumps or mechanics learn about electric engines, on top of other more traditional techniques.

Skills Recognition of Prior Learning (RPL)/Validation of Non-Formal and Informal Learning (VNFIL) also needs to be strengthened as it helps to facilitate the reallocation of workers across and within occupations from declining to growing industries.

Changing education and training systems is a complex multi-stakeholder process, and training providers around the world innovate by intensifying environmental sustainability and green competences in their programmes. Best practise[32] suggests that green skills should be developed in cooperation with companies, ideally leading to resource centres delivering teacher training for other establishments. Some centres even adopt a whole-institution approach incorporating sustainable development not only in the curriculum, but also through the management and governance of the institution, the application of a sustainability ethos, community engagement, long-term planning, and sustainability monitoring and evaluation. Institutional support and funding as well as networks of providers at

[30] *lifewide*: occurs in multiple contexts, such as work, at home and in our social lives; *lifelong*: from cradle to grave (OECD 2008: Understanding the Social Outcomes of Learning).
[31] CEDEFOP (2017): Investing in skills pays off, available online at https://www.cedefop.europa.eu/en/publications/5560
[32] UNEVOC 2017 - Greening Technical and Vocational Education and Training A practical guide for institutions, available online at: https://unevoc.unesco.org/up/Greening%20technical%20and%20vocational%20education%20and%20training_online.pdf

national and international level (e.g. ETF Network of Excellence (ENE)) are instrumental in disseminating these innovations, in increasing capacity for action and in encouraging proactive attitudes and peer learning.

Moreover, as the green transition proceeds, and labour markets evolve ever-faster, all citizens will continuously face changing skills requirements, which entail frequent and diverse learning needs throughout their career.

For this reason, lifelong career guidance needs to be embedded in education policies to accompany citizens navigating this process by providing updated careers information, e.g. sectors with growing employment opportunities and corresponding training paths. Additionally, continuous training needs to be expanded through different forms of learning (non-formal, informal) to address the upskilling and reskilling requirements of the green transition targeting employees and job seekers who aim to change jobs or even industries.

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Useful links

ETF green skills award 2022 edition, video pills of finalists, available at: https://www.etf.europa.eu/en/news-and-events/news/vote-green-skills-award-2022

ETF communication material on the future of work and sustainability: available online at https://youtu.be/pvSXVZO62W4

Key ETF publications related to the future of work, available online at: https://www.etf.europa.eu/en/publications-and-resources/publications?field_related_campaigns_target_id_verf%5b%5d=7157&campaigns=1#block-etf-foundation-content