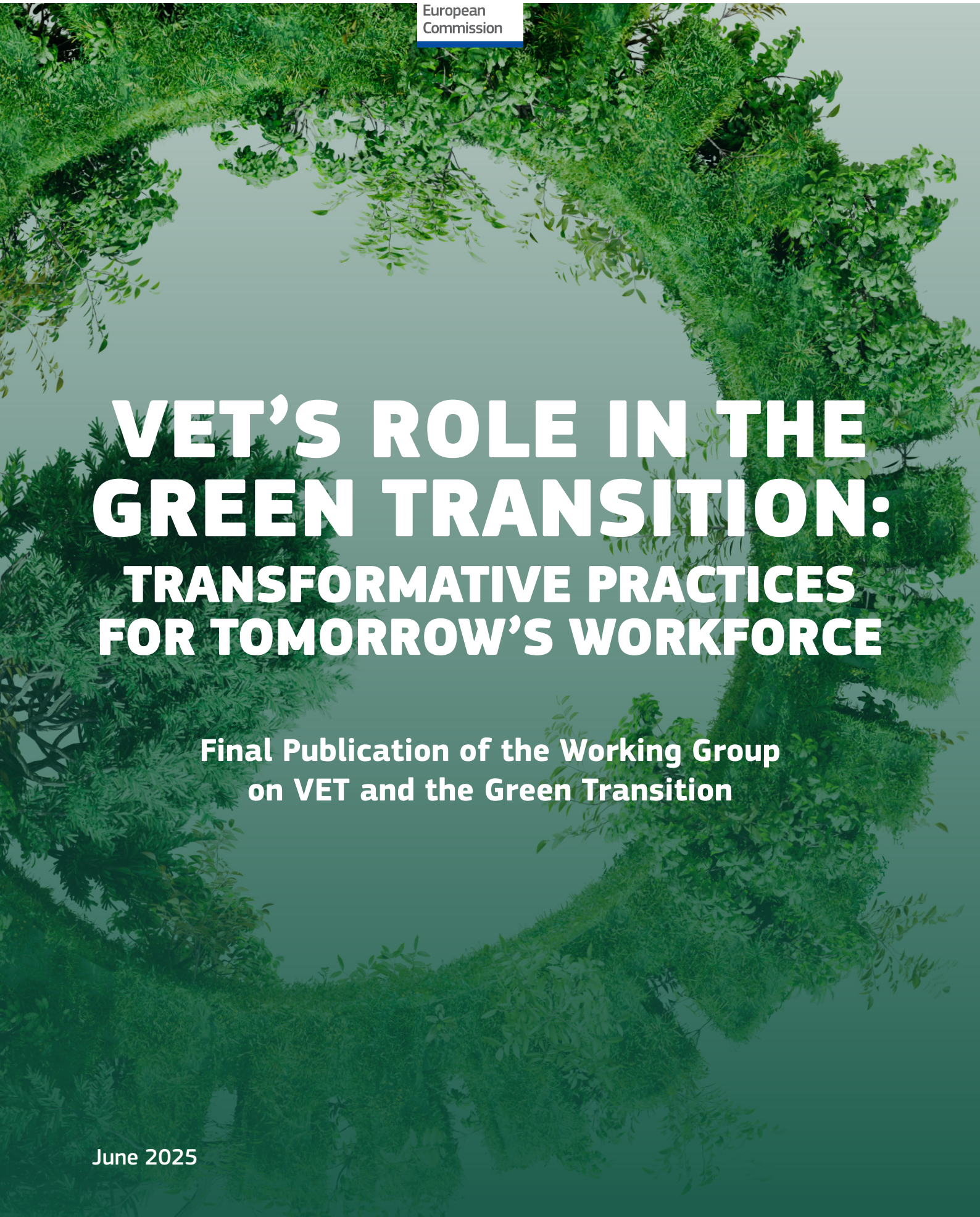

European Commission

VET'S ROLE IN THE GREEN TRANSITION:

TRANSFORMATIVE PRACTICES FOR TOMORROW'S WORKFORCE

Final Publication of the Working Group on VET and the Green Transition

June 2025

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CONTENTS

EXECUTIVE SUMMARY

Skills and Vocational Education and Training are key to the green transition

Vocational education and training (VET) is key to ensuring that both young people entering employment and adult workers have the skills to contribute to and fully benefit from the green transition. 'Greening' VET encompasses a wide range of technical and craft skills that are crucial to reaching our climate and environmental objectives, such as installing renewable energy systems. Crucially, VET for the green transition also promotes broader environmental awareness. This helps learners to understand the broader purpose of climate goals; and the key role of technical skills in reaching these.

These efforts pertain to VET at all levels of the European Qualifications Framework, both in more formal educational settings and less formal settings linked to the workplace. Further, VET has a key role to play not just in newly emerging activities that are key to green innovation and competitiveness. VET also addresses skills bottlenecks in more 'traditional' industries, including ways to make resource use more sustainable in such activities. In short, the green transition has consequences for skills – and thus for VET – across all sectors and occupations.

The Working Group on VET and the Green Transition

Every aspect of VET policy contributes to the green transition, from national and regional policies and skills anticipation systems to learning practices in individual workplaces and classrooms. Since 2021 the European Education Area (EEA) Working Group on VET and the Green Transition has been devoted to this topic. This report is the final publication of the Group. It presents key insights and lessons from its peer learning activities (PLAs), webinars and regular meetings. It also draws on the two editions of its Compendium of Inspiring Practices in 2023 and 2024, which provide over 120 examples of concrete policies and practices from across Europe. This executive summary draws out the key messages from the report.

Key messages

Excellent and responsive VET is a key driver for the green transition

For VET to play a full role in the green transition, it needs to be responsive to changing skills needs. VET provision also needs to be of high quality and attractive to learners. Greening VET represents a major opportunity to boost VET excellence across numerous fronts. For example, investments in green technologies and campus greening offer the opportunity to upgrade the infrastructure of schools. The green transition also throws a spotlight on the need to enhance basic skills in VET. These act as a foundation stone for the skills needed to access new job opportunities. New skills needs in the green transition further emphasise the imperative to put in place adequate systems for upskilling and reskilling adults and for lifelong advice and guidance.

Building more flexible, agile and responsive VET systems

Green skills shortages are a significant brake on progress in Europe. Bottlenecks occur not just in new skills and new occupations but also in persistent shortages for 'traditional' skills like construction, electrical installation and plumbing systems, that are needed to build new infrastructures such as for renewable energy production and supply. For VET, this means having skills anticipation systems that can gather up-to-date and detailed data from different sources using new technologies, e.g. 'big data' techniques applied to online job advertisements in combination with data from public employment services, skills forecasts and foresight, and skills and jobs surveys, graduate tracking. Equipped with such data, programmes and qualifications may be adjusted, to shorten the 'time to labour market' of skills provision.

Developing lifelong learning for the green transition

It is important that there is coherence across all stages and types of VET regarding the green transition, from initial VET to upskilling and reskilling of those already in the workforce. In many cases, this will mean upgrading VET provision for adults in creative ways. This can be done by making use of both formal and non-formal learning opportunities, exploring new delivery models based on public-private partnerships and finding new ways to accredit skills such as through micro-credentials. People of all ages need to be able to access advice, guidance and counselling on new green job opportunities. Additional support can include basic skills development for people who might be at a disadvantage in the labour market, and supporting them through their journeys through learning journeys and into work.

Being trailblazers in green technology development, innovation and entrepreneurship

New product and service innovation – such as with electric vehicles - play a vital role in the green transition. VET is ideally positioned to develop the skills people need for green technologies, for example through practical project-based learning and competitions. VET can also connect technology, innovation and entrepreneurship by integrating cutting-edge technologies and sustainable practices into curricula, equipping students with the skills and knowledge needed to start and manage sustainable businesses (sustainable entrepreneurship education) and by fostering enterprise start-ups (such as through business incubation units). Integrating green approaches into curricula and fostering partnerships with businesses and regional stakeholders enables VET institutions to drive the innovation and diffusion of new green products and services. This creates opportunities for enterprise development and sustainable business practices.

Building broader partnerships and collaboration at every level

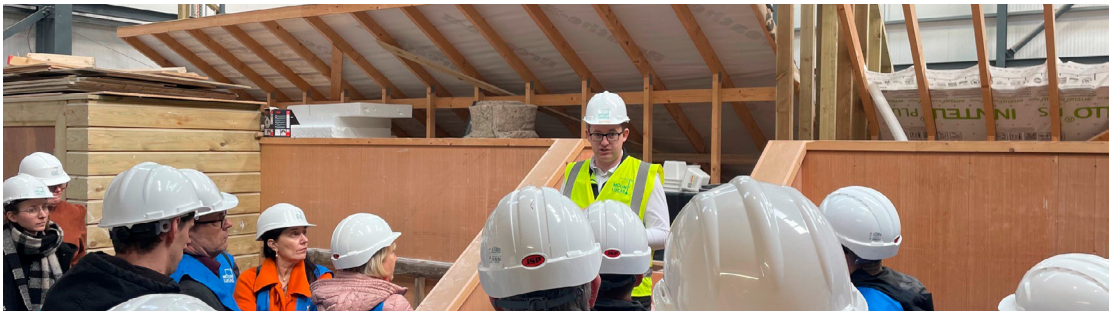
Crises in the climate and the environment pose complex challenges that require multi-disciplinary solutions and the involvement of a widening pool of actors in VET. Collaboration and partnerships with such actors bring in fresh approaches, skills and expertise which can deliver benefits at all levels of VET systems. At local level, teachers are increasingly working with young people, the community and civil society groups to co-create green solutions to environmental issues and to green VET school campuses. Apprenticeships offer a platform of collaboration with employers which enables cross-fertilisation of learning venues in schools and workplaces in relation to greening/sustainability. At the regional and national levels, partnerships between companies and VET providers, such as through Centres of Vocational Excellence and specialised competence centres, are developing practical solutions to sectoral skill needs. Social partners and social dialogue mechanisms can help in the design of VET greening policies.

Creating change agents for the green transition

A vital part of making VET fit for purpose for the green transition is ensuring that key stakeholders have the knowledge and skills needed to understand sustainability and to change policies and practices accordingly. At implementation level, teachers and trainers need a range of competencies. These include core skills such as problem solving and critical thinking for greening curricula. Pedagogical skills are needed to implement more experiential and learner-centred teaching methods. School leaders and company managers need enough understanding of greening to provide frameworks and support for teachers and trainers. More than that, teachers and trainers may become change agents and work together as multipliers and mediators for the green transition in their schools and workplaces, empowering students and stakeholders in their local community. Fulfilling such roles requires appropriate training and the creation of positive, supportive environments by school leaders and company managers.

Leading by example

Whilst positive impacts can be achieved in VET schools and training companies through small measures, greater impact can be achieved by adopting a 'whole institution' approach. This implies adjusting every aspect of the school/workplace environment through the perspective of sustainability. Such an approach enables VET providers to lead by example, becoming beacons of excellence for greening in their communities through 'campus greening' activities, creating an immersive setting to promote green mindsets and behaviours. At the same time, local businesses can provide access to relevant and up-to-date equipment as well as training resources and expertise. Through these means, VET providers can offer state-of-the-art teaching and training to students. Sharing experiences and expertise through a process of cross-fertilisation, VET providers and companies with high quality apprenticeships and work-based learning can act as leaders in the green transition.



Making the most of everyone's talents

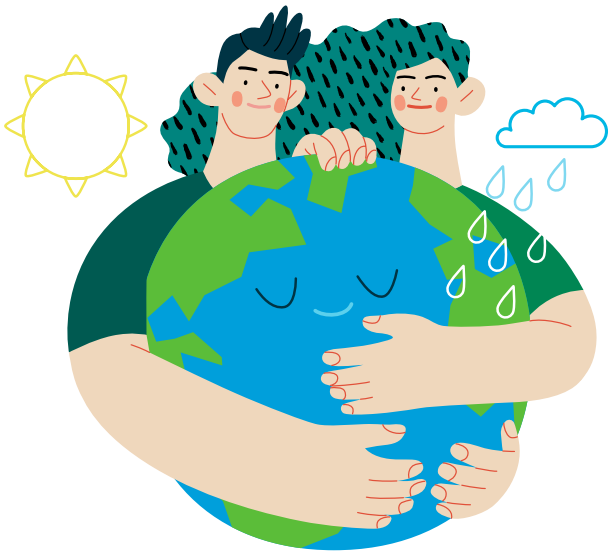
Whilst the green transition will lead to job losses in some (notably carbon-intensive) sectors, it has already and will continue to stimulate new job opportunities. A key question is how to ensure that everyone can benefit fairly from these opportunities, including men and women, younger and older workers. Although many hurdles remain, new green jobs have created opportunities in sectors where women have traditionally been underrepresented, such as the energy sector. Setting up new enterprises that provide more sustainable products and services can be a pathway into entrepreneurship for women, countering gendered social norms around business ownership and management.

Ensuring an inclusive transition

For some communities, the green transition can seem costly, for instance where carbon-based, 'brown' industries are decommissioned and there are significant job losses. Interventions to enable people in such communities to transition into alternative employment through up-skilling and reskilling is vital to ensure continuing public support for tackling climate change. More generally, it has been found that disadvantaged youth are less likely to be aware of and care about the environment and to have environmental sustainability skills. Ensuring they are equipped for and benefit from the green transition is all the more important. VET – of all types of education and training – is perhaps best positioned to support such goals, due to its close link to the labour market. Making sure the green transition has positive employment benefits is also important as a counter to the employment threats posed by increasing digitalisation of production and service delivery, especially with the advent of artificial intelligence (AI).

Engaging with the international dimension

Climatic and other human-made environmental crises pay no attention to national boundaries, and international cooperation has been central to our response since these problems were first identified. Trans-national cooperation is a key feature of VET, enabled by the European Union. The EU provides opportunities to address the challenges of green skills development, e.g. through funding opportunities, policy guidance and peer learning, as in the Working Group itself. VET learner and staff mobility enable common environmental issues to be addressed. Trans-national projects facilitate good practice sharing and the development of solutions to common problems. This common work can help tackle skill shortages on a Europe-wide basis. Internationally developed tools based on shared reference points and benchmarks avoid duplication of efforts and offer opportunities for mutual learning.



Legacy of the Working Group and way forward

Over the course of its mandate (2021-2025) the Working Group VET and the Green Transition has witnessed major shifts and several crises. Global temperatures have steadily risen, with 2024 reaching the highest temperatures on record. As part of the hottest decade known thus far, Europe has been the fastest warming continent. Extreme weather events have occurred across Europe, including heatwaves and droughts, as well as extreme rainfall and floods[1]. In 2022, Russia's war of aggression against Ukraine and the weaponisation of energy caused an energy crisis. This prompted the EU to further accelerate its clean energy transition. A global clean technology race ensued, with the largest economies in the world investing massively in green innovation[2]. In parallel, labour and skills shortages in the EU became ever more pressing, driven by demographic shifts, technological change and the twin green and digital transitions[3].

Through the Working Group VET and the Green Transition, experts from across Europe have not just observed these challenges, but also collected a rich evidence base to face it. This includes concrete examples of how action can be taken to build the skills we need for a better future. These practices and insights have been documented in two editions of the Compendium of inspiring practices, as well as this report. Many of these are concrete applications of new developments in VET, for example when it comes to the use of micro-credentials[4], or co-operation between VET providers and broader networks in promoting 'vocational excellence'.

The findings of the Working Group seem highly relevant in the context of the Union of Skills[5], which aims to promote the skills for a more competitive Europe, and has as one of its main strands to 'up- and reskilling for the green and digital transitions'. The findings are also pertinent to the Clean Industrial Deal[6] which highlights that the EU's workforce must have the necessary skills to support the transition to a low-carbon economy. The Working Group invites the Commission to build on its insights when it formulates its upcoming European Strategy for Vocational Education and Training. More generally, the Working Group invites policy makers, VET providers and stakeholders to make the most of these ideas and promote excellence in VET to make a decisive contribution towards climate neutrality.

Working Group on VET and the Green Transition

To play its role fully in the green transition[7], it is not enough for vocational education and training (VET) to be responsive to emerging skill needs: it needs to be part of the transition itself. This means examining every aspect of VET policy and practice to see how it can play its part in green skills development, from national/regional policies and skills anticipation systems to learning practices in individual workplaces and classrooms. Since 2021 the European Education Area Working Group on VET and the Green Transition (see box below) has been devoted to this task. This report presents key insights and lessons from its peer learning activities (PLAs), webinars and regular meetings, as well as drawing on the two editions of the Compendium of Inspiring Practices it produced in 2023 and 2024. The two Compendia provide over 120 examples of concrete policies and practices from across Europe as well as analysis and insights about the process of greening VET.

1 European State of the Climate 2024, Executive Summary ESOTC_Executive_Summary_24.pdf
2 Commission Communication of 1 February 2023: A Green Deal Industrial Plan for the Net-Zero Age (COM(2023) 62 final
3 Labour and skills shortages in the EU: an action plan, COM(2024) 131 final.
4 Council Recommendation on a European approach to micro-credentials of 16 June 2022.
5 Communication from the European Commission on The Union of Skills. COM(2025) 90 final
6 Clean Industrial Deal - European Commission
7 A Glossary at the end of the report provides definitions of key terms such as 'green transition'.

Objective

To enable technical exchanges and contributions to help countries implement the principles and objectives of the Council Recommendation on VET[8] for sustainable competitiveness, social fairness and resilience, and the Osnabrück Declaration on VET as an enabler of recovery and just transitions to digital and green economies[9], with particular reference to the green transition.

Mandate

September 2021 to the end of 2025

DEEP DIVE ON POLICIES AND PRACTICES

This chapter provides a description and analysis of the changes required for VET to make a significant and positive contribution to our response to climate change and other environmental challenges. The actions required are organised as a set of nine key strands. These strands emerged from an examination of the content of the discussions and exchanges that took place in the Working Group since it began in 2021. The strands are as follows:

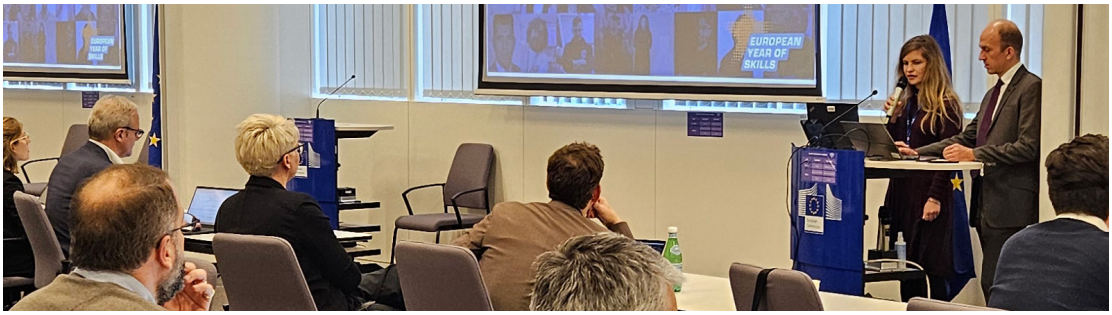
1. **Building more flexible, agile and responsive VET systems**, which shows how VET can provide the skills required for the green transition.
2. **Developing lifelong learning for the green transition**, which acknowledges the need for provision that is coherent across all stages and types of VET.
3. **Being trailblazers in green technology development, innovation and entrepreneurship**, which shows how VET can play a significant role in the innovation and diffusion of new green products and services as well as enterprise development.
4. **Building broader partnerships and collaboration at every level**, which responds to the fact that environmental crisis can only be tackled through collaborative responses.
5. **Creating change agents for the green transition**, which recognises the potential not just to upskill and reskill teachers, trainers, company managers and school leaders, but to enable them to become multipliers of change.
6. **Leading by example**, which shows how, by adopting 'whole institution' approaches, VET providers and companies can become beacons for greening excellence in their communities.
7. **Making the most of everyone's talents,** which demonstrates how VET can use the green transition as an opportunity to tackle long-standing inequalities that women face in the workplace.
8. **Ensuring an inclusive transition**, which shows that upskilling and reskilling can be key tools in making sure the benefits of the green transition are fairly distributed, including in communities impacted by the closure of carbon intensive industries.

9 **Engaging with the international dimension**, which reflects how transnational mobility and cooperation projects are a natural part of the solution to environmental crises that are inherently global in nature.

Building more flexible, agile and responsive VET systems

Identifying skills for the green transition

Identifying relevant skills for the green transition and incorporating them into VET curricula and provision is a fundamental building block for a proactive response to the green agenda, keeping VET 'ahead of the curve' rather than being in a 'reactive' mode. This is why it was one of the first topics discussed by the Working Group in 2022. Globally, the green economy is at a stage in its development where there is heavy reliance on government policy to create the



market conditions in which innovation, product/service development and business growth can flourish[8].It is also vital that future and existing workers are being trained so that they have the skills needed for new economic activities, as well as for the expansion of infrastructures that will be necessary and which demand 'traditional' skills.

Skills needs should thus be the building block for VET strategies related to the green transition, and it is important that there is clarity around the types of skills required. This is well illustrated in Green Skills 2030, Ireland's first strategy for how its VET sector (called FET, Further Education and Training) will play its part in the green transition. Working Group members learnt about this strategy, co-funded by the EU, during the PLA held in Ireland March 2025. It also recognises the transversal skills required across these levels, such as critical thinking and climate literacy. Using such analysis, the strategy identifies a set of strategic priorities which includes the integration of green skills and transversal competences based on the European GreenComp framework into all FET programmes, and supporting FET green skills programmes design and delivery. The strategy also provides the basis for identifying pathways between Further and Higher Education to meet skills gaps along with opportunities for the development of specialist FET skill centres. This illustrates how the green transition can be a lever for wider improvements in VET.

Across Europe, general skills anticipation mechanisms are often used to generate data about green jobs and skills, supplemented by specific studies focused on certain sectors or occupations. Increasingly, new technologies are being used as part of these approaches. At European level, Cedefop's Green Observatory is showing how skills intelligence can be strengthened by **combining methods** such as surveys and forecasts with 'big data' methods

8 ILO (2019) Skills for a Greener Future. https://www.ilo.org/projects-and-partnerships/projects/skills-greener-future

such as data collection from online job advertisements[9] to discover patterns in unstructured data. Its 2024 publication, 'Tackling the green transition in labour market. Using big data to identify the skills that make jobs greener', shows the potential for using big data to enable more detailed analysis of job 'greenness'. It also identified the need for employers in the wholesale and retail trades to accelerate their green transition. Meanwhile, Cedefop has also conducted skills foresight exercises on smart and green cities, waste management, the circular economy and agri-food. Cedefop's work also highlights the importance of **'good governance' of skills anticipation** if optimum use is to be made of the data gathered. This entails promoting a system where stakeholders coordinate, use and disseminate skills intelligence, encourage timely adjustment of education and training and influence employment policies and contribute to meeting labour market needs and supporting lifelong employability of the workforce.

In Austria, the Green Tech Valley Cluster, which comprises over 300 green tech companies and 2,300 researchers, places special emphasis on understanding green jobs and skills through its Green Tech Radar: Green Jobs & Skills which takes a ten-year future perspective on trends and regulations. Through the Radar, it has been identified that, for companies, making jobs appealing and involving employees in the green transition is crucial. AI and automation are reshaping green jobs, requiring a workforce skilled in interaction, communication, teamwork, empathy, creativity, and analytical thinking.

In Germany, studies have been conducted at a highly granular level. For example, a research project at the Research Institute of the Federal Employment Agency (IAB) has used a **Greenness of Jobs Index (GOJI)** to examine the ecological transition in occupations and specifically the proportion of environmentally friendly and environmentally harmful tasks found in occupations. As well as enabling the number of occupations with green tasks to be tracked over time (rising from around 1,400 in 2012 to over 1,650 in 2020), the project enabled conclusions to be drawn between occupational groups with climate-friendly and climate-harmful tasks. It found that climate-friendly occupations tended to be better paid, more stable and to require higher qualified people. It also found that environmental business practices and non-technical skills like communication should be included in all vocational programmes.

9 Cedefop & UNESCO-UNEVOC. (2025). Meeting skill needs for the green transition - Skills anticipation and VET for a greener future Cedefop practical guide 4.

Adjusting VET programmes and qualifications

Using the types of methods described above, programmes and qualifications across the EU are being adjusted to reflect the new skill demands of the green transition. This means adjusting not just **technical skills** but also making sure that programmes include **transversal skills** they need like environmental awareness, teamwork, communication and problem-solving. Sometimes existing programmes are being adjusted, while in other cases new, short courses are being introduced to meet the needs of people already in employment for upskilling and reskilling.

In France, **a holistic approach** has been adopted by the Ministry of Education and Youth, which comprises several strands. The approach seeks to: provide a common base to all VET students on green awareness in professional work situations (e.g. resource management, health and safety, environmental care) through a module common to all VET qualifications. It also aims to implement in each VET qualification specific green competencies related to the trade/jobs associated with a qualification (e.g. with the maintenance of energy systems); develop specific qualifications centred on green jobs (e.g. maintenance of renewable energy systems). Finally, it aims to develop green competencies in the non-VET level-4 qualification that leads to the level-5 VET qualification.

Meanwhile, in Croatia, **common core green elements** have been introduced into VET curricula covering topics such as environmental protection, waste management, sustainable development and ecology. Competency examples for ecology include using ecological materials in the design and manufacture of furniture, promoting ecological solutions in the disposal and sorting of kitchen waste, and knowing basic ecological principles applicable in interior design.

Sometimes existing qualifications can be found to be overall well-suited to the green transition but require adjustments in small, but crucial ways. For example, at its Peer Learning Activity in Bonn, Working Group members heard about a project called H2PRO, conducted by BiBB (the Federal Institute for Vocational Education and Training). This project has sought to identify the skills and qualifications needed to support the nascent hydrogen energy sector. Identifying relevant skilled occupations and further training strategies for the hydrogen economy, the project checked whether existing qualification needs are already covered by existing training regulations and found that whilst existing training occupations were adequate, safety-related qualifications to enable the safe handling of hydrogen were required.

The LIFE FOSTER project is led by the Italian network for VET and aims at reducing waste in the restaurant industry. The primary focus of LIFE FOSTER is prevention of food waste, rather than food waste reduction – which highlights the importance of a **systemic approach** to prevent and reduce waste. This project (co-financed by the EU LIFE programme) learns from the results of existing initiatives and organises them to be used more effectively thanks to the adoption of a holistic toolbox. Being implemented in France, Italy, Malta and Spain, the

project focuses on the fields of training and education, prevention, and communication. Interestingly, this initiative has developed innovative tools and resources, such as an interactive manual for students and a monitoring app to track food waste reduction. For internships, LIFE FOSTER developed an interactive booklet accessible from different devices which gives up to date information for preventing food wate at work. Moreover, the LIFE FOSTER's app allows restaurant owners and VET trainers to quantify the food waste that is generated from their work, both for catering activities and restaurants.

Inspiring practices from the Compendia

In Germany, an updated nationwide standard for all trainees in the dual system on 'environmental protection and sustainability' has been in force since 2021 comprising six core skills and competences for the green transition.

In Albania, the green transition permeates all VET programmes thanks to a range of measures. For example, the subject 'Environment and Sustainable Development' is part of all VET qualifications at grade 13.

The introduction of the Photovoltaic Systems Electrician qualification in Romania's IVET system addresses the growing demand for skilled labour in the photovoltaic industry (co-funded by the EU under the Recovery and Resilience Facility and REPowerEU).

Developing lifelong learning for the green transition

When adjusting programmes so that they are 'fit for purpose' in respect of the green transition, it is important that such changes have a lifelong learning aspect. In other words, approaches to green skills development need to be coherent across all stages and types of VET and be able to **equip both young people and adults** with requisite technical and transversal skills, from IVET and initial labour market entry to upskilling and reskilling. As the 2023 edition of the Compendium highlighted, it is important that core green skills are embedded into all VET programmes since this ensures that everyone is provided with foundational green skills on which they can subsequently develop more specific technical and transversal skills throughout their lives. An essential element of this, alongside putting in place appropriately flexible programmes, is to ensure people can access advice, guidance and counselling to steer them towards the new job opportunities being generated by the greening of the economy.

The example from France in section 1 provides a good example of how national policy can support such a holistic lifelong learning approach to green skills development. An example with a more specific focus is provided by an Inter-company VET Centre that falls under the responsibility of Cologne Chamber of Crafts (Handwerkskammer zu Köln) which Working Group members had the opportunity to visit during the Peer Learning Activity in Bonn. The centre provides training services for small and medium-sized enterprises. It has developed a **VET and Continuing VET portfolio** linked to the energy strategy of the Chamber, which focuses on green topics and content delivered through a training facility for energy-efficient and sustainable qualification offerings. Supporting apprenticeships related to 38 different job profiles, a cross-sectional analysis has been made of sustainability content in the different instruction plans by a research centre at the University of Hannover. The analysis examined content according to four categories: envi-

ronmentally harmful substances, product and plant life, energy efficiency and use of materials.

An interesting practice on the reskilling of workers is the example of the Peatlands Climate Action Scheme (co-funded by the EU under Next Generation EU). In this project, Bord na Móna in Ireland, a semi-state company, is returning over 33,000 hectares of bogs to their natural state. Previously relying on peat as an energy fossil fuel source, peat extraction from bogs is to be phased out in Ireland by 2030. Bord na Móna is a great example of brown-to-green transition, as they started this process already back in 2017 – stopping the harvest of peat and investing in renewable energy. In this reconversion process, workers who were used to draining and harvesting peat in the bogs had to adapt their skills for decommissioning, rehabilitating and restoring the peatlands. In this context, the company is **committed to re-scaling and reskilling the workers.** When developing the Peatlands Climate Action Scheme, Bord na Móna created a traineeship for skills transition, with programmes ranging from biodiversity to safety & health at work, and machine operation practices. This allowed personnel experienced on fossil fuel extraction to get reskilled for restoring the peatlands.

Part of adopting a lifelong learning approach is taking action not just on new 'green jobs' profiles such as wind turbine engineers but also more broadly on j**obs required to build new infrastructures** – both in terms of the numbers of people required and the need for new skills that might not be obviously 'green'. This is well illustrated by the UpTrain project, which Working Group members had the opportunity to learn about at the Peer Learning Activity in Bonn. UpTrain was one of several projects funded by the German Federal Ministry of Education and Research (BMBF) as part of the InnoVET programme, which was run by the Federal Institute for Vocational Education and Training (BIBB), to encourage innovation to improve the quality and attractiveness of VET. UpTrain, which was finalised at the end of 2024, targeted the skills needs of the public transport sector which is forecast to require approximately 100,000 additional qualified personnel positions by 2025 as well as the upskilling of existing personnel to meet the need for digitalisation, electrification, and automation. To strengthen the permeability of industry education and the attractiveness of vocational training, digital learning content for a mobility academy has been designed along with advanced training courses that place learners in three different learning venues: transport companies, universities, and industries. Two new programmes were introduced leading to qualifications at Professional Specialist and Master Professional levels. Aimed at existing professionals, the programmes aim to deepen understanding of complex technical systems.

At the same time, **people who already in work and company managers** also need to have opportunities to **upskill or reskill for the green transition.** Such opportunities can be both formal and non-formal (uncertificated). The example of CHEMIE[3], the sustainability initiative of the German chemical industry, described in section 4 provides a good example of an effective non-formal approach. The example from Ireland of 'Green Skills For Business' which Working Group members learnt about at one of their webinars, shows how 'micro-qualifica-

tions' can be used. Developed by the state agency for further education and training (SOLAS), these **accredited short courses** are intended to help employees and employers boost their awareness of the key environmental sustainability issues and equip them with the skills to make a positive contribution to sustainability in the workplace. Micro-qualifications are available through the Skills to Advance programme at little or no cost to participants and companies and can be taken in-person, online with tutor support and/or in a blended learning format. The programmes are accredited by Quality and Qualifications Ireland, and sit at Levels 4, 5 or 6 on the Irish National Framework of Qualifications (equivalent to EQF Levels 3-5).

Guidance, coaching and counselling

Guidance, coaching and counselling are essential elements of a lifelong learning approach to the green transition. Such services can **help young people to find training opportunities** related to the green transition and can **support adult workers to retrain and upskill** for new occupations, including where carbon-based 'brown' industries are being closed down in pursuit of environmental goals. They can also help learners and training companies to ensure a successful employment outcome from their training or apprenticeship by supporting them after they have completed a programme/qualification. As the Working Group's 2024 Compendium demonstrates, such services may be integrated into larger interventions or be the subject of dedicated measures[10]. Skills anticipation systems have an important role to play in providing these services with the information they need to provide accurate advice and guidance.

Guidance, coaching and counselling also have important roles to play in respect of **supporting people who might be at a disadvantage** in the labour market because of their background, e.g. people who left school early, migrants and refugees, identifying and supporting them through additional supports such as basic literacy, numeracy and digital skills development and access to socio-psychological services. As the examples below show, the benefits of such services are maximised when they are available not just to help people access VET, but throughout their learning journey and on into employment or continuing VET.

At the Peer Learning Activity in Graz, two programmes in which **guidance and counselling** play important roles were presented. The first programme, called 'ÖKO Booster' (eco-booster), is based in Vienna and managed by AK Wien (Chamber of Labour), AMS Wien (Public Employment Service) and waff (Vienna Employment Promotion Fund). It aims to make a valuable contribution to successfully addressing both climate change and unemployment. ÖKO Booster thus targets individuals aged 18 to 24 who are yet to complete their education, who are registered with the Austrian Public Employment Service and who have an interest in technical and craft-based tasks. It supports them into occupations such as plumbing and electrical engineering. Alongside training in basic professional skills, each participant receives an accompanying programme with socio-pedagogical support, bilingual trainers, cultural and sports activities, and placements in active cooperation with leading companies.

A coaching programme called 'Lehre statt Leere', s**upports apprentices and training companies** in Austria since 2015. Lehre statt Leere is facilitated by the organisations Jugend am Werk and SozKom, which provide coaching and support for both apprentices and training companies without any age restrictions. During coaching, apprentices and/or in-company trainers receive advice and support with challenges related to their apprenticeship training

10 pp.20-21, European Commission (2024) VET and the Green Transition. A Compendium of inspiring practices. 2024 edition. https://employment-social-affairs.ec.europa.eu/vocational-education-and-training-and-green-transition-compendium-inspiring-practices-2024-edition_en

to help them find solutions to challenges they may encounter on the way to completing their apprenticeship. The coaching process starts with an initial consultation, followed by individual and/or group coaching. Topics covered in coaching include apprentice onboarding, motivation, learning objectives and training content, and managing performance pressures and conflicts. Apprentices can receive services for up to six months after the end of their apprenticeship, whilst training companies can benefit from advice on how to improve training quality. Services are free of charge, voluntary and confidential.

Inspiring practices from the Compendia

During the school year 2022 to 2023, Cyprus introduced outdoor, nature-based education and experiential learning in Secondary Technical and Vocational Education.

In 2024, Greece was introducing a nationwide apprenticeship class on green skills in the post-secondary year of initial VET, with the goal of making green transition part of apprenticeship curricula.

Since 2021, Sweden has been funding a wide range of Higher Vocational Education programmes leading to post- secondary-level diplomas to meet rising skills demands in occupations such as energy technicians specialised in wind and solar power, sustainable battery production, engineering for sustainable construction, etc.

In the Netherlands and Belgium-Flanders, the Energy Education project Energie(k) Onderwijs includes a recruitment and awareness campaign aimed at learners in primary and secondary education and adults (project co-financed by the EU under Interreg).

Another important aspect of the green transition involves recognising that people may already **possess many of the skills required** to take up new employment opportunities, but **not the requisite qualifications**. This may be especially true for people who entered the workforce before new programmes related to the green transition came into being, and in localities affected by the closure of highly carbon-dependent industries where it is important people have the opportunity to transition into new industries. Opening up new green employment opportunities means using techniques that recognise the skills people possess and matching them to available jobs. In Estonia, a new system – Oskuste Kompass (Skills Compass) – has been launched as part of the 2022-2029 reforms of the professional qualifications system. These reforms aim to achieve more flexible linkages between education and work by improving skills forecasting through the OSKA system (co-funded by the EU) and ensuring the qualifications system (OsKuS) keeps pace with labour market changes by replacing profession-based qualifications with skills profiles and applying digital solutions including skills registers. As one of these digital solutions, the Skills Compass enables citizens to identify the skills they possess online, including green skills, to create a skills profile, to research occupations that match their skill set and to use the outputs from the process in job or training applications. It also enables VET experts to create competency profiles and curricula.

Being trailblazers in green technology development, innovation and entrepreneurship

Technological developments and new product and service innovation play a vital role in the green transition. For example, tools like smart meters help to manage energy usage in homes and workplaces, whilst, at the other end of the spectrum of technological sophistication, vehicle manufacturers have already made substantial investments in the technology needed to operate electric vehicles and continue to do so. So essential is the role of digitalisation, that it is common to refer to the 'twin transition' of green and digital.

VET is ideally positioned not only to develop the digital skills people need but also to work on their application, for example through practical project-based learning and competitions to develop solutions to green challenges. But more than this, VET has a unique combination of characteristics that make it ideally positioned to **lead the way in green technology development, innovation, and entrepreneurship.** Its close links to business and the practical focus of its provision means it can integrate cutting-edge technologies and sustainable practices into curricula and equip students with the skills and knowledge needed to start and manage sustainable businesses as well as, in the most advanced cases, supporting sustainable business start-up/incubation units. By fostering partnerships with businesses and regional stakeholders, VET institutions can drive the innovation and diffusion of new green products and services, **highlighting new green approaches**, such as reducing food waste. When VET providers work with businesses, students enjoy the opportunity to develop the necessary skills demanded by the labour market while having the chance to get trained with the latest innovations developed by companies.

Pioneering green technology

VET providers can play a pivotal role in the development and implementation of green technologies. By equipping students with the **latest tools and knowledge**, VET can ensure that graduates are prepared to meet the demands of a green economy. The GREENOVET project (co-funded by the EU under Erasmus+) is a prime example of this effort. This collaborative initiative among regions in Austria, Finland, Portugal, and North Macedonia aims to advance VET excellence with a focus on green innovation. The project has developed activities for VET learners, engaging a diverse consortium of schools and stakeholders. This specific example illustrates how green technology and innovation processes can empower

VET graduates' employability. GREENOVET implements activities for VET learners via a skills ecosystem that comprises 30 partners across the aforementioned regions. Additionally, GREENOVET has also established a Community of Practice of **Centres of Vocational Excellence** (CoVEs), a community of around 100 members which fosters learning and addresses regional challenges (further discussion of CoVEs is provided in section 6).

Moreover, in Austria, the 'Educational Network for Energy Transition' (Bildungsnetzwerk Energiewende Steiermark) led by HTL BULME (a higher technical federal college), focuses on **young learners' capacity to develop their technical, digital skills, and innovative practices.** The GREENOVET network has developed teacher training programs in cooperation with the University of teacher training of Styria and the Green Tech Academy, which allows students to cover the necessary skills. It has also created a micro-credential course, 'Sustainability Coordinator at School', for schoolteachers and administrators, as well as Green Transformation Cards which are designed to support companies on the path to climate neutrality, and can be used as part of 'Do-It-Yourself Workshops' to create a common understanding of climate neutrality and to provide the basis for action planning for more sustainable business practices. Additionally, regional competitions on green skills and international challenge-based learning competitions have been organised, promoting VET through events like the 'Green Science Station' at the European Research Night.

Moreover, the E2MILY GT project at the Higher Technical Colleges in Weiz (Austria) showcases significant advancements in green technology with the successful **development of a zero-emissions electric car.** This interdisciplinary project, involving students and several departments, utilises sustainable materials and marked a milestone as the first electric car fully developed by a school. Similar projects were initiated at other Austrian Higher Technical Colleges, involved in the HTL Zero Emission Challenge, an annual competition encouraging students to develop electric cars using sustainable materials. Another notable initiative is the Monaco Energy Boat Challenge, where students from the Higher technical College TGM in Vienna designed **sustainable boats** using renewable materials and propulsion systems.

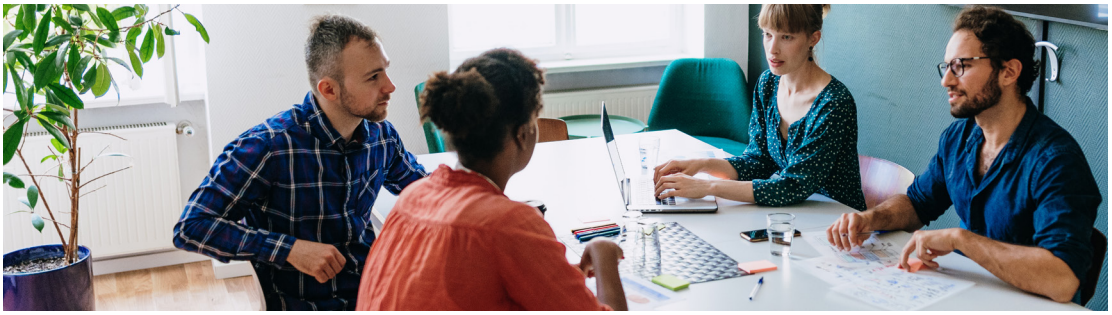
Driving innovation

Innovation is at the heart of the green transition, and VET providers are well-placed to foster this innovation. By integrating cutting-edge technologies and sustainable practices into their curricula, VET institutions can drive the **development and diffusion of new green products and services** via the knowledge and experience gained by their students. The innovative efforts of VET schools not only equip students with the skills needed for the green economy but also create opportunities for enterprise development and sustainable business practices.

The Green Village at the HTL BULME (a higher technical college) in Graz (Austria) and Digitalisation Projects **DIGIPRO (on behalf of the Austrian Federal Ministry of Educations, Science**

and Research) further illustrate how VET providers can play a key role in driving innovation. The Green Village project is part of an updated curriculum for industrial IT, automation, and green energy solutions, allowing students to **adapt to new skill needs**. Courses on e-mobility, renewable energies, and system connectivity are included within these projects, with companies financing state-of-the-art products used by students. Specifically, companies finance state-of-the-art products used by students, such as batteries, allowing them to become familiarised with products not usually available at such stages in their education.

The Digital Product Development project (DIGIPRO), which is also part of a national initiative fostering professional digital skills, was also developed in collaboration with companies. The project enables students to simulate and improve development through digital designs, digital twins and the use of augmented reality prior to the construction and commissioning of machines.



Fostering entrepreneurship

Entrepreneurship is a third key component of the green transition, as it drives the conversion of the aforementioned skills and innovative practices into business opportunities. VET providers can play a significant role in fostering entrepreneurship by equipping students with the **skills and knowledge needed to start and manage sustainable businesses.** In addition, by collaborating with businesses and regional stakeholders, VET institutions can provide the essential skills component of an environment that encourages and enables innovation and supports the development of green enterprises – the skills 'ecosystem'.

In this regard, ENVIPARK in Torino (Italy) acts as a **competence centre that supports companies, research and development institutions, and public administration** at local, national, and European level. ENVIPARK facilitates innovation by providing companies with access to demo sites for testing their tools and collaborating with universities and researchers. The park's dual business model focuses on innovation services and technology park development, aiming to create a hub for enhancing competencies and facilitating stakeholder collaboration to launch new initiatives and projects. This process, particularly for small and medium-sized enterprises (SMEs), is often challenging and time-consuming, which can create delays in industrial ecosystems which affects competitiveness. ENVIPARK is designed to streamline this process.

On the one hand, the ENVIPARK technology park aspect emphasises the importance of using public funding effectively to generate revenue through services provided to investing companies. However, while innovation services can have a significant impact on the local territory, generating revenue from these services can be difficult due to market conditions. Balancing the infrastructure and innovation services pillars is essential to ensure that public investments retain their value. The ENVIPARK campus also hosts open labs for experimental activities focused on areas such as green chemistry, circular economy, hydrogen, and surface engineering.

Additionally, on the relevance of entrepreneurship, the AVL Apprentice Training project in Graz (Austria) focuses on greener, safer, and better mobility, with climate neutrality as a top priority. This company invests substantial resources in **training apprentices in various technical and commercial professions**, ensuring a high retention rate and providing opportunities for further education. Specifically, AVL invests 10 % of the company's turnover in research and development, offering traineeships and vocational training for 10 different professions. After investing substantial resources in training, AVL is able to retain 75 % of the apprentices, who have been supported by a comprehensive programme developed by the company. Highly specialised companies such as AVL face difficulties finding skilled experts in the market offer and, consequently, they have decided to invest in training and retaining potential staff within the company.

Inspiring practices from the Compendia

In the automotive sector in the Flanders region of Belgium, the InnoVET project Online Learning and Evaluation in Automotive Education involved collaboration with VET schools, industry partners, and research centres to create innovative and accessible training around electric vehicle technology involving augmented reality.

The eSmart Home Project in Hungary has integrated skills for the green transition with digital skills and working in a collaborative manner aimed at 14-year-old pupils in their orientation year preceding IVET. By learning the basics of coding, 3D design and printing, pupils have been able to construct a hydroponic greenhouse equipped with sensors.

In Luxembourg digital technologies are used in teaching and learning as part of the Neobuild initiative, which develops training programmes in sustainable construction, and seeks to develop innovative digital tools to support greener construction methods.

Building broader partnerships and collaboration

Crises in the climate and the environment pose complex challenges which require multi-disciplinary solutions and the involvement of a **much wider pool of actors** than might have been traditionally involved in VET. Looking across almost all the examples contained in this document, it is possible to see that collaboration and partnerships to bring in the widest possible range of relevant skills and expertise should be a vital feature of VET's approach to the green transition.

Partnerships and collaboration can bring benefits at every level of VET systems. At the classroom, school, and workplace level, the enthusiasm of young people for a sustainable future can be harnessed by teachers by working with them to co-create green solutions to environmental issues in their schools, such as through green campus committees. In the wider community, learning opportunities are being developed collaboratively with community and civil society groups, working on local environmental issues.

At the regional and national levels, we can see the development of sector partnerships between companies and VET providers and, increasingly, the formation of **Centres of Vocational Excellence** and specialised competence centres focused on the green transition. Nationally, there is also a key role to be played by social partners and social dialogue mechanisms: depending on national circumstances, employers' organisations and trade unions

can be involved in the entire gamut of greening activities described in this report from skills anticipation and programme design to providing services on greening to their members and being involved in curricula at school level.

At its February 2024 webinar on **social partners**, Working Group members heard examples from both employers and trade unions. The European Trade Union Committee for Education (ETUCE) represents unions in Member States that represent VET teachers/trainers, negotiate collective agreements and may even contribute to drafting national curricula and VET policies including on greening. Working with the European Federation of Education Employers in a joint project entitled *European Social Partners in Education Promoting Environmental Sustainability in School Learning, Teaching and Management*, ETUCE has developed a Joint Policy Recommendation which was adopted by the European Sectoral Social Dialogue Committee for Education in December 2023. The Recommendations focus on how to develop concrete actions to promote environmental sustainability in school learning, teaching and management, and how to include environmental development priorities in social dialogue and joint social dialogue initiatives, with the intention that they are adapted to national, regional and local settings.

Concretely, the Recommendations encourage social partners in education to work collaboratively to ensure Education for Environmental Sustainability (EES) is presented in all **social dialogue agendas**, along with a range of concrete measures including:

- Promoting the implementation of EES in an inclusive, cross-curricular whole-school approach which involves the relevant education stakeholders (e.g. parents and families, local communities, and as appropriate, scientists, civil society organisations, etc.);
- Ensuring that schools are open to supporting civil society in cultivating a 'learning community' through meaningful outreach to local community organisations in their endeavour to promote environmental sustainability;
- Supporting and encouraging teachers in their mission to challenge and facilitate students to be critical thinkers enabling them to confidently address the threat of environmental change;
- Advocating for initial teacher education and continuing professional development which enables teachers and trainers to implement ESS that is cross-curricular, collaborative and transformational.

Working Group members also heard about the sustainability initiative of the German chemical industry, CHEMIE[3]. Understanding sustainability as a triad of economic, ecological and social aspects, the initiative is an **alliance** between the chemical industry's **business association, a trade union**, and the sector's **employer organisation** and is aimed at anchoring sustainability as a guiding principle in the industry. In operation since 2013, CHEMIE[3] provides a range of support to the sector including a toolbox on biodiversity, guidelines on how to report against national sustainability obligations, as well as various learning opportunities including pilot projects and workshops to develop or test sustainability solutions and events to enable exchange amongst experts on specific topics. In particular, it runs a free-of-charge webinar series on 'sustainability in corporate practice' aimed at managers and employees of member companies. Addressing the fundamentals of sustainable business, such as climate protection, energy, raw material selection, resource efficiency, human rights, financing and reporting, webinar topics have included the skills needed for sustainability, a report on future skill needs that uses AI to evaluate hundreds of thousands of job descriptions in Europe, China and the USA, and the circular economy.

Creating change agents for the green transition

Inspiring practices from the Compendia

The Norwegian tripartite industry programme for skills development ('Bransjeprogram') involves collaboration between central government and social partners, and covers VET at all levels. Activities launched include the Battery Industry programme.

In Latvia, Bulduri Horticultural Secondary (Vocational) School is both an educational institution and a company. It has strong links to higher education and research institutions, and has developed a plant biotechnology laboratory that enables VET students to train in a scientific research environment. The technical school participates in EU-funded Erasmus+ projects, including for mobility of learners and teachers.

In Poland the digital and green transitions have made it increasingly important for social partners to be more involved in VET. The Sectoral Agreement for VET is developing a cooperation network (supported by European Social Fund Plus) that includes sectoral employers' organisations, the Ministry of Education and Ministries for relevant sectors and which helps determine skill demands and review core curricula.

Equipping VET to make a positive contribution to the green transition means making sure teachers, and school leaders on the side of education and in-company trainers and company managers on the side of business are able to implement new curricula and teaching and learning methods. This means, as a minimum, incorporating green elements into both initial teacher/trainer education and continuing professional development: specifically, **ensuring teachers have core skills** like problem solving and critical thinking that they can use to green curricula and teach new nationally determined qualifications/programmes. It also means having skills to use more experiential and learner-centred teaching methods like multi-disciplinary project-based learning along with knowledge of how the green transition is affecting the professional industry domains in which they teach. It further entails opening up spaces in which the worlds of work and education can cooperate and learn from one another through

processes of cross-fertilisation. This reflects the fact that sometimes it is the school that has the best understanding of updated curricula requirements and can help in-company trainers/ owners adapt (e.g. in apprenticeships), especially in micro-companies; whilst sometimes it is the company that understands better industry standards and can share with school teachers.

Teachers also need to be given the **skills to empower students** to get involved in – and take responsibility for - sustainability activities like extra-curricular campus greening activities. They also need to be enabled to work with a wider group of stakeholders such as in their local community, as explained in section 4 on collaboration and partnerships. **Training in-company trainers** for sustainability can have effects both for trainees/apprentices and for the companies within which they work, a double benefit notable in the following example from the Working Group's Peer Learning Activity in Bonn.

The German Federal Association for Sustainability (Bundesvereinigung Nachhaltigkeit e.V.) has developed training about sustainable development for **in-house vocational trainers in SMEs** as part of the development project INEBB (Integration of Sustainable Development into Vocational Training) and the subsequent INEBB2 project.The projects were funded by the Federal Institute for Vocational Training (BIBB) with funds from the Federal Ministry of Education and Research (BMBF) as part of the UNESCO Global Action Programme on Education for Sustainable Development. With content based on the German Sustainability Code (DNK), which supports companies in their sustainability reporting, training takes place over three months and comprises a six-day programme of blended learning plus self-study. Action-oriented learning is a key part of the approach using storytelling. Training can be delivered by individual companies or through Chambers of Commerce and Industry. Successful completion of the programme leads to the award of a Chamber of Commerce and Industry certificate as 'Training specialist on education for sustainable development.

Those involved most directly in teaching and learning can also be supported to become multipliers and mediators for the green transition, a good example of which is the certified 'Sustainable Mentor' training developed as part of its 'sustainable successful leadership' management training offer by the German Association of Chambers of Industry and Commerce (Industrie- und Handelskammer IHK). Recognising that **'sustainable mentors'** are key facilitators of corporate social responsibility, the training enables participants to develop social skills to be role models and ambassadors, learning such activities as stakeholder mapping, change behaviours, communication and creative thinking. Learning takes place through a mix of face-to-face teaching, online learning and an optional eight hours of online peer learning in small groups. It is aimed at a wide target audience of people who already have basic knowledge in the field of sustainable entrepreneurial action and would like to support their colleagues in an informal or voluntary manner in implementing a sustainable transformation, e.g. entrepreneurs, managers, CSR managers, and environment managers.

Inspiring practices from the Compendia

Launched in 2022, Finland's national development programme for sustainable development and the green transition in VET provides a national sustainability roadmap for VET, which includes the goal of supporting students through training to become 'responsibility agents' with green transition and sustainable development competences in their own study fields.

In Austria, the university course Sustainability Coordinator at Schools is a scientifically based and practice-oriented continuing education program for teachers at upper secondary VET level, which was developed by Green Tech Academy Austria (GRETA) and the University College of Teacher Education Styria, in the context of the GREENOVET project (supported by Erasmus+).

In Murcia, Spain, the Fair Trade in Action initiative involves setting up and running a non-for-profit, Fair Trade commercial establishment with the active participation of an NGO supplier in an educational centre and other local commercial establishments. Open for around six weeks each year, it provides opportunities for interdisciplinary learning.

Leading by example

Many VET providers are already equipping students with the skills necessary to adapt to and foster the green transition and more and more providers are adopting **'whole institution' approaches**[11] that apply sustainability principles across the range of institutional practices, ensuring that sustainability has high visibility and offering students an immersive experience in green practices. Through this approach, VET schools can serve as **beacons for greening in their communities** through 'campus greening' activities. These activities encompass educational initiatives that promote sustainable practices and raise the awareness of students, while developing their skills and even reducing the environmental impact of the campus, such as recycling programmes at schools, installation of energy efficient technologies or building green-renovation activities.

At the same time, **VET providers are working closely with local businesses** that can provide access to relevant and up-to-date equipment as well as training resources and expertise (see also section 4). This enables VET providers to offer state-of-the-art teaching and training to students, supported by the latest technological advancements and practices which, in turn, ensures that graduates are well-prepared to meet the demands of a greening economy landscape. Together, VET providers and companies with high quality apprenticeships and work-based learning can lead the green transition by example.

HTL BULME (a higher technical federal college) in Graz, Austria, has created a 'Green Village'. where renewable **energy systems are installed and operated in real-life settings** in practical classrooms. There is official cooperation with the Austrian Federal Photovoltaic Association and close contact with industry is seen as key so that teaching can be as practical as possible. For example, HTL BULME works closely with AVL in Graz (Austria), a company focused on green transition in the mobility technology sector, and which the Working Group was able to visit during its Peer Learning Activity. By working closely with AVL, students gain access to the latest tech-

11 'Guiding principles for greening TVET' in UNESCO-UNEVOC and Cedefop (2024) Meeting skill needs for the green transition: Greening TVET for the green transition. https://unevoc.unesco.org/glearning/content/index.html#/lessons/o1aeH5Y8QPAhGnuTOBPORKeJKRfno4e0

nologies and innovations in the field, allowing them to develop the necessary skills demanded by the labour market while being trained with state-of-the-art equipment and practices.

Action on the part of the private sector to develop leading VET provision for the green transition is well illustrated by the example of the German INEBB 2 Transfer Project (see above). The project is a VET for sustainable development initiative with two parallel main strands: first, a **private sector network** which offers sustainability training for in-company personnel (ANAKO); and, secondly, a **network of chambers of industry and commerce** that offer sustainability training for staff via courses by the Chamber of Industry and Commerce East Brandenburg (IHK).

Centres of Vocational Excellence **(CoVEs)** can play a pivotal role in supporting the green transition. Developed initially in several EU Member States, the European Commission launched funding for transnational CoVEs through the Erasmus+ programme, including several directly relevant to the green transition. The GREENOVET project (see above) has developed activities for VET learners, engaging a diverse consortium of schools and stakeholders. To further support these initiatives, the European Commission has also launched an e-library on Vocational Excellence. This online resource allows users to filter resources by excellence theme, including the green transition and green skills, and thus providing valuable information and best practices for advancing VET in these areas.

Inspiring practices from the Compendia

In Latvia, the Riga State Technical School seeks to integrate green thinking into both teaching and learning and the everyday life of the school, seeking to reduce its ecological footprint, e.g. by transitioning to cleaner energy sources and implementing the '3Rs' – reduce, reuse, recycle.

In France, a national network of Centres of Vocational Excellence includes CoVEs that focus on the energy transition and eco-industry sector. In the Auvergne-Rhône Alpes region the 'Smart Energy Systems Campus' brings together over 100 public and private sector actors to design and offer innovative teaching methods and access to VET through to doctorate level.

Since 2020, Ireland has developed a national network of Nearly Zero Energy Buildings (NZEB) and Retrofit Centres of Excellence which provide courses for new and existing construction workers, from introductory modules to specialised skills training.

Making the most of everyone's talents

The green transition presents a unique opportunity to address both the shortages of skills and labour and the inclusivity goals that are critical for a sustainable future. This includes **addressing gender divisions in the workplace**, particularly in sectors like energy production, which have traditionally been male dominated. By doing so, we can ensure that women play their full role in these sectors, contributing to the green transition and benefiting from the new job opportunities it creates; and there has already been progress to date in this regard - globally women are better represented in the photovoltaic (PV) solar and renewable energy

(RE) sectors compared to the traditional energy sector[12]. By providing targeted training and education, VET can help bridge the current skills gap and ensure that women are equipped with the necessary skills to thrive in green jobs. In addition, through the types of activities in innovation and enterprise development described in section 3, VET can offer the opportunity for new pathways into entrepreneurship for women that counter male-dominated social norms around business ownership and management.

In October 2024, the Working Group on VET and the Green Transition hosted a webinar on 'Women in Green Tech'. This webinar brought together experts from various sectors to discuss the challenges and opportunities for women in the green technology sector. The examples presented during this event provide practical insights into how gender divisions in the workplace can be addressed and how women can be empowered to play a full role in the green transition. The European Commission highlighted the importance of investing in green and clean technologies and addressing the substantial gender gap in the green technology sector where women remain underrepresented, especially in education and training sub-fields relevant to the energy sector. In 2024, the Directorate-General for Research and Innovation (R&I) published the 'Gender balance in the R&I field to improve the role of women in the energy transition' report. The findings of this research emphasised the **need for strong representation** of women to achieve gender equality and harness diverse perspectives necessary for the energy transition, which aligns with the importance of mainstreaming gender equality for addressing skills shortages in the green transition. The report highlighted that strong representation of women in the energy industry is essential not just as a matter of gender equality, but as a strategic imperative to harness diverse perspectives, skills, and experiences crucial for innovative and effective solutions for the energy transition.

Key findings of the report showed that, out of the EU27 energy sector, only 25 % of the share of the workforce are women, with only 28 % of senior positions being covered by women and, more specifically, only 22 % of the R&I staff being women. These numbers underscore the need to employ 200,000 more women to achieve a minimum gender balance of 40 % in the energy sector by 2050. The main causes for such low representation of women in the energy sector include the gendered image of the energy industry, gender-biased corporate cultures, culturally embedded gender roles, and systemic barriers deterring girls from STEM careers.

In this line, back in 2023, the Directorate-General for Education, Youth, Sport and Culture published the 'Issue paper on gender equality in and through education', within the mandate of the Working Group on Equality and Values in Education and Training. This issue paper addressed gender gaps in education and the importance of dismantling gender stereotypes, focusing as well on non-traditional education and career pathways.

12 International Renewable Energy Agency (IRENA) and International Labour Organization (ILO) (2023), Renewable Energy and Jobs: Annual Review 2023, International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2023/Sep/IRENA_Renewable_energy_and_jobs_2023.pdf

The webinar also helped share the good examples of other stakeholders, such as WindEurope's strategy for promoting career opportunities and increasing STEM education among women, and Hydrogen Europe's initiatives on skills and career growth for women. Concerning the renewable energy sector, WindEurope has identified that, in the renewable energy sector, women represent 32 % of the total workforce, while their wages are 15 % lower than men at the same skill-level. Considering the top profiles in high demand (such as project managers, renewable energy technicians, engineers or software developers), WindEurope focuses on three key strategies for **creating career pathways for women** in the sector. Namely, they focus on first, setting and working towards measurable equality **targets**; second, promoting career opportunities; and last, **increasing STEM education**.

Inspiring practices from the Compendia

In Spain's Canary Islands, a Women's Entrepreneurship Laboratory aims to promote and increase female self-employment, through the creation of innovative and sustainable business ideas, led by young women under 30 years of age.

Hydrogen Europe is also committed to promoting women in green hydrogen through **mentoring programs and career development initiatives** that highlight new pathways for women in the sector. It is especially focused on the importance of creating opportunities for women in green jobs and addressing gender divisions in the workplace, as can be seen through the development of their Women in Green Hydrogen Expert Database. This tool **showcases women's talent** in the sector, a valuable source to find experts and tackling the male-dominated field. Together with events such as the launch of the 'Women in Green Hydrogen - Brussels Hub', Hydrogen Europe aims to elevate the visibility of women in the sector through mentoring programs and career development initiatives.

Concerning the energy sector, the Working Group on VET and Green Transition discussions on this matter emphasised the need for effective communication strategies to create a positive image of women entering and already in the industry. This must be paired with supportive policies for work-life balance, and collaboration between industry associations and educational programs to attract women to the sector. All these initiatives are essential for **creating a more inclusive and diverse green workforce.**

Ensuring an inclusive transition

The green transition brings both opportunities and challenges for individuals and communities, especially where carbon-based industries are decommissioned and **significant job losses** occur. In such contexts, upskilling and reskilling are vital to equip individuals with the skills needed for further employment or training and to help ensure that the benefits of the transition are fairly distributed. Recent years have seen growing resistance to measures to combat climate change, which makes it all the more important that skills development takes place to ensure a fair sharing of the benefits of greening. More generally, it has been shown that disadvantaged youth are less likely to have environmental sustainability skills and to be aware of and care about the environment[13], so ensuring they are prepared for the green transition is critical.

VET is well positioned to support such goals: in many countries VET has a long tradition of **creating opportunities** for people with low educational attainment and preventing early school leaving. Making sure the green transition has positive employment benefits is also important considering the employment threats posed by increasing digitalisation in the economy, especially with the advent of artificial intelligence (AI).

During October 2024, the European Training Foundation (ETF) hosted a peer learning activity in Torino (Italy). ENVIPARK is a technology park that has been active for over 20 years, with a focus on environmental innovation and sustainability. The Park was built on the site of a defunct steel works and hosts around 60 companies, employing approximately 600 people. In line with ENVIPARK's mission, the area in which it is built was redeveloped with green building technologies and sustainable architecture. This intervention turned a **large industrial site into a sustainable and bioclimatic campus**, which features green roofs, walls, rainwater recovery systems, and bee farming activities. It also hosts open labs for experimental activities focused on areas such as green chemistry, circular economy, hydrogen, and surface engineering.

The examples from the ENVIPARK site visit highlight the role that such interventions can have in the employment regeneration of locations previously dependent on carbon-intensive industries. By providing a hub for enhancing competencies and facilitating stakeholder collaboration, ENVIPARK helps to create new opportunities for green jobs and sustainable business practices, focusing on the importance of upskilling and reskilling to ensure that the benefits of the green transition are fairly distributed and that communities can transition into alternative employment.

The ÖKO-Booster project particularly targets **youth entitled to asylum or eligible for subsidiary protection** who have German language proficiency and an interest in technical and

13 See chapter 1 in European Commission (2024) Education and Training Monitor 2024; OECD (2023), OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition, OECD Publishing, Paris https://doi.org/10.1787/27452f29-en;

craft-based tasks. Recruitment takes place in close cooperation with upstream and adjacent institutions, such as compulsory school leaving courses, youth coaching, etc. as well as advice centres.

At its PLA in March 2025, the Working Group learnt about **climate justice education for adults** (a project co-funded by the EU). In 2019, City of Dublin ETB launched its Climate Justice Education strategy, recognising that climate change disproportionately affects marginalised communities. With many communities facing issues with low literacy levels, there was a possibility to combine interventions on climate education with interventions for adults and communities: climate education provision was fragmented and presumed that people were very knowledgeable of climate issues, which excluded marginalised communities; and there were no resources that had been literacy-proofed for adults. Additionally, amongst adult educators, whilst motivation to teach climate action justice was high, confidence in teaching the subject was low. A two-pronged strategy was therefore adopted to develop stand-alone climate justice education programmes and to integrate climate justice into existing interventions, including in areas like drug addiction and social housing, with a focus on empowering people to become climate action leaders through learner-centred and critical pedagogies. Curricula are not fixed but respond to learners, so that whilst learning outcomes might vary, all adults receive the same certificate recognised by the official state agency, Quality and Qualifications Ireland. An important output from the initiative has been a handbook for tutors working with adults with low literacy and associated national tutor training. Work also takes place with community partners to develop their capacity around education-based climate co-operation. In 2023–24, over 1600 learners and 55 tutors were engaged in 179 programmes incorporating climate justice education.

Inspiring practices from the Compendia

In Malta, a VET course in agribusiness is being developed to better meet the needs of secondary school students with low levels of educational achievement. The project aims to improve student engagement and attitudes towards schooling, reduce absenteeism, open pathways for further education or employment, and provide certification opportunities in agribusiness.

Since 2019, Syrian and Turkish host communities in Türkiye have benefited from VET and skills certification in the renewable energy sector including solar power and wind energy through measures such the development of a training programme that takes place in a blended learning format and the sustainable renovation of learning space.

In Portugal, the Green Skills and Jobs Programme aims at professional training and requalification of workers whose employers were directly or indirectly affected by the increase in energy costs, and of unemployed people. To prevent unemployment, the programme promotes the maintenance of jobs for some and the stimulus to the creation of new jobs, for others, whilst accelerating the transition and energy efficiency.

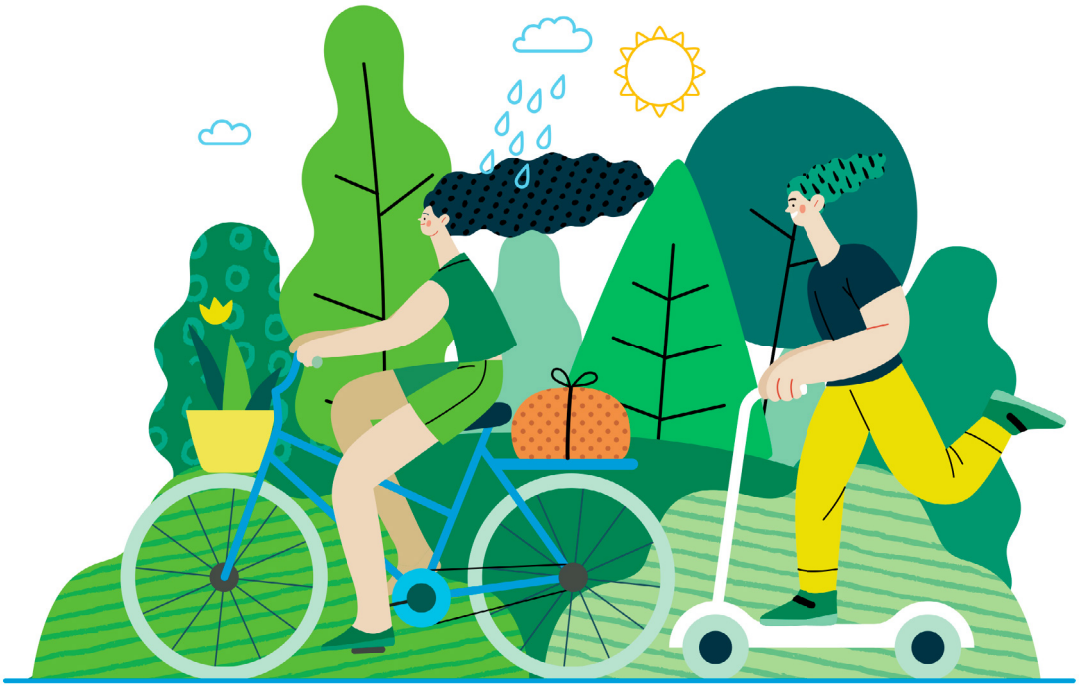
Greece launched the Upskilling and retraining programmes for 120,000 unemployed in high demand sectors of the economy with emphasis in digital and green skills. These programmes (co-funded by the EU under the Recovery and Resilience Facility) were implemented in the national context of upgrading knowledge, abilities, and skills of the human resources (upskilling), as well as the reskilling of the individuals in digital and green skills.

Engaging with the international dimension

Due to its global nature, the green transition requires consideration from an international perspective. Throughout its activities, the Working Group heard examples of how transnational cooperation can bring new insights into VET's response to the sustainability agenda – and how such cooperation takes place not just within Europe but, increasingly, beyond. Specifically, **mobility**, like that facilitated by the EU's Erasmus+ programme can be a valuable way for learners and teachers/trainers to gain insights into different approaches to environmental issues and bring them back to their home countries.

In Belgium, the Erasmus+ mobility project Itinéris from Wallonia, shows how EU funding can be used to boost teachers' green skills by observing practices in Finland. The objective of this mobility project was to reinforce, both at the pedagogical and technical levels, the skills of pedagogical experts in eco-construction, wood construction, sustainable construction, and energy efficiency. The mobility project included visits to Finnish training centres and to construction companies, where Belgian teachers and trainers learned about the Finnish professional learning model. Itinéris allowed both teams to **learn about the diversity and differences of the skills and competences** specific to another context, which allows teachers and trainers to get insights into new perspectives and bring back enhances knowledge.

For their part, multi-year transnational projects can enable VET practitioners and policy-makers to exchange good practices and develop solutions to common environmental challenges. Such projects are also developing qualifications and/or programmes that can help tackle skill shortages on a Europe-wide basis, although, as has been pointed, the implementation of such qualifications/programmes can be held back by continuing constraints posed

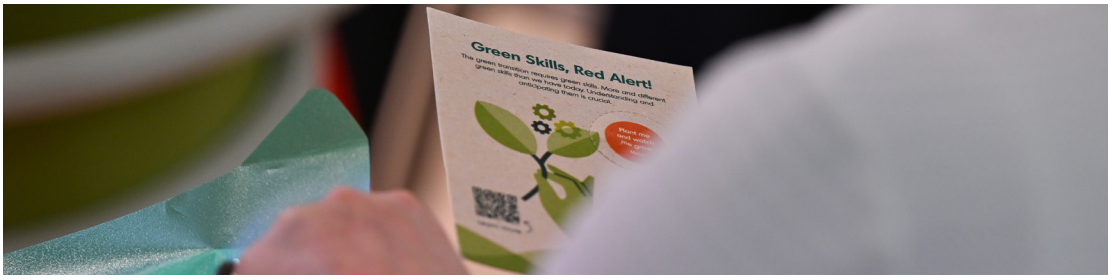


by lack of harmonisation between national skills recognition systems[14]. Another aspect of the international dimension is the development of **tools based on shared reference points and benchmarks** which offer opportunities to raise standards through 'upward convergence' highlighted in section 6.

VET plays a pivotal role in facilitating these international exchanges and collaborations. By integrating international perspectives into their curricula and fostering partnerships with institutions in other countries, VET providers can enhance the quality and also the attractiveness of the education and training they offer. This not only supports the green transition but also prepares learners and staff to work in a globalised world where the challenges posed by the green transition require coordinated efforts across borders.

The Working Group also benefitted from the example of cooperation on sustainability, training and qualifications beyond Europe provided by SWB Bus und Bahn at the Peer Learning Activity in Bonn in October 2022. This example focused on the development of skills for the refurbishment and upcycling of public transport vehicles that previously would have been scrapped. As well as visiting the upcycling facilities, the Working Group learnt about GRANITE, a network linking Germany and Japan that enables **international collaborations between partners in applied research and technology** from Germany and Japan. As part of the original initiative behind the network, SWB Bus und Bahn offered knowledge transfer on the topic of second life refurbishment of city railways; and thanks to this international exchange, cooperation with Japanese Universities (KAGAWA University, SHINSHU University) was initiated.

Looking beyond Europe, the October 2024 Peer Learning Activity hosted by the ETF showcased how **international cooperation can advance green VET innovation across borders.** Specifically, one of the primary objectives of the PLA was to showcase the international dimension of VET, particularly in advancing green VET innovation across and beyond Europe. By fostering international collaboration, the PLA demonstrated how VET institutions can share good practices, develop transnational solutions, and enhance the skills needed for the



green transition.

During the PLA, the International Training Centre of the International Labour Organisation (ITC-ILO) explained how **collaboration with international partners** on pilot programmes in countries like Ghana and Thailand have helped those providers implement tools for greening of VET curricula. Moreover, ETF shared their International Self-Assessment Tool for CoVEs (ISATCOVE), designed to enable VET providers to review their practices in relation to vocational excellence, and which has been extended to interested countries outside Europe, e.g. in Africa. Additionally, the work of the Nationally Determined Contributions

14 Draghi, M. (2024a) The future of European Competitiveness. Part A, A competitiveness strategy for Europe. https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en#paragraph_47059

Partnership was presented, which helps more than 200 members across 130 countries achieve the Paris Agreement and Sustainable Development Goals (SDGs) with a focus on ensuring that the workforce possesses the necessary skills and with assistance being mainly directed towards countries in the Global South.

Inspiring practices from the Compendia

Thanks to the Erasmus+ programme, there are many opportunities for transnational corporation related to the green transition:

The transnational AppInternN project has set up a network of career hubs across Greece, Italy, Spain, and Belgium (with the support of Erasmus+ funding) to enable students and graduates to search for apprenticeships or jobs through relevant databases, and offer guidance and promote special events (seminars, webinars, information events, study visits, presentations, job fairs, etc.).

The Climate Change Teachers' Academy (CLIMADEMY), involving partners from Finland, Germany, Greece, and Italy, provides a European platform and community of practice for teachers to learn about and exchange practices on the green transition.

The GreenSkills4H2 project is part of the European Hydrogen Skills Alliance. The project brings together stakeholders from research, higher education, national and regional public bodies, and large companies to identify skill needs, develop a skills strategy and design and pilot training programmes for hydrogen, which is at the heart of Europe's decarbonisation strategy.

In the hospitality sector, the EcoSME project promotes sustainability skills for SMEs by providing flexible, open source, multi-lingual training tools. Operating in Slovenia it involves partners from Ireland, France, Spain, and Portugal.

GLOSSARY

Definitions are taken from Cedefop's glossary, except where indicated.

Green economy – Economic system in which the production, distribution and consumption of wealth strives to sustainable development (increasing energy and resource efficiency, reducing carbon emissions and pollution, protecting biodiversity and ecosystems) to improve human well-being, limit environmental risks and preserve natural assets.

Green job – Occupation supporting the transition to greener economy and society.

Skills for the green transition – 'include skills and competences but also knowledge, abilities, values and attitudes needed to live, work and act in resource-efficient and sustainable economies and societies.'

They are:

- **Technical:** required to adapt or implement standards, processes, services, products and technologies to protect ecosystems and biodiversity, and to reduce energy, materials and water consumption. Technical skills can be occupation-specific or cross-sectoral;
- **Transversal:** linked to sustainable thinking and acting, relevant to work (in all economic sectors and occupations) and life. Alternatively referred to as 'sustainability competences', 'life skills', 'soft skills' or 'core skills'.

Green transition means the transition of the Union economy and society towards the achievement of the climate and environmental objectives primarily through policies and investments, in accordance with the European Climate Law laying down the obligation to achieve climate neutrality by 2050, the European Green Deal and international commitments, including the Paris Agreement, other Multilateral Environmental Agreements and the Sustainable Development Goals.

APPENDIX

Outline of content of webinars and peer learning activities

Webinars

- April 2022: Skills intelligence for the green transition
- October 2022: Common core green elements for VET curricula
- March 2023: The role of teachers and trainers in greening VET
- June 2023: Green VET in action: preventing food waste
- February 2024: Social partners, VET and the green transition
- October 2024: Women in green technology

Peer Learning Activities

- October 2022: Transition of VET towards environmental sustainability, in Bonn (Germany)
- April 2024: VET and the Green Transition, in Graz, (Austria)
- October 2024: International dimension of VET, (European Training Foundation in Turin, Italy)
- March 2025: Dublin and Mount Lucas (Ireland)

Compendia of inspiring practices

- 2023 edition
- 2024 edition

Testimonials

''The Working Group made a difference. The distance travelled together was impressive – from only a general understanding on how to move ahead with the relatively new priority for greening VET, to reaching a convincing joint platform. The rich material of best practice from the European countries is truly inspiring. The work of the group was an excellent opportunity for mutual reinforcement of national and EU strategies for green transition in VET. The commitment of all the involved stakeholder was really remarkable and itself can serve as an example of best practice.''

Ilze Buligina, Ministry of Education and Science, Latvia

"My five-year participation in the Working Group was an extremely enriching experience for me. I had the opportunity to work with experts and representatives from numerous Member States and not only to learn from their innovative measures and strategies, but also to actively contribute Austria's achievements in VET. A particular highlight was the PLA held in Graz. It was a great pleasure to present our country's approaches and progress at European level and to receive valuable feedback at the same time. I therefore look back on this time with great gratitude and look forward to continuing to incorporate the experience and knowledge I have gained into my work."

Wolfgang Pachatz, Federal Ministry of Education, Austria.

"The Working Group has provided an excellent opportunity to learn from international colleagues' experience. No one has all of the answers in isolation; sharing is so important."

Sarah Miley, Department of Further and Higher Education,
Research, Innovation and Science, Ireland.

"Being part of the Working Group on VET and the Green Transition was a valuable experience. I appreciated the open space for sharing good practices and learning from peers across Europe. The peer learning activities offered inspiring, hands-on insights into how VET supports the green transition at grassroots level. Within the chambers of commerce and industry network, we'll build on this experience and continue advancing VET for a greener future."

Larisa Panait, Eurochambres

"Being part of this group is a valuable experience which not only broadened my professional knowledge but also strengthened my belief in the power of international cooperation in education and policy making."

Nataša Hafner Vojčić, Secondary, Higher Vocational and
Adult Education Directorate; Ministry of Education, Slovenia

"Participating in this Working Group has underscored the essential role of vocational education and training in advancing the green transition. The Group's technical exchanges have proven valuable in fostering sustained cooperation among Member States, facilitating the sharing of effective practices and the pursuit of common progress. As the landscape of skills and labour market demands continues to evolve, there is evident value in ensuring that such collaboration endures and adapts, contributing meaningfully to broader European ambitions."

Vanessa Narro, Sub-Directorate General for VET Organization and Innovation,
General Secretariat for Vocational Training; Ministry of Education,
Vocational Training and Sports, Spain

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