



2025



Vocational Education and  
Training **and the**

# Green Transition

*A Compendium of  
inspiring practices*

*June 2023*





**EUROPEAN COMMISSION**

Directorate-General for Employment, Social Affairs and Inclusion  
Directorate B — Jobs and Skills  
Unit B.3 — Vocational Education and Training, CEDEFOP

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# **Vocational Education and Training and the Green Transition**

A Compendium of inspiring practices

Manuscript completed in June 2023

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## Foreword by Commissioner Schmit to ‘Vocational education and Training and the Green Transition: a Compendium of inspiring practices’

Climate-neutrality is key to our future security and prosperity, and is at the heart of the European agenda through the European Green Deal. It becomes clearer every day that we need to speed up our efforts to protect the environment, secure energy supplies and ensure that our industry remains competitive. A skilled workforce is key to making this a reality. Fairness and inclusivity need to be integral to the green transition, leading to more quality jobs.

As the green transition gathers pace, all occupations – both new and existing – will require new skills and competences, as stressed in the newly adopted Green Deal Industrial Plan. Many workers will need to gain job-specific technical knowledge. All of us will need to develop the right mindsets to live, work and act in a sustainable manner. As reflected in the European Skills Agenda, high-quality vocational education and training (VET) can equip young people and workers with the tools needed to thrive in a greener economy.

At the EU level, we have a strong policy framework that will support these goals, through the Council Recommendation on VET of 2020 and the Osnabrück Declaration. The European Year of Skills builds on this work and aims at implementing this vision on the ground, enabling people to get the skills needed for quality jobs and helping companies address skills shortages.

But many challenges remain. How can national strategies take up the challenges of greening VET? How are curricula in specific sectors being updated to the new requirements? What can individual VET schools, workplaces, teachers or trainers do?

Answering such questions requires a collective response involving all stakeholders. Under the coordination of the European Commission, the Working Group on Vocational Education and Training and the Green Transition<sup>1</sup> gathers delegates from EU Member States, candidate countries, EFTA countries, EU agencies, and European social partners, VET provider associations and civil society organisations. They have shared their experiences on how VET can support the green transition. This compendium of inspiring practices is the first output of these ongoing exchanges.

I would like to thank everyone who has contributed to this first edition of the compendium. I encourage readers to get inspired and build on these examples in their own country, workplace or classroom. In doing so, the European vocational education and training community can provide a decisive push towards a more sustainable, competitive and inclusive Europe.



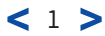
1 The Working Group on Vocational Education and Training and the Green Transition was established in December 2021 with a mandate until December 2025.



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## Lessons from inspiring practices on VET and the Green Transition

The transition to an environmentally sustainable, circular and climate-neutral economy has significant social, economic and employment impacts. Ensuring that all citizens obtain the necessary knowledge, competences, skills and attitudes to cope with these changes is vital to a socially-just transformation of the EU. Vocational education and training (VET) has a key role to play to help young people and adults develop skills so they can thrive in their careers and lives.

The European Education Area Working Group on VET and the Green Transition enables technical exchanges and contributions to help countries implement the principles and objectives of the Council Recommendation on vocational education and training,<sup>2</sup> and the Osnabrück Declaration.<sup>3</sup> As part of its mandate, this Working Group has collected a set of inspiring practices from across Europe, presented in a Compendium. These are the key lessons from those practices.

### New directions

It is clear from the inspiring practices that there has been an **upsurge in activity** related to the green transition, leading VET in new directions. VET has constantly sought to be more responsive to changes in the labour market. The inspiring practices demonstrate that **VET can also be a leader of change**, fostering new mindsets, behaviours and technical skills to grasp opportunities linked to the green transition. The inspiring practices also show that the green transition can help VET to improve its **attractiveness**.

#### Examples of new or reinforced directions in VET:

- › an increasing focus on **transversal skills for the green transition** in all programmes and qualifications;
- › adopting **new ways of teaching and learning** including blended/digital learning, project-based learning and learning through games;
- › developing **solutions to environmental challenges** as part of the curriculum;
- › linking VET to business ideas, **entrepreneurship and innovations** including regional development activities;
- › engaging with a **wider range of stakeholders** to bring in environmental expertise.

<sup>2</sup> [Council Recommendation C417/01 of 24 November 2020](#).

<sup>3</sup> [Osnabrück Declaration on vocational education and training as an enabler of recovery and just transitions to digital and green economies of 30 November 2020](#).



## Foundational elements

The inspiring practices identify a number of elements that can provide a solid foundation for the greening of VET in Europe:

- › VET is capable of **mobilising key stakeholders** for the green transition. Collaborative by nature, VET can harness the strengths of youth, educators and employers towards green objectives. Each of these groups has a vital role individually; together they create synergies that promote solutions for the common good.
- › Involving **social partners** in the timely updating of curricula and qualifications can ensure that taught skills meet existing and future labour market demands. Sectoral social dialogue in particular can make a significant contribution to ensuring that skills development is effective and practice oriented.
- › **Existing collaboration platforms** at national/regional levels can often be used to promote the green dimension. Shared governance models and school-employer collaboration are key in this regard.
- › **Strategic national and European policy frameworks** enhance and enable VET. These can anticipate skill needs and support the greening of programmes and teaching and learning. Policy instruments can offer incentives, both financial and non-financial (e.g. labels), encouraging VET stakeholders to take action towards a greener and more circular economy.
- › The green transition is multi-faceted and it is important **that strategies and interventions reflect this diversity**. From national government to individual teachers, every actor has a role to play. It is important that this is captured through holistic approaches.
- › **VET schools** can offer an immersive learning environment for learners, e.g. through energy efficiency measures, recycling and improvements to green spaces. National frameworks in VET are increasingly enabling schools to ‘think global, act local’.
- › Many **teachers, trainers, and learners** – especially young people – are highly **enthusiastic** in respect of the green agenda. VET schools and companies can build on this motivation, including apprentices as change agents in workplaces.





## Emerging success factors and possible ways forward

The inspiring practices also shed light on the factors that have so far emerged which are likely to make a success of activities to green VET:

- › Ensuring national plans and strategies provide a clear framework with **integration between the different components**, e.g. ensuring teacher training is in line with new curriculum goals.
- › Promoting the role of **social partners in the design and delivery of VET**. Active involvement in VET allows companies to equip apprentices with key competences as well as job-specific skills relevant to the green transition.
- › Establishing **strategic partnerships** with relevant partners (e.g. Chambers of Commerce, employers' and workers' associations, and learners' and VET providers' associations) is key to upscaling activities.
- › Ensuring **school managers provide a supportive environment** for teachers, by developing a vision and values that are shared across the school, with clear plans of action for greener learning environments.
- › Motivating and enabling **teachers** to take forward the green agenda in their schools, by providing the space, time and training to do so. Professional development opportunities through formal training, networks and communities of practice are key.
- › **Motivating and incentivising companies** to engage with the agenda of skills for the green transition, including by offering work-based learning offers or renting out or lending the latest equipment. Close cooperation between the two learning venues, the companies and the vocational schools, is key. Some VET schools have a local employer base that includes companies keen to ensure VET learners get the technical skills for the green transition that they need. For other companies, there may be a need to highlight the benefits of occupation-specific and transversal skills development for all workers, including the positive effects on company image.
- › **Promoting synergies between the green and digital transitions**, such as by using digital technologies as learning tools to teach skills for the green transition; and developing digital solutions to green challenges as part of curricula.
- › Ensuring close cooperation between **VET practice and research** to develop programme approaches that address concrete needs while being state-of-the-art in terms of content and didactics.

*“Professional development opportunities through formal training, networks and communities of practice are key.”*



## Introduction

### Background

Climate change and environmental degradation pose unprecedented challenges for humankind. We are on ‘code red’, as the International Panel on Climate Change has shown; human activity is driving global warming at an increasing rate, threatening our environment.

To overcome these challenges, the European Green Deal aims to transform the EU into a modern, resource-efficient and competitive economy, ensuring zero net emissions of greenhouse gases by 2050; economic growth decoupled from resource use, with no person and no place left behind.

The transition to an environmentally sustainable, circular and climate-neutral economy will have significant social, economic and employment impacts. Without ensuring that all citizens obtain the necessary knowledge, competences, skills and attitudes to cope with these changes, a socially-just transformation of the EU will be impossible.

Vocational Education and Training (VET) provides learners with skills that support their personal and professional development. Whether they are young people getting started in their careers or adults looking to upskill and reskill, VET enables learners to adjust to the changing demands of the working world, including those related to the green transition.

In this context, the Working Group on Vocational Education and Training and the Green Transition shares good practices on how to adapt VET to the needs of the green transition. As set out in its mandate, the aim of the Working Group is to: enable technical exchanges and contributions to help countries implement the principles and objectives of the Council Recommendation on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience;<sup>4</sup> and the Osnabrück Declaration on vocational education and training as an enabler of recovery and just transitions to digital and green economies,<sup>5</sup> with particular reference to the green transition.

This Compendium is a major output of the Working Group. It brings together policies and practices that are being developed and implemented across European Union Member States, candidate countries, EFTA and beyond to enable VET to support the green transition and which have been selected to inspire others to action.



*“The transition to an environmentally sustainable, circular and climate-neutral economy will have significant social, economic and employment impacts.”*

<sup>4</sup> [Council Recommendation C417/01 of 24 November 2020.](#)

<sup>5</sup> [Osnabrück Declaration on vocational education and training as an enabler of recovery and just transitions to digital and green economies of 30 November 2020.](#)



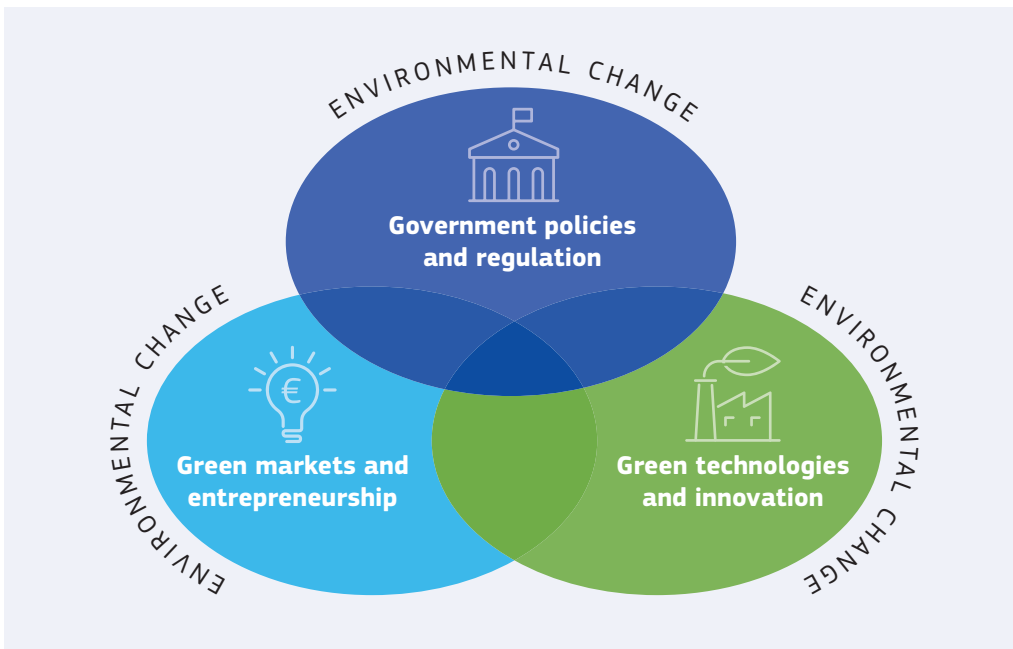
Building a set of inspiring practices in this field is important because VET lacks a well-developed body of documentation that sets out why and how VET can be an integral part of the green transition. Until now, up-to-date evidence from across the whole of Europe has been sparse,<sup>6</sup> particularly concerning information on what works and why it works at the level of (for example) VET institutes and teaching and learning. This Compendium, without claiming to be exhaustive, aims to address this knowledge gap as a reference document in the field of greening VET, and will increase its geographical and thematic coverage over subsequent editions.

What is the nature of the changes taking place in our economies and societies that need a response from VET? And what has been done so far in terms of policy to address them? These two contextual questions are considered in the following sections.

## The green transition and skills needs: taking stock

There are several **change drivers for the green transition**. As shown in the Figure 1, human-driven changes to the global climate and to ecosystems are stimulating change in three broad areas that are closely inter-related: government laws and policies on the environment; technological developments to reduce our dependence on fossil fuels and overall environmental impact; and the evolution of markets for green products and services.

**Figure 1: Change drivers for the green transition**



Developing **new green products and services**, like self-charging electric cars or eco-tourism, and getting them to market is vital for the green transition. Greener mindsets and behaviours amongst consumers are already driving many developments. Government action is key to promoting cleaner production and consumption and often plays a central role in stimulating innovations. New products and services affect the jobs market and create new skills demands.

<sup>6</sup> Exceptions to this are Cedefop (2019). *Skills for green jobs: 2018 update*. European synthesis report, Luxembourg: Publications Office of the European Union. Cedefop reference series; No 109. <https://www.cedefop.europa.eu/en/publications/3078>; and Cedefop and OECD (2022), *Apprenticeships for greener economies and societies*. Luxembourg: Publications Office of the European Union.



Some of the **employment effects** of the green transition have already been observed (e.g. job creation around the renewable energy sector, job losses stemming from the closure of coal mines). Still, many of the effects lie in the future, given that the impacts of climate change are still yet to be fully felt and given that there is the need to accelerate transition towards climate neutrality. The likely patterns of **job creation and loss** during the green transition and the effects on occupations are complex;<sup>7</sup> however, overall more jobs are forecast to be created through the green transition than destroyed.<sup>8</sup> There will, however, be important spatial and sectoral variations. For instance, sectors like renewable energy and environmental goods and services have expanded significantly in recent years, whereas in manufacturing and construction, the effects of the green transition have been more variable. Job losses will be particularly felt in industries that are intensive users of fossil fuels and products and/or major polluters, which are either being eliminated or transformed.<sup>9</sup> Such industries, being tied to natural resources, are often concentrated in particular localities and hence the negative employment effects are particularly acutely felt in certain places. While existing skill sets can provide a foundation for new occupations (e.g. helping off-shore oil workers into employment in off-shore wind energy because of the ‘skills proximity’ of the different jobs), transitions are not inclusive by default.

Regarding **occupations**, the green transition can lead to a number of completely new occupations (e.g. solar panel installers), but will mostly change the tasks required in existing occupations (e.g. technician occupations in automotive production as we shift to electric vehicles).

In terms of **skills needs for the green transition**, changes in production and service delivery will require two broad types of skills.<sup>10</sup> The first of these are the **transversal skills that can be applied across all occupations**, e.g. in saving energy, recycling and also developing greener mindsets and behaviours.<sup>11</sup> For instance, the rapid and unpredictable nature of environmental change needs skills such as adaptability and learning how to learn. Skills like critical thinking and problem solving are needed by everyone so that they can identify opportunities to improve the sustainability of business processes and develop appropriate solutions. Teamwork and collaboration skills are also key since environmental challenges are frequently multi-dimensional, and tackling them requires many different types of skills.<sup>12</sup>

*“Skills like critical thinking and problem solving are needed by everyone.”*

7 We differentiate here between jobs and occupations. Jobs are the work posts in which people are employed, while occupations are the types of jobs people do, e.g. social workers, retail assistants, bricklayers etc.

8 The Council Recommendation on ensuring a fair transition towards climate neutrality of 16 June 2022 notes ‘with the right accompanying policies in place, the green transition could in aggregate create around 1 million additional quality jobs in the Union by 2030 [...], while mitigating the protracted decline in middle-skilled jobs as a result of automation and digitisation.’

9 Cedefop (2021). The green employment and skills transformation: insights from a European Green Deal skills forecast scenario. Luxembourg: Publications Office of the European Union. <http://data.europa.eu/doi/10.2801/112540>

10 See the document on ‘Work-based Learning and the Green Transition’ produced by the Inter-Agency Working Group on Work-based Learning. <https://www.cedefop.europa.eu/en/publications/2232>

11 Research suggests that there is a key difference between having green attitudes and putting them into practice; it is important that people are provided with infrastructures that enable them to make more eco-friendly choices so that ‘living green’ can become widely accepted. See, for example, Wheeler, S. (2004). *Planning for Sustainability: Creating Livable, Equitable, and Ecological Communities*.

12 Many of these core green skills are not new. Indeed, for some time they have been seen as essential for modern working life (e.g. 21st century skills). But the green transition is bringing a fresh and strong imperative for their development – and a new need for them to be strengthened within VET qualifications and programmes.



Different sectors and occupations might require different mixes of such soft skills, as shown in Cedefop's Policy Briefs on the waste management sector<sup>13</sup> and on how VET can support the development of smarter and greener cities.<sup>14</sup>

The second broad type of skills that will be increasingly in demand in the green transition are the **technical skills that are specific to individual occupations**, where they can help to bridge skills gaps and mismatches. These skills will be needed to design and deliver the new products and services required to mitigate or adapt to the effects of climate change and to reduce other environmental impacts. For example, farmers may need new knowledge and skills about how to reduce their dependence on harmful pesticides or carbon-based fertilisers, while construction workers will need to learn how to install new insulation materials.

## The European policy context

This Compendium sits in the context of a body of policies, tools and interventions that have been developed at European level and which enable interventions to support VET in developing a full role in the green transition.

The broad strategic objectives set out in the European Green Deal<sup>15</sup> and the Industrial Strategy<sup>16</sup> are operationalised in the new **European Skills Agenda**,<sup>17</sup> launched by the Commission in July 2020. This agenda calls for a 'paradigm shift on skills' and includes a number of key targets and actions related to greening and skills.

In November 2020, the Council of the European Union adopted a **Recommendation on vocational education and training** (VET) for sustainable competitiveness, social fairness and resilience.<sup>18</sup> Ministers with responsibility for VET from EU Member States, Candidate Countries, EEA-EFTA countries, European social partners and the European Commission endorsed the '**Osnabrück Declaration**' on vocational education and training as an enabler of recovery and just transitions to digital and green economies.<sup>19</sup>

**The Council Recommendation on ensuring a fair transition towards climate neutrality**<sup>20</sup> aims to ensure that the Union's transition towards a climate-neutral and environmentally sustainable economy by 2050 is fair and leaves nobody behind. The Recommendation includes specific policy guidance on education, training and lifelong learning. The Council recommendation on **learning for the green transition and sustainable development**<sup>21</sup> aims to ensure that learners of all ages acquire the knowledge to live more sustainably, obtain the skills needed in a changing labour market and take action for a sustainable future.<sup>22</sup>

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13 Cedefop (2022). *Too good to waste: tapping the potential of vocational education and training in the waste management sector*. Luxembourg: Publications Office of the European Union. Policy brief. <http://data.europa.eu/doi/10.2801/434846>

14 Cedefop (2022). *Cities in transition: how vocational education and training can help cities become smarter and greener*. Luxembourg: Publications Office of the European Union. Policy brief. <http://data.europa.eu/doi/10.2801/009067>

15 [COM/2019/640 final of 11 December 2019](#).

16 [COM/2020/93 final of 10 March 2020](#).

17 [COM/2020/274 final of 1 July 2020](#).

18 [Council Recommendation C417/01 of 24 November 2020](#).

19 [Osnabrück Declaration on vocational education and training as an enabler of recovery and just transitions to digital and green economies of 30 November 2020](#).

20 [Council Recommendation 2022/C 243/04 of 16 June 2022](#).

21 [Council Recommendation 2022/C 243/01 of 16 June 2022](#).

22 [COM/2022/108 final of 8 March 2022](#).



In May 2022, the European Commission presented the **REPowerEU Plan** in response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. The strategy aims to save energy, produce clean energy and diversify our energy supplies. It contains measures supporting the objectives above through an accelerated requalification of the workforce towards green skills.

In February 2023, the Commission adopted the **Green Deal Industrial Plan (GDIP) for the Net-Zero Age**<sup>23</sup> to enhance the competitiveness of Europe's net-zero industry and support the fast transition to climate neutrality. The GDIP includes a specific pillar on 'enhancing skills' to ensure that the European workforce is skilled in the technologies required by the green transition.

In 2023, the **European Year of Skills**<sup>24</sup> aims to address the skills gap, by leveraging national efforts and also by highlighting existing and new EU initiatives, including EU funding possibilities, to support their take-up, and promote the organisation of skills-related activities and events across the EU.

**Funding mechanisms** have been made available to support VET and the green transition.<sup>25</sup> At European level, this mainly concerns the European Social Fund+, Erasmus+,<sup>26</sup> the Recovery and Resilience Facility, the Just Transition Fund, InvestEU, and Horizon Europe.

## Purpose and structure of the Compendium

This Compendium seeks to **fill gaps in our knowledge and understanding** of how VET can be equipped to meet the challenges of the green transition. As noted above, thus far these gaps have been quite substantial. But as the Compendium demonstrates, since 2020 especially, VET has begun to step up the scale and depth of its engagement with the green agenda.

In the next sections, the Compendium shows how 'greening' can take place **across every aspect of VET**: from strategies and plans at national level, down to individual members of teaching and training staff.<sup>27</sup> Each section begins with a short examination of the overall state of play and how it might be adapted to the green transition so as to frame the inspiring practices. A range of sources has been used for this purpose.<sup>28</sup>

23 [COM/2023/62 final of 1 February 2023](#).

24 [Decision \(EU\) 2023/936 of the European Parliament and of the Council of 10 May on a European Year of Skills](#).

25 EU funding instruments for upskilling and reskilling, available under <https://ec.europa.eu/social/main.jsp?catId=1530&langId=en>

26 An overview of Erasmus+ funding is available under <https://erasmus-plus.ec.europa.eu/funding/>

27 Across Europe a wide range of terms are used for those people involved in the various forms of teaching, training and instruction that take place within VET, including tutors, mentors, instructors, trainers in schools, colleges or workplaces. The compendium refers to 'teaching and training staff' to refer to these in all their diversity, taking into account national contexts.

28 These sources include: Cedefop (2019). *Skills for green jobs: 2018 update. European synthesis report*. Luxembourg: Publications Office of the European Union. Cedefop reference series; No 109. <http://data.europa.eu/doi/10.2801/750438>; International Labour Organisation (ILO). (2019). *Skills for a Greener Future. A global view based on 32 country studies*. (Geneva). Available at: [https://www.ilo.org/wcmsp5/groups/public/-/ed\\_emp/documents/publication/wcms\\_732214.pdf](https://www.ilo.org/wcmsp5/groups/public/-/ed_emp/documents/publication/wcms_732214.pdf); UNESCO/UNEVOC (2017). *Greening Technical and Vocational Education and Training: UNEVOC's practical guide for institutions* (Bonn); Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*. Luxembourg: Publications Office of the European Union. Cedefop reference series; No 122 <http://data.europa.eu/doi/10.2801/628930>; and the European Commission's Apprenticeship Support Service Online Training Module 8 on the Green Transition <https://ec.europa.eu/social/main.jsp?langId=en&catId=1147&furtherNews=yes&newsId=10229>



The inspiring practices were gathered from the Members of the Working Group on VET and the Green Transition. Delegates were asked to identify **examples of inspiring practices** under a number of topics and to complete a template for each practice. These templates form the basis for the fiches in which the inspiring practices are described in detail. A number of **lighthouse projects** were selected by the Working Group from the very extensive and rich set of inspiring practices. This subset of projects aims to provide readers with a snapshot of the kind of initiatives that are covered in the compendium, across different themes and countries. The inspiring practices and lighthouse projects are meant to provide examples of initiatives that address common challenges. They should not be seen as providing a benchmark or blueprint against which activities could be evaluated as ‘better’ or ‘worse’. Every practice depends for its success on a particular set of contextual factors and should be seen amongst other in light of national, regional and sectoral circumstances.

It is on the basis of the fiches that this Compendium has been built, with successive drafts of the document being reviewed and discussed by the Working Group during its regular series of meetings, leading to subsequent revisions. It is intended that the Compendium will be a **‘living document’** and will be subject to periodic revisions so as to keep up to date with the dynamic picture of change in VET.

## Who the Compendium is for and how to use it

The Compendium will be of interest to **both those involved in VET policy and practice as well as those beyond VET** who want to understand better the ways in which VET can contribute to the green transition. It has inspiring practices of relevance to all stakeholders:

- › policy-makers;
- › social partners;
- › those responsible for VET at regional and municipality levels;
- › VET school managers;
- › school-based teaching and training staff;
- › in-company trainers, mentors, tutors, etc.;
- › individual companies looking for inspiring ways to ensure their employees get the skills they need for the green transition;
- › Public Employment Services and other actors involved in upskilling and reskilling the workforce.

*“Every practice depends for its success on a particular set of contextual factors.”*

The Compendium has been designed so that it can be **read as a whole** but also consulted by readers who wish to **focus on a particular topic**.

It contains numerous examples, the majority of which are **inspiring practices** that link to a fuller description contained within a fiche. Short descriptions of the practices are provided in this Compendium, and the full descriptions in the fiches can be accessed by clicking on the relevant **hyperlink** embedded in the text (this functionality requires a pdf reader).

While it is intended that the practices in this Compendium will inspire others, it is also important not to overlook the challenges of transferring a practice from one place to another: **practices are always context-dependent**, though to varying amounts. Readers should therefore be aware of the nature of the VET system surrounding any intervention and are encouraged to consult the country reports produced by [Cedefop's ReferNet Network](#) so as to get a better understanding of a country's VET policies and structures.



# Inspiring practices for greener VET

The following sections show how VET is being transformed at all levels: from the development of strategies, plans and funding mechanisms; to the redesign of qualifications and programmes through the upgrading of professional development opportunities for teaching and training staff; to individual school-level actions.





The interventions illustrated range from small-scale but significant interventions in particular areas to large-scale programmes that integrate actions across all the major areas required to transform VET.

Although the document is structured under a series of headings, it should be noted that this structure has been designed so that practices in different areas might be easily identified but that it is also somewhat artificial. Many of the inspiring practices cover more than one aspect of VET and indeed it has been said that holistic and systematic approaches to greening VET offer the greatest likelihood of ensuring the success of the ‘project’ itself given the inter-connectedness of policies, programmes and teaching and learning.<sup>29</sup> While such holistic approaches involve actions at all levels (from national to local) based on common goals and within strategic frameworks, bottom-up approaches are also an essential in testing, piloting mobilising and raising awareness around the green transition until holistic approaches can be put in place. Indeed, as the inspiring practices show, individual VET institutions and training companies can often lead developments, showing the way for others in how to adopt holistic approaches at local level.

The scale, depth and complexity of the challenges posed by the crises in our environment mean there are important roles to be played by all the ‘traditional’ actors involved in VET – and also that the sector should reach out in new directions, to involve people and organisations with relevant knowledge and expertise in local communities and civil society. Looking at the different types of stakeholders and the roles they play in the inspiring practices presented, the following observations can be made:

- › **National and regional authorities** play a central role in setting the frameworks within which VET can be greened, and in setting up and managing skills anticipation mechanisms that have a vital role in identifying relevant skill needs.
- › A key part of national developments is the involvement of **social and economic partners** in determining the policies and strategies for the green transition. Employers’ and workers’ organisations along with individual companies, have important roles to play in both skill anticipation and the greening of programmes and qualifications, bringing direct knowledge of changes required and ensuring that occupational profiles are in line with the requirements of the labour market. Social and economic partner involvement generally reflects the overall situation around social dialogue in individual countries, and official/established VET structures, consultative bodies and platforms are often used to engage social partners on green issues.<sup>30</sup>

*“Holistic approaches involve actions at all levels (from national to local) based on common goals and within strategic frameworks.”*

29 International Labour Organisation (2022). Greening TVET and skills development: a practical guidance tool. [https://www.ilo.org/skills/pubs/WCMS\\_847095/lang--en/index.htm](https://www.ilo.org/skills/pubs/WCMS_847095/lang--en/index.htm)

30 Cedefop (2019). *Skills for green jobs: 2018 update. European synthesis report*. Luxembourg: Publications Office of the European Union. <https://www.cedefop.europa.eu/en/publications/3078>



- › **VET institutions, teaching and training staff along with local employers**, have a vital role in taking forward the green agenda in VET.<sup>31</sup> Indeed, the success of VET depends on close cooperation between these two learning venues: schools and companies. Not only are they central to the successful implementation of curricula that have been greened at national level, they have considerable scope to influence the development of green mindsets and behaviours that are essential for the green transition in both current and future generations: by greening **how** people learn (for example reusing materials for practical training) as well as **what** people learn (the ‘reduce, reuse, recycle’ principle).
- › **Civil society** can also be of benefit to VET as it embraces the green agenda. VET can reach out beyond ‘traditional’ stakeholders to engage with NGOs and community groups in the environmental sustainability field. They have vast knowledge and expertise including in reaching out to vulnerable groups, which can be drawn upon to inform teaching and learning practices and the content of curricula.



*“The success of VET depends on close cooperation between these two learning venues: schools and companies.”*

<sup>31</sup> Including schools, colleges, higher VET institutions such as Universities of Applied Science and similar educational facilities.



## Understanding and identifying skills for the green transition

An essential pre-requisite for VET to respond effectively to the green transition is the ability to make accurate assessments of likely skill needs. It is thus crucial that mechanisms are in place through which green skill needs can be identified and a shared understanding of skills for the green transition can be developed.

### Understanding skills for the green transition

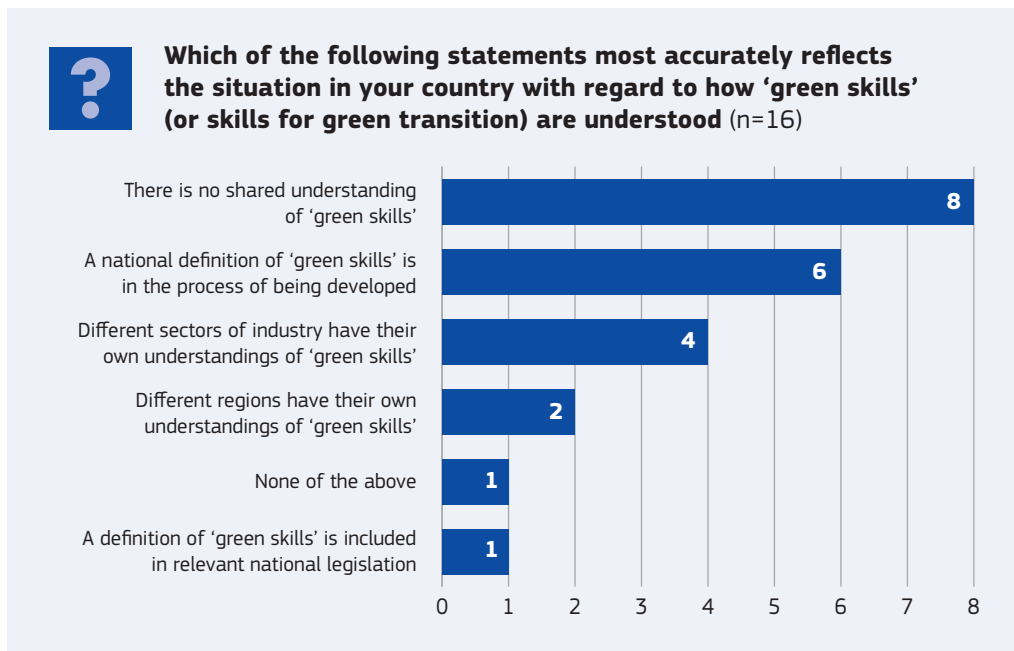
Within individual countries in Europe, there appear to be a variety of ways in which skills for the green transition are understood (Figure 2). In many countries there is no shared understanding of such skills,<sup>32</sup> although a significant proportion of countries is working to develop one and in **Germany** a definition has been included in relevant national legislation for several years.<sup>33</sup> It is quite common for different sectors and regions to have their own understandings of skills for the green transition.

32 At European level, the [European Skills, Competences, Qualifications and Occupations \(ESCO\) taxonomy](#) has identified 'green skills and knowledge concepts' including 381 skills, 185 knowledge concepts, and 5 transversal skills. The [European Sustainability Competence Framework \(GreenComp\)](#) covers the knowledge, skills and attitudes needed by learners of all ages to live, work and act in a sustainable manner (including critical thinking, systems thinking and connection to nature).

33 Cedefop, (2018), *Skills for green jobs: an update – Germany*, available at [https://www.cedefop.europa.eu/files/germany\\_green\\_jobs\\_2018.pdf](https://www.cedefop.europa.eu/files/germany_green_jobs_2018.pdf)



Figure 2: The understanding of skills for the green transition<sup>34</sup>



Source: Questionnaire to Working Group members (April 2022).



## Anticipating skills needs for the green transition

In general, recent years have seen the strengthening of mechanisms for identifying and anticipating skills needs in EU Member States,<sup>35</sup> and it is these general mechanisms that tend to be used for anticipating skills for the green transition as well.<sup>36</sup> Skills anticipation takes place at national level, regional level or both, according to the country concerned (for more on regional measures, see [Section 4 Greening VET at sectoral and regional levels](#)).

To zoom in on skills for the green transition, ad hoc mechanisms like time-limited expert groups or studies are commonly used. In **Malta**, in 2020, the National Statistics Office conducted a Green Jobs Survey, the aim of which was to analyse the skills needs for the green transition. This was followed in October 2021 with the National Employment Policy 2021-2030 that aims to equip workers with in-demand skills (including skills for the green transition). In a few countries, specific structures and processes have been created for the anticipation of skills for the green transition like **France's** National Observatory for Jobs and Occupations of the Green Economy.

*“Recent years have seen the strengthening of mechanisms for identifying and anticipating skills needs in EU Member States.”*

<sup>34</sup> 16 members (n=16) responded to the survey, although they could opt for multiple options when responding which goes to explain why the overall number of responses is above 16.

<sup>35</sup> See for example, Cedefop's country-specific reports on this topic: <https://www.cedefop.europa.eu/en/publications/4180>

<sup>36</sup> See section 4.1 in Cedefop (2019). *Skills for green jobs: 2018 update. European synthesis report.*



Whatever the exact mechanism used, skills anticipation is typically based on a combination of quantitative data, e.g. from national surveys, and qualitative inputs from stakeholders, including social partners and sector experts. On the whole, it seems that there is a lack of highly-granular data at the level of skills and regions to inform our understanding of the green transition alongside the developing body of evidence: this is at the level of sectors and occupations on the one hand, and global and national levels on the other.<sup>37</sup>

In Denmark, [mapping of future competence needs in relation to the green transition](#) took place in 2022 by zooming in on the largest VET programmes for meeting climate goals. Five professional committees (covering carpenters, electricians, agricultural workers, car mechanics and the mercantile area as a whole) conducted a range of activities such as literature mapping, various types of data collection and interviews with relevant experts.

In Sweden, [strengthening the role of Higher Vocational Education](#) is taking place to ensure that programmes are tailored closely to labour market needs: the National Agency for Higher Vocational Education is in regular contact with regions, industry representatives and other labour market actors to collect information on labour market needs, and such collaboration is also used to help sectors to translate skills needs into tangible competence descriptions, detailed enough for the design of training programmes.



*“There is a lack of highly-granular data at the level of skills and regions to inform our understanding of the green transition.”*

<sup>37</sup> Zaussinger, F., Egli, F., Schmidt, T., Schmid, S., Amarasinghe, U. and Scharf, U. (2022) Labour market impacts of the green transition: the need for more granular data, in Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*.



## Putting in place strategies and funding mechanisms

Along with identifying and anticipating skill needs, an effective approach to ensuring VET is equipped for the green transition requires strategies, plans and funding arrangements to be put in place, which can provide systematic and coherent frameworks for the actions required.<sup>38</sup>

### Strategies, plans and development programmes

In recent years, countries have put in place substantial bodies of laws, strategies and plans related to the environment. In 2019, Cedefop<sup>39</sup> noted that, in Europe, consideration of green jobs and skills tended to be 'framed by a range of broader green strategies, plans and legislative acts of parliament, such as policies to protect the environment, encourage biodiversity, improve energy efficiency, and reduce reliance on fossil fuels'. Plans and strategies with a specific focus on jobs and skills related to the green transition tended to be produced in particular by 'organisations in sectors strongly affected by the greening of employment'.

*“Countries have put in place substantial bodies of laws, strategies and plans related to the environment.”*

<sup>38</sup> An overview of Erasmus+funding is available under <https://erasmus-plus.ec.europa.eu/funding>

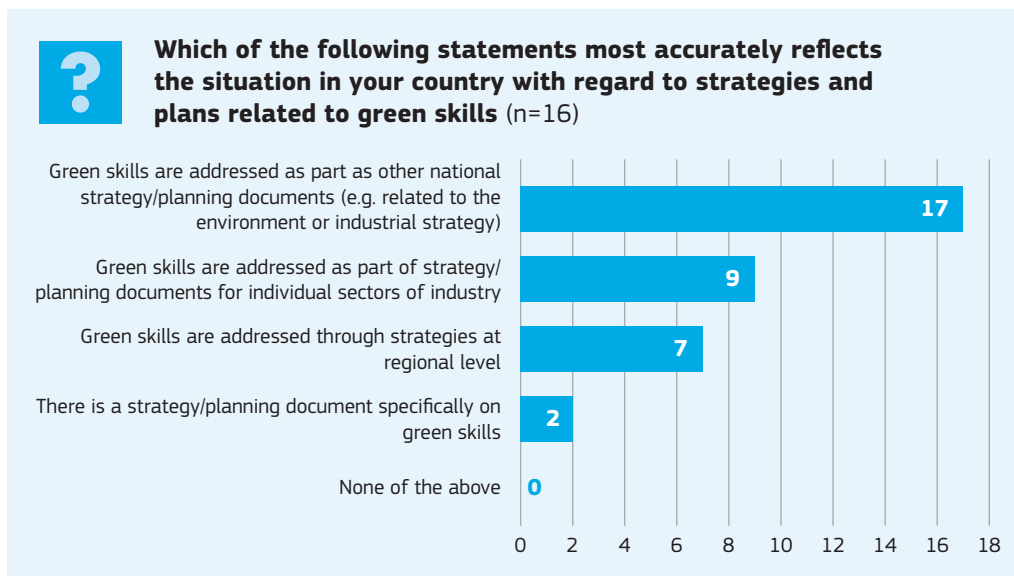
<sup>39</sup> pp. 11 and 15, Cedefop (2019). *Skills for green jobs: 2018 update. European synthesis report*. Luxembourg: Publications Office of the European Union.



This variety in the way in which skills for the green transition are handled in national policies continues, as shown by the responses to a questionnaire sent to Members of the Working Group on VET and the Green Transition in April 2022.<sup>40</sup> According to the results (Figure 3), most countries do not have a strategy or planning document *specifically* on skills for the green transition but address them as part of other national strategies and/or planning documents that deal with the environment or industry. Strategies for individual sectors are also quite a common vehicle for planning skills for the green transition, as are regional strategies.



**Figure 3: The strategies and plans related to skills for the green transition implemented in EU Member States<sup>41</sup>**



Source: Questionnaire to Working Group members (April 2022).

National measures to support the acquisition of skills for the green transition now abound. In Croatia and France, for instance, there are strategies and planning documents specifically on green skills. These are Plan Oporavka<sup>42</sup> in **Croatia**, and the laws Loi sur la transition énergétique pour la croissance verte<sup>43</sup> and Loi Climat et résilience<sup>44</sup> in **France**. For instance, **Sweden** implemented the 2020 Green Jobs Initiative, which aimed to reskill unemployed people in shortage occupations related to green jobs.

40 The questionnaire received 25 responses from 6 stakeholder organisations, and 16 countries.

41 16 members (n=16) responded to the survey, although they could opt for multiple options when responding which goes to explain why the overall number of responses is above 16.

42 [https://planoporavka.gov.hr/UserDocImages/dokumenti/Plan\\_oporavka\\_i\\_otpornosti%2C\\_srpanj\\_2021..pdf?vel=13435491](https://planoporavka.gov.hr/UserDocImages/dokumenti/Plan_oporavka_i_otpornosti%2C_srpanj_2021..pdf?vel=13435491)

43 <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000031044385/>

44 <https://www.ecologie.gouv.fr/loi-climat-resilience>



Additionally, under the Recovery and Resilience Facility (RRF),<sup>45</sup> some EU Member States are planning measures related to skills for the green transition.<sup>46</sup> In **Austria**, the Just Transition Strategy Action Plan for Education and Training of the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology was published in January 2023. Within the Just Transition procedure, key stakeholders, including the Federal Ministry for Climate Protection, the Vienna Chamber of Labour and the Vienna Public Employment Service, collaborated with stakeholders from the fields of research, business and labour representation. They collaborated to undertake scientific analyses of sectors affected by the green transition and to develop measures to strengthen education and training in terms of ‘new/additional content and skills’ and ‘education and training/infrastructure’.



The inspiring examples show that strategies and plans at national/regional level can take a variety of forms: from holistic approaches covering all aspects of VET, through to plans that target specific parts of the VET system or zoom in on a particular aspect of the green transition. Often such plans exist side-by-side since they are not mutually exclusive and can indeed be complementary.

### Taking holistic approaches

In Finland and Slovenia, **holistic approaches** have been adopted. The Finnish practice is shown in the lighthouse box below.

In **Slovenia**, the national [Climate Goals and Contents in Education project](#), which started in 2022, includes guidelines for dealing with the green transition, a model for identifying occupational competences for sustainability and good practices, training for teachers and other educational staff and the creation of didactic materials. With a group of demonstration and pilot schools working to become sustainable schools under the approach, key success factors are considered to be the high motivation of teachers and school managers and the involvement of a wide variety of experts in the field of climate change and sustainability.

45 The Recovery and Resilience Facility aims to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions. [https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility\\_en](https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en)

46 European Commission (2023). Recovery and Resilience Scoreboard – Thematic Analysis Adult learning and skills [https://ec.europa.eu/economy\\_finance/recovery-and-resilience-scoreboard/assets/thematic\\_analysis/scoreboard/thematic/analysis\\_%20adult\\_learning\\_skills.pdf](https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/assets/thematic_analysis/scoreboard/thematic/analysis_%20adult_learning_skills.pdf)



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## Implementing holistic strategies and practices for permanent change

Holistic approaches to greening VET are important to ensure that the key aspects of VET mutually support one another. At national level, this means implementing strategies and plans that integrate, for example, VET management, teaching and pedagogy, teachers' skills and competences, and working life cooperation within a coherent framework. Finland's national development programme for sustainable development and the green transition in VET does just that; it provides a strategic framework and develops methods and materials for the development of green management and teaching skills that are needed for staff, students and workplace supervisors.

Launched in 2022, key features of the programme include: the development of a national sustainability roadmap for VET which frames the definition of local goals and measures; the goal of bringing about permanent changes among all education providers; supporting students through training to become 'responsibility agents' with green transition and sustainable development competences in their own study fields; and developing practical solutions for the green transition (such as a carbon footprint calculator) through an experimental approach using a range of funded projects, which bring together key stakeholders including VET providers.

**For more details see fiche:**



**Development Programme of sustainable development and green transition in vocational education and training.**

## Targeting higher VET

Developing higher-level VET – beyond upper-secondary level – has an important, indeed crucial, role to play in the green transition. Many new green occupations that are emerging<sup>47</sup> and forecasts of additional employment in sectors like waste management suggest that demand will likely require such higher-level qualifications.<sup>48</sup> Moreover, this approach strengthens the key role of higher education and VET systems in supporting lifelong learning and reaching out to a more diverse student body.

In Italy, [the reform of Higher Technological Institutions](#) – or ITS Academies (Istituti Tecnologici Superiori) – which started in 2022, gives strategic priority to the education and training of highly skilled technicians to accompany the digital and ecological transitions. Key focal areas currently include: 'energy efficiency', which aims at training high-skilled technicians for energy saving in sustainable buildings, for energy supply and plant construction and for the management of energy systems and certification of operation of energy plants; and 'sustainable mobility', which aims at training high-skilled technicians for the production and maintenance of transportation, related infrastructure and logistics.

47 p.111 International Labour Organisation (ILO). (2019) *Skills for a Greener Future. A global view based on 32 country studies*. (Geneva). Available at: [https://www.ilo.org/wcmsp5/groups/public/---ed\\_emp/documents/publication/wcms\\_732214.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_732214.pdf)

48 Cedefop (2022). Too good to waste: tapping the potential of vocational education and training in the waste management sector. Luxembourg: Publications Office of the European Union. Policy brief. <http://data.europa.eu/doi/10.2801/434846>



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## Developing green programmes at higher levels

Demand for higher-level technical skills to support the green transition means having in place a wide range of relevant programmes beyond upper-secondary education level that can support greening within specific occupations and sectors. Such an approach has been adopted in Sweden where Higher Vocational Education (HVE) is a post-secondary type of education that leads to diplomas at levels 5 and 6 of the European Qualifications Framework (EQF). Starting in 2021, a wide range of HVE programmes is being funded 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 line with the autonomy available to providers in Sweden, every provider develops their own syllabuses and learning materials. However, to provide a national strategic overview, a commission of inquiry for the future of HVE has been tasked with examining how HVE can increasingly produce the competences needed for the green transition and if HVE programmes should be given stronger priority in the selection process. In addition, the contribution of HVE will be monitored as a part of the government's action plan for a circular economy.

**For more details see fiche:**



**Strengthening the role of Higher Vocational Education (HVE) for the green transition.**

## Approaches to funding

Funding to support national strategies can take a wide variety of forms, including measures such as subsidising the cost of courses, the creation of funding pots that stakeholders can access through bidding processes, and leveraging contributions from employers and students.

An example of **cost subsidies** is provided by **Austria** where structural financial support is provided to enterprises who train apprentices under the [Digi Check for Apprentices \('Digi Scheck for Apprentices'\) scheme](#) which, from January 2023, was extended to promote and make visible green skills. Initiated as a means of enabling apprentices to acquire transversal skills and to catch up on skills they could not acquire because of the COVID-19 pandemic, the scheme now encompasses competences related to climate protection, energy and resource management. To acquire such skills, apprentices take approved add-on courses whose costs are covered 100 % by the scheme.

In **France**, the national network of [Centres of Vocational Excellence focused on the energy transition and eco-industry](#) (*Les centres d'excellence Campus des Métiers et des Qualifications de la filière «Transition énergétique, éco-industrie»*) combine national and regional funding as well as company resources to target resources on a key sector related to the green transition.

In **Portugal**, impactful investments to foster lasting and sustainable growth are underway linked to updating of the [National Catalogue of Qualifications](#), and include the development of Renewable Energy Centres (within the scope of the Specialised Technological Centres investment) that are being created in public and private educational establishments.



Through investments in mainly technological and educational equipment and resources, they offer VET programmes to develop the skills and qualifications of young people while promoting the competitiveness of companies, thus boosting the creation of qualified jobs and strengthening the quality of VET qualifications.

An important issue for **apprenticeships** in general is the **distribution of costs across stakeholders**, particularly the question of how much employers and participants should be required to contribute.<sup>49</sup> This is also relevant in the context of the green transition. Depending in part on the national approach to how VET is funded in general, participants may be required to make a contribution to training. For example, in **Luxembourg** adult participants in two short courses on '**waste and resource management**' and the '**circular economy for municipalities**' are required to make a contribution to costs.






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## Catalysing local actions through a national strategic approach to funding

In Denmark, various funding pools have been created to support local actors in greening VET. The aim is for the funds to act as a catalyst in the development of lasting practices that can serve as an inspiration to others. The overall approach is the result of a political agreement reached by the government with several political parties to ensure the availability of strong 'green' educational offers in the field of VET and labour market education. Some funds support the green transition in all sectors while others target those sectors expected to be especially important in the green transition.

- › One funding pool is for investment in equipment and associated skills development related to **carbon reduction** in the target sectors of agriculture and food, technology, construction and transport. There is an application process through which local actors can access funds for equipment and for providing professional development for teachers in how to use the equipment.
- › Another funding pool focuses on strengthening youth education's work on **green entrepreneurship**. The pool is intended to provide students with a broader insight into and experience with green entrepreneurship. Projects must be carried out in collaboration with one or more companies, higher education institutions or other relevant organisations, which have knowledge and experience in green entrepreneurship.
- › There is also a funding pool for the development and testing of **teaching courses** on vocational training and labour market education within the green transition and sustainability. The pool is open to all providers of vocational education and labour market education.

### For more details see fiches:

-  Pool for equipment investments and associated skills development.
-  Pool with an entrepreneur green focus across youth education.
-  Pool for development and testing of teaching courses on vocational training and labour market education within green transition and sustainability.

<sup>49</sup> See, for example, Cedefop (2020). *Financing apprenticeships in the EU. Luxembourg*: Publications Office of the European Union. <http://data.europa.eu/doi/10.2801/4720>



## Creating greener VET programmes and qualifications

Meeting the need for green skills means making appropriate adjustments to the VET programmes and qualifications available both to young people (to support their labour market entry) and to adults (to support their need for upskilling and reskilling). Two broad types of skills need to be considered:

- › **Technical skills specific to individual occupations** that will be needed to design and deliver the new products and services related to the green transition. Farmers may need new knowledge and skills about organic production. Construction workers will need to learn how to install new insulation materials.
- › **Transversal skills for the green transition that can be applied across all occupations**, e.g. in saving energy and recycling and also broader transversal skills which help to develop greener mindsets and behaviours. Many of these core green skills are not new. Indeed, for some time they have been seen as essential for modern working life (e.g. 21st century skills). But the green transition is bringing a fresh and strong imperative for their development – and a new need for them to be strengthened within VET qualifications and programmes.

*“Meeting the need for green skills means making appropriate adjustments to the VET programmes and qualifications.”*

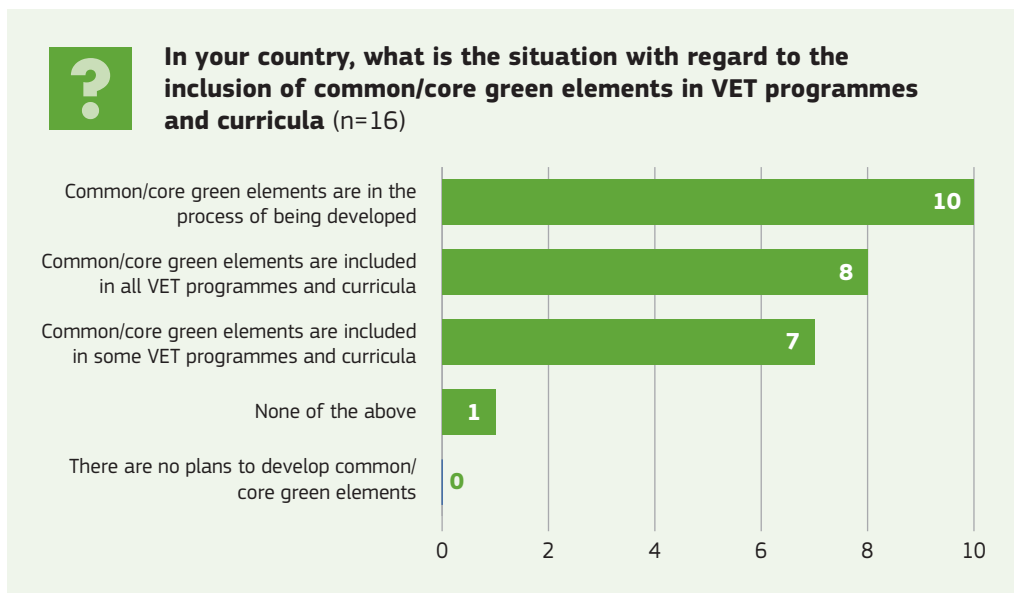


## Integrating green skills across all VET programmes

In the survey of Working Group members, most countries were found to include common/core green elements in some or all their VET programmes or are in the process of developing such elements (Figure 4). In **Luxembourg**, core green elements are currently developed in I-VET curricula based on sectoral skills needs; to date, transversal green skills are not part of all VET curricula. In Estonia, the RRF supports the green transition of enterprises by, for instance, investing in the development of upskilling and reskilling modules, including detailed training content, structure and training materials, to provide training related to skills for the green transition.<sup>50</sup>



**Figure 4: The inclusion of common/core green elements in VET programmes and curricula in EU Member States**



Source: Questionnaire to Working Group members (April 2022).

50 European Commission (2021) Proposal for a Joint Employment Report 2022. Available at <https://ec.europa.eu/social/main.jsp?langId=en&catId=89&furtherNews=yes&newsId=10104#:~:text=The%20Joint%20Employment%20Report%202022,European%20Pillar%20of%20Social%20Rights>



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## Developing a national green competence standard

In **Germany**, an updated nationwide standard for all trainees in the dual system on ‘environmental protection and sustainability’ has been in force since 2021 and sits alongside three other sets of standards covering company organisation fundamentals, health and safety and digitalisation. Developed by the Federal government, State (Länder) governments, and the social partners, it comprises a set of six core skills and competences for the green transition which have to be integrated throughout the entire traineeship, in in-company training framework plans and in examinations. The standard is a binding minimum requirement for all modernised and newly developed recognised training occupations.

The core skills cover:

- › recognising opportunities to avoid pollution;
- › giving due consideration to economic, environmentally-compatible and social aspects of sustainability when using materials and energy;
- › complying with environmental protection regulations as they apply to the company providing training;
- › avoiding waste while also recycling and disposing of materials in an environmentally friendly way;
- › developing proposals for sustainable actions in own work area;
- › complying with company regulations while working together in the best interests of economically, ecologically and socially sustainable development.

### For more details see fiche:



Updated nationwide standard for all trainees in the German dual system: occupational profile item on “Environmental protection and sustainability”.



In **Belgium-Wallonia**, [adaptation of the training offer](#) is taking place in which environmental sustainability perspectives are being promoted in training programmes, based on an interdisciplinary approach, and pedagogical concepts such as education for sustainable development and global citizenship education are being developed to empower citizens to contribute to sustainable development.

In **Hungary**, the [Green Earth complex sustainability pedagogy programme for VET](#) is introducing a new foundational course in VET for 9–10th graders. To accompany the curriculum, learning resources and a methodology manual for teachers are being developed, along with a teacher training course. It is intended that the methodology will provide a model that can be adapted and used in other Visegrád countries following research on the effects on the sustainability attitudes of pupils and teachers.



In **Italy**, sustainability is an integral component of a new national approach to **civic education** which is being introduced in all schools across the whole education system including adult education. Civic education is now being included as a compulsory discipline that is separately assessed and incorporates the development of knowledge, skills and competences connected to the 2030 Agenda and the related Sustainable Development Goals. At upper-secondary-school level, the expected competences include: the ability to respect, care for, preserve, and improve the environment and the ability to work towards sustainable development.

Green skills are being included in **core curricula and school programmes for VET occupations** in **Poland**. The core green skills which are defined across all occupations refer to the knowledge and understanding of environmental protection principles; observing the rules of environment protection; and counteracting the threats to the environment while organising the workplace and performing professional tasks.



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### **Taking a holistic approach to greening programmes**

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; its purpose being to develop the knowledge and skills of students on the main concepts and practices related to environmental issues and the impact of rapid economic development on sustainable development. The subject also entails practical activities and small projects to protect the local environment. In addition, all practical modules in VET contain a performance criterion on being able to apply safety and environmental protection rules. Finally, some subjects such as 'food technology', 'forestry protection' and 'oil extraction' also have their own specific curriculum elements dealing with sustainability.

Alongside these curriculum-related aspects, steps have been taken to ensure teachers are equipped to teach sustainability. The environment and sustainable development issues are part of VET teacher training standards, and pre-service and continuous professional development programmes. More than 80 % of current vocational teachers and instructors taking part in the 'Basics of Didactics in VET' course are also trained on how to incorporate environment and sustainable development concepts and practices into their teaching and learning. There are also specific measures such as a teaching and learning package, available online, to support teachers and students in relation to the 'Environment and Sustainable Development' subject mentioned above.

**For more details see fiche:**



Green Elements for VET Curricula in Albania.



## Developing the technical skills required

In order to develop the technical skills needed for the green transition, new VET programmes and components of existing programmes are needed. In both these cases, existing programmes need to be assessed against emerging green skill needs. Though qualifications review processes vary between countries, key tasks involve updating the occupational (competence) standards that underpin qualifications and associated curricula. For example, in **Poland**, curricula are updated and adjusted to the needs of the green economy in cooperation with employers and social partners. For example, in 2021 a new green skill related to the organisation of organic farming was developed for the agricultural and horticultural sector. National core curricula for VET occupations define technical green skills specific to individual occupations, for example in the energy industry (renewable energy), chemical industry (environment protection, waste management) and construction (environmental engineering).

Updating should ensure that qualifications are not only in line with green skill needs from the side of industry, but also reflect the environmental goals in national legislation (which might be called the ‘green fundamentals’). It also means making sure that there is enough investment in new teaching materials and the professional development of teaching and training staff to support delivery.

In **Belgium-Wallonia**, [adaptation of the training offer](#) is underway in which the Training Department for Small and Medium Enterprises (SFPME) and the Walloon Institute of Training in Work-study and Self-employment and Small and Medium-sized Enterprises (IFAPME) have created a new training programme related to the green trade of ‘suburban market gardener and farmer’ since 2022. A new module on waste management is available to learners in areas as diverse as construction and logistics.

In **Luxembourg**, starting in 2019, the [Smart Buildings and Energy programme](#) has been focused on technicians’ programmes in relation to smart technologies and smart buildings and energy. Implementation in individual schools has involved the linking of theory and practice, so that in addition to working together with people from the field, the programmes provide opportunities to get a glimpse of real professional life in green industries.

In **Austria**, [‘Metal Technology’](#), as one of the most popular apprenticeship courses, was the first curriculum for apprentices in which green skills were formally integrated. The success of the apprenticeship training derives from the fact that this is seen as a common task and is a key responsibility of all the relevant stakeholders at national level. The development of training regulations is a process that has been implemented in Austria by law and involves government representatives, social partners and the school administration (concerning the part-time vocational schools), working together as part of the Federal Advisory Board of Apprenticeship Training (Bundesberufsausbildungsbeirat, BBAB).

Training courses of short to medium duration that cover green skills in energy and the environment are being developed in **Portugal** and will be integrated into the [National Catalogue of Qualifications](#). With these standards, training providers can develop their own tools to support education and training practice such as toolkits, software, digital learning tools, etc. A transversal unit for climate transition literacy and resource sustainability has also been designed to be included in several qualifications of the National Catalogue of Qualifications.



*“Existing programmes need to be assessed against emerging green skill needs.”*



## Greening courses for reskilling and upskilling adults

A further aspect of programme development involves developing courses for reskilling and upskilling adults. This is especially important to make sure that the existing workforce is equipped for the green transition. Courses can support ‘short-term adaptation’ and provide ‘first-level induction on the challenges and opportunities of the green transition.’<sup>51</sup> The inspiring practices illustrate the wide range of interventions that can be taken in relation to upskilling and reskilling.

In **Austria**, a **Climate Protection Training Centre** was established in 2022 in the region of Lower Austria. The Centre is a joint measure of the Public Employment Service and the Vocational Training Institute of the Chambers of Labour and the Austrian Trade Union Federation. It aims to address regional needs for skilled workers in green jobs and will cover all areas of vocational training, from I-VET to upskilling and reskilling measures. The initiative will retrain job seekers along with other VET students in cooperation with renowned manufacturers, energy suppliers, trade associations, schools and universities.

In **Finland** the structure of qualifications/programmes includes space for optional modules. A new **module on climate responsibility** was introduced in 2022, which is available to anyone taking a VET course. The vocational competence requirements in the unit include the examination of the background of climate change, the presentation of the impacts and solutions to climate change and the enhancement of work with climate responsibility. Students demonstrate their competence through practical tasks on climate responsibility in their chosen vocational field.

In **Luxembourg** a **training programme on ‘waste and resource management’** was introduced for adults on Continuing Vocational Education and Training (CVET) courses in 2015. The three-day course introduces the principles of the circular economy in relation to waste management and presents an overview of relevant legislation. More recently, a seminar has been developed, which shows organisations how to move towards being ‘carbon-neutral’ and is applicable to a wide audience. The seminar will train participants in the calculation of an organisation’s carbon footprint, which could provide the basis for seeking carbon-neutral certification in the future.

An inspiring practice involving partners from **Italy, Spain, France and Malta** through the **LIFE FOSTER** project has developed courses in food waste reduction for adults (and young people) that are based on the same model. The programme can be easily adopted in different countries. With a focus on preventing food waste through concrete solutions that can be applied in the food service industry and in households, the project takes a holistic approach. As well as encompassing training in the causes and consequences of food waste, it also includes strategy development to fix the problem in one’s own organisation, how to implement an action plan to move from a waste management to a waste prevention approach, and monitoring of progress and results.



*“The inspiring practices illustrate the wide range of interventions that can be taken in relation to upskilling and reskilling.”*

51 Clarke, L. and Winch, C. (2022) VET for a greener construction sector: low road or high road approaches to apprenticeship, in Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*.



## Fostering links beyond VET: greening employment and green enterprise development

VET's links to the labour market is one of its major advantages over other forms of education. Making these links closer has been an objective at EU and Member State levels for many years. With the green transition leading to new employment opportunities, it is important that measures are put in place that ease the **transition from VET into the jobs being created and transformed by the green transition**. There is a wide variety of ways in which this can happen.

An inspiring practice from **Germany** shows how a '[holiday camps](#)' concept for young people can be used to promote green employment, offering experiences of green jobs and providing enhanced forms of guidance. Over a five-day period, participants are supported to discover their own strengths and motivations, while developing insights into social challenges and trends, and reflecting on their own lifestyles.

In the case of **Luxembourg**, modules are included on green topics in the [Diploma+ programme](#) that offers a bridge between upper-secondary education and the world of work. The programme targets youngsters who have just finished secondary education or a higher-level programme, or who have left higher education early and are looking for career direction. The modules 'Innovation Project' and 'Green Skills & Circular Economy' offer an introduction to the green transition and incentivise young people to rethink and adapt their attitudes and habits both in their professional and private lives. There is a focus on entrepreneurial skills development in the context of environmental responsibility.

Programmes are also being developed in Europe in relation to **green entrepreneurship** (see [Section 6 Developing the skills of teaching and training staff](#) on new ways of teaching and learning). The green transition is opening up markets for new products and services, and it is important that, as part of VET, people have the chance to develop the entrepreneurial skills they need. The inspiring practices show that there are strong synergies between the types of generic/transversal/core skills and mindsets required for the green transition and those required as part of entrepreneurship (teamwork, creativity, resilience, etc.).

In **Denmark**, for example, a [national funding pool with an entrepreneur green focus](#) supports local projects that provide young people with a broad insight into and experience of green entrepreneurship. With the skills they acquire, it is intended that students will translate knowledge about green entrepreneurship into their future educational path or business. Projects must be carried out in collaboration with one or more companies, higher education institutions or other relevant organisations, which have knowledge and experience in green entrepreneurship.



*“It is important that, as part of VET, people have the chance to develop the entrepreneurial skills they need.”*



## Greening VET at sectoral and regional levels

The inspiring practices show that **sectoral and regional interventions** are an important part of the landscape for green skills and VET.

### Supporting the greening of sectors

**Sectoral interventions** tend to take place in those sectors most affected by environmental changes and regulations – energy, transport, construction, waste management, etc. Such interventions can play key roles and it is important that they take place within national strategic frameworks to ensure that there is a systematic coverage of all key sectors.

In the Walloon region of **Belgium**, the [Regal Plan](#) focuses on one element of the green agenda – namely, food loss. Initiated in 2018, the Plan comprised of actions aimed at reducing losses and waste at all levels of the food chain by 30 %, and included the development of curricula and training materials, including a digital tool for future food sector professionals. Since 2019 new training courses in business management have included a course module on organic, sustainable development, and a module on the circular economy has more recently been added by IFAPME, which is part of the new Walloon sustainable development project (third Walloon strategy of sustainable development – ‘Food Wallonia’) and pursues 17 objectives of sustainable development.



In **Denmark** there is a raft of measures to support the green transition in VET underpinned by a systematic approach to mapping green skill needs. In this context, the government is providing a subsidy for [nine 'knowledge centres'](#) to prepare new courses and teaching materials tasks related to the green transition. Among other things, the knowledge centres prepare and test new teaching courses and materials as well as assisting with the competence development of VET teachers in sustainability.

The [Neobuild initiative](#) in **Luxembourg** involves key sector players in developing and implementing sustainable construction training programmes and a technology innovation centre for the upgrading skills of workers as part of Continuing VET.



## Greening VET to support regional development

**Regions** can play an important role in green skills development. In some countries, regional green skills anticipation takes place. **France**, for instance, has regional observatories for employment and training that publish studies on green jobs and skill needs, which underpin regional strategies. **Spain's** National Observatory of Occupations has a regional network that identified the key skills gaps in selected green occupations in 2017, drawing on the expertise of regional groups of experts. Regional and local authorities are also often active in respect of measures to develop green skills, according to the distribution of responsibilities within countries' governmental structures. Public-private partnerships are often a feature of such interventions.

In the **Lower Austria region**, a [Photovoltaic Academy](#) was set up in 2022 by a partnership including public authorities, enterprises and social partners. Hosted by a Higher Technical College, the initiative is a response to high demand for skilled workers in the field of photovoltaics. Training consists of several modules that cover theory as well as a 'module practical day'.

An emerging area that is highly relevant to the topic of green skills and the role of VET is that of **regional innovation ecosystems**. Regional development and innovation strategies have a long history in many parts of Europe, but more recently VET has started to play a significant role in their design and implementation.<sup>52</sup> Research suggests that VET (especially higher VET) is well placed to contribute to both applied research<sup>53</sup> and technology diffusion, especially to SMEs.<sup>54</sup> Apprenticeships can also play an important role in local communities and innovation ecosystems around the green transition.<sup>55</sup>

*“Regions can play an important role in green skills development.”*

52 Hazelkorn, E. and Edwards, J., (2019) Skills and Smart Specialisation: The role of Vocational Education and Training in Smart Specialisation Strategies, EUR 29875 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-11889-3 (online), 978-92-76-11890-9 (print), doi:10.2760/828852 (online), 10.2760/34689 (print), JRC118229.

53 Beddie and Simon note the potential to involve VET learners in applied research projects, which will enhance learning and lead to a more innovative workforce. Beddie, F. M., & Simon, L. (2017). VET applied research: driving VET's role in the innovation system. Adelaide: National Centre for Vocational Education Research.

54 Curtain, R. (2004). Vocational Education and Training, Innovation and Globalisation. Adelaide: National Centre for Vocational Education Research.

55 See chapter 4, Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*. Luxembourg: Publications Office of the European Union. Cedefop reference series; No 122 <http://data.europa.eu/doi/10.2801/628930>



The concept of **Centres of Vocational Excellence (CoVEs)** explicitly links VET into these strategies<sup>56</sup> and given the key roles that technology and innovation are playing in the green transition, there are opportunities for VET to become integral to green innovations. A number of green CoVEs are currently funded under Erasmus+.<sup>57</sup>



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## Developing regional vocational excellence for the energy transition

In France, there is a national network of 116 CoVEs, which are distributed across the country and offer a combination of initial and continuing VET, as well as support for the validation of non-formal and informal learning. The CoVEs aim to support the success of students in their training and their integration into employment by offering them different opportunities and pathways, such as direct employment offers or specific training leading to employment. **12 CoVEs focus on the energy transition and eco-industry sector** (Les centres d'excellence Campus des Métiers et des Qualifications de la filière « Transition énergétique, éco-industrie »).

In the Auvergne-Rhône Alpes region the 'Smart Energy Systems Campus' brings together over 100 partners including VET providers, higher education institutions, research laboratories, local authorities and companies. Working together, these partners design and offer innovative teaching methods and access to VET through to doctorate level. Examples of the Campus' broad range of activities include: a survey on the energy transition which has quantified the needs of the regional hydrogen sector in terms of skills and training; the testing of a game – 'Game of Professions' – by guidance counsellors, which has been designed to introduce young people to the diversity of professions with the goal of making young people and adults aware of the different possible training paths to reach a position; and an 'ambassadors' scheme, which enables company representatives to visit VET schools to talk about relevant professions and their personal motivations and career development, to inspire young people.

### For more details see fiche:



The centres of vocational excellence (CoVe) entitled Campus des métiers et qualifications, dedicated to Energy transition and eco-industry.

56 European Commission (nd). *Centres of Vocational Excellence*. <https://ec.europa.eu/social/main.jsp?catId=1501>

57 <https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=10200&furtherNews=yes>



Poland is developing [120 Sectoral Skills Centres](#) (SSCs) which will cover industries related to the green transition, such as various types of renewable energy, environmental protection, environmental engineering and waste management. The centres will provide space for innovative and lasting cooperation between business and vocational education at all levels, and will contribute to ensuring the provision of qualified personnel responding to the needs of the modern economy in all sectors of industry. SSCs tasks will include innovation, development, education and training activities, under which the transfer of knowledge and new technologies to education will be increased, and the ecological and digital transformation will be promoted. The practical training of young people, upskilling and reskilling adults, sectoral training for VET teachers and the preparation of persons with disabilities, so that they can enter employment in a given industry, will obligatorily include a component related to digitisation and green transformation, to develop the learners' green skills and digital skills.



In Spain, the Basque Centre for Research and Applied Innovation in VET ([TKNIKA](#)) runs innovation projects in the areas of technology and management and links these directly to the design of courses for VET teachers, trainers and students in a virtuous circle of development. TKNIKA has partnered with the Basque Energy Cluster (Cluster Energía), which is linked to the European cluster collaboration platform – through its Smart Microgrids<sup>58</sup> project TKNIKA has trained teachers and students in microgrid operations and maintenance, and has created teaching materials to transfer this knowledge to VET centres.<sup>59</sup> Since 2018 TKNIKA has implemented its acuaponic project which develops innovations in the field of aquaponic crops<sup>60</sup> for the entire VET system of the Basque Country and its partners. It has worked on developing new aquaponic production models and sought to transfer knowledge to VET teachers – e.g. through an introductory course on aquaponics that it has designed.



*“The centres will provide space for innovative and lasting cooperation between business and vocational education at all levels.”*

58 Microgrids provide smart grids, which can improve the efficiency of energy that is produced and consumed locally from multiple sources while also being joined to main distribution networks.

59 <https://tknika.eus/en/about-tknika/> and <https://tknika.eus/en/cont/proyectos/smart-grid-isare-2/>

60 Aquaponics combines hydroponics with aquaculture to produce fish and vegetables in a recirculation system. It is therefore a more sustainable means of tackling issues of food insecurity.



## Adopting new ways of teaching and learning

New green skills need new ways of teaching and learning, which means considering both how to green the methods and resources of teaching and learning as well as the environment or setting within which they take place. This is an important area where more research is required, and it is notable that Erasmus + is funding several projects to develop new methods and materials – projects like GREENOVET,<sup>61</sup> which is developing new teaching methods focused on employability and entrepreneurial skills for the green transition, and the European Platform for Urban Greening, which aims to create curricula and learning methods for urban greening professionals in ‘vertical green landscaping.’<sup>62</sup> Digital tools should also be brought into play since the digital transition offers opportunities to do things in greener ways, as discussed below.

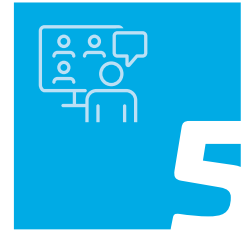
*“New green skills need new ways of teaching and learning.”*

61 <https://www.greenovet.eu>

62 <https://platformurbangreening.eu>



VET is well placed to support the changes in teaching and learning needed for the green transition. The combination of practical and theoretical learning, which is the basis of VET means that it already provides fertile ground for the development of both technical and core green skills such as critical thinking and problem solving. Teaching and training staff are used to a mixture of pedagogies and learning environments, which perhaps makes the challenge of embracing **new teaching and learning methods** less daunting. Certainly, it is important to acknowledge that pedagogical change is not a straightforward process and faces numerous obstacles (e.g. experience with digital technology in the classroom is that quite frequently teaching and training staff continue to use existing pedagogies once new tools have been introduced).<sup>63</sup> Adopting non-threatening approaches to bring about changes in teaching and learning can be important – e.g. aiming to give teaching and training staff more options to add to their portfolio of methods they use rather than mandating change.



## Digital and blended learning

**Digital and blended learning** is perhaps one of the most prominent areas of innovation found in the inspiring practices, and has the potential to expand the range of experiential learning opportunities available (e.g. though augmented and virtual reality). The practices show that the COVID-19 pandemic has given a significant push to this form of learning. From these practices it seems that blended learning is often an integral component of many projects related to the green transition in VET.



*“Blended learning is often an integral component of many projects related to the green transition in VET.”*

<sup>63</sup> See Section 2.1 European Commission (2020) *Innovation and Digitalisation. Eight Insights for Pioneering New Approaches. A Report of the ET 2020 Working Group on VET.* <https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8365&furtherPubs=yes>



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## Connecting with the digital transition

The digital transition links to the green transition in two ways: both in terms of digital learning and also since digital technologies will help provide some of the answers to environmental challenges. This dual aspect is well reflected in the range of practices being taken forward in Luxembourg.

Using digital technologies in teaching and learning is an integral part of the Neobuild initiative, which develops training programmes in sustainable construction, and seeks to develop innovative digital tools to support greener construction methods. Neobuild is Luxembourg's only Technological Innovation Centre for Sustainable Construction and offers companies complete, cross-disciplinary, initial and continuing training courses with a business focus. The aim is to demonstrate that new digital teaching methods can provide a more interactive and dynamic form of learning, where people remain the main actors in the development. Neobuild has built a real zero-energy laboratory where a wide range of innovative materials, products and systems can be tested in real life conditions such as various plasters, insulation materials, different types of triple glazing, wood-cement or straw facades and even vacuum insulated pre-walls.

With a focus on training people in digital skills to solve environmental challenges, the technician's programmes on 'Smart Technologies: Smart Energy' and 'Smart Technologies: Renewable Energies,' which were launched in 2019, help students understand the link between IT and the various technical fields in order to: plan, carry out and document projects; make different devices and computer systems communicate; operate and maintain complex electrical installations; recognise and repair faults in technical installations; and advise clients. Five schools are involved, each focusing on a particular specialism. Learning activities under the programmes include students working on a project to help install a photovoltaic system in a school, and programming and operating industrial robots.

### For more details see fiche:



Neobuild; Technician's programme: "Smart Building and Energy".



Technician's programme: "Smart Technologies".



In **Belgium-Wallonia**, an output of the [Regal Plan](#) is an innovative digital learning tool to raise awareness of and combat food waste. The tool comprises a range of different supports including videos, polls and online quizzes, and it can be used on a smartphone as learning material. Digital tools are also used in the teaching of green skills within the framework of the Start Digital project, and transversal digital skills are being implemented in all occupations including those related to green industries. Thanks to equipment provided by IFAPME, some courses are provided through blended learning.

As part of the [LIFE FOSTER](#) project involving partners from Italy, France, Malta and Spain, a **web application** has been developed to monitor food waste and its costs, which is used by trainers and students in specifically dedicated laboratories. The application was a useful didactical tool to increase students' awareness of their effectiveness in reducing food waste and stimulated them to improve in their work.



## Project-based learning

Another type of pedagogy which has great potential for supporting the skills development needed for the green transition is **project-based learning**. This form of learning is well suited to provide the sort of interdisciplinary learning and problem solving that replicate the complexity of environmental challenges. It can also be extended across classrooms and workplaces to help enterprises tackle their environmental issues and into the local community (see also [Section 8 Linking with civil society to develop co-curricular activities](#)). Amongst the inspiring practices, project-based learning is often linked to the development of entrepreneurial skills.

In **Albania**, [green elements for VET curricula](#) have been developed which include textbooks and other teaching and learning support materials (in hard copy or digital format) that contain green elements, as required by the learning outcomes of respective qualifications. Furthermore, 'Environment and Sustainable Development,' which is part of all vocational qualifications (branches/profiles) at Grade 13, includes practical activities and small projects to protect the local environment. Indeed, all vocational schools organise extracurricular activities focused on local environment protection measures.



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### Project-based learning with experts in civil society

Local communities provide a potentially highly-valuable resource for VET schools, teachers and trainers to develop project-based learning for sustainability. The Fair Trade in Action initiative has been run at municipal level in Murcia, Spain for around two decades. The 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. The establishment is open for around six weeks each year and is complemented by an online store.

Learning is interdisciplinary and wide-ranging. Student activities include market analysis, brand development and promotion, converting a workshop classroom into an attractive point of sale, and commercial tasks such as sales, fulfilling orders and after-sales customer service. Students are also encouraged to use new technologies in stock management and in collection, and payment operations as well as online sales. Teachers from different educational centres work together to provide didactic materials to support the learning.

In addition to favouring professional interdisciplinarity, the initiative helps the transmission of educational values to the entire community of the educational centre such as solidarity, equality and justice. Contributing to environmental awareness and cultural diversity knowledge, this practice adds an ethical value to training in commercial activities and marketing.

**For more details see fiche:**



Fair Trade in Action.



## Learning by developing digital products and services for the green transition

Amongst the inspiring practices, project-based learning often includes a digital element in the form of involving students in the development of innovative digital tools related to the green transition. This differs somewhat from digital or blended learning per se, which involves using digital learning tools, and it is important to highlight given the increasingly important role that digital technologies are playing in greening our societies and economies.

In **Belgium-Wallonia**, as part of the [adaptation of the training offer](#) taking place, a team of learners have created through the web developer training available in the region an award-winning dashboard that will make it possible to monitor the reduction of greenhouse gases related to the regional strategy for improving buildings' energy efficiency (Calcul O2 project). In this respect, IFAPME has deployed a new digital learning platform for all the network's training courses.

In **Cyprus**, among the tools developed and implemented as part of the [LIFE-FOODPRINT](#) project, are an online '[Collaboration Platform](#)' and '[Food waste calculator](#).' Developed to support the implementation of the 'Roadmap to a Resource-Efficient Europe,' which calls for action to tackle food waste, such tools are aimed at encouraging the adoption of sustainable practices in Cyprus' food and hospitality industries as well as among consumers to have a direct or indirect environmental and economic impact. Another practice from Cyprus shows how a project to [restore classic cars](#) and convert them into electric vehicles – in which there was a significant digital element – can be interdisciplinary and develop both specific skill sets as well as raise awareness of sustainability issues more broadly.

In the [Bulduri Horticultural Secondary \(Vocational\) School](#) in **Latvia**, which has strong connections to higher education and research institutions, a 'smart garden' is being created, which uses a robot to monitor plant growth and health and an intelligent watering system controlled from a local weather station, created in the school. Such design projects provide learning opportunities for students at the intersection of the green and digital transitions.

In **Spain**, teachers and students have been involved in developing an award-winning [educational High Performance Liquid Chromatograph](#) prototype that is a digital alternative to the liquid chromatograph normally used in VET, which is costly to purchase and maintain, uses chemical reagents and produces waste products whose disposal is costly to manage. Objectives for involving students in the development included increasing their skills in teamwork and problem solving.

## Learning for entrepreneurship

As was shown in [Section 3 Fostering links beyond VET: greening employment and green enterprise development](#), the green transition is often linked with entrepreneurship. Several new ways of teaching and learning evident in the inspiring practices are connected to teaching entrepreneurship and the development of business ideas that could support the development of the market for green products and services.

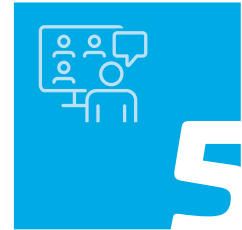
In **Spain**, the [sustainable fashion brand project](#) aims to show how the polluting character of the fashion industry could be reduced through new technology. Activities embraced a range of disciplines and included market research, the creation of a genuine fashion collection, brand development and use of multimedia material to promote the brand.



*“The green transition is often linked with entrepreneurship.”*



Working with other countries through an Erasmus+ project, Spanish partners in the ‘[Sustainability-driven Entrepreneurship](#)’ project sought to respond to the fact that sustainability is not so often included in entrepreneurship studies at educational institutions. The project aimed at improving entrepreneurial competence among students, teachers and trainers, as well as increasing knowledge on sustainability and sustainability-driven entrepreneurship. Teaching and learning materials have been developed to enable learners to, inter alia, discover the principles of sustainable development, develop sustainability-driven business ideas and plans, and evaluate the sustainability impact of businesses.



## Learning through games

**Game-based learning** also has potential to support the green transition in VET. Although often associated today with digital gaming, the use of games in formal learning has a long history.<sup>64</sup> Indeed, there are already many commercial products available – e.g. for designing greener cities or green buildings. Game-based learning also has a well-known track record in engaging people who are disengaged by other learning methods.<sup>65</sup>

That said, game-based learning features less prominently amongst the inspiring practices than the other type of pedagogies described above. An exception is in **Germany**, where the ‘[Education for Resource Conservation and Resource Efficiency” Network](#)’ – BilRes – supports a Travelling Exhibition under which two educational games have been developed – one directed towards everyday life (‘My World – My Things’) and one towards the organisation of events (‘My Event – My Celebration’). Suitable for use in the general subject component of VET that is taught in vocational schools, the games can also be used for pedagogical training.

## How green are our learning resources?

It is important to be aware of the **sustainability of resources and equipment** used and whether greener alternatives are available, as well as reusing, recycling or repurposing old, out-dated equipment. Digital tools may provide more sustainable options, but care needs to be taken in this regard. In **Luxembourg** the [Sustainable Digitalisation](#) practice uses a training course to draw attention to the ‘hidden ecological footprint’ of digital tools and shows how resources can be saved and the ecological impact reduced with concrete and uncomplicated measures.

*“Game-based learning also has potential to support the green transition in VET.”*

<sup>64</sup> Games are also, of course, a prime method through which children learn from their earliest years.

<sup>65</sup> European Commission (2020) Innovation and Digitalisation. *Eight Insights for Pioneering New Approaches. A Report of the ET 2020 Working Group on VET.* <https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8365&furtherPubs=yes>



## Developing the skills of teaching and training staff

VET teaching and training staff<sup>66</sup> need appropriate professional development opportunities to develop a range of skills. The types of skills needed are:<sup>67</sup>

- › the same core green skills they need to teach to their students/apprentices (knowledge of the '3Rs' (reduce, reuse, recycle) critical thinking, adaptability, collaboration, problem solving, etc.), so that they can embed green concepts and activities in all their teaching and learning;
- › skills to implement the curricula and learning programmes that have been greened at national level;
- › knowledge of how the green transition is affecting the industries and occupational profiles relevant to their subjects.

66 Across Europe a wide range of terms are used for those people involved in the various forms of teaching, training and instruction that take place within VET, including tutors, mentors, instructors, trainers in schools, colleges or workplaces. The compendium refers to 'teaching and training staff' to refer to these in all their diversity, taking into account national contexts.

67 See Chapter 8, ILO (2022) *Greening TVET and skills development. A practical guidance tool*. [https://www.ilo.org/skills/pubs/WCMS\\_847095/lang--en/index.htm](https://www.ilo.org/skills/pubs/WCMS_847095/lang--en/index.htm)



Such skills need to be embedded in initial training for teaching and training staff, and relevant short continuing professional development (CPD) courses need to be developed to enable upskilling and reskilling. Since CPD for teaching and training staff takes place within the context of their day-to-day working lives, national measures may also be needed to support VET schools in a national roll-out of green courses. Equally, teachers and trainers may learn ‘on the job’, co-creating their learning with students, as the example from Luxembourg below shows. Other measures that may help the green upskilling of teaching and training staff include: networks for exchanging good practices similar to the subject networks of which teachers are often part; and schemes that recognise exemplary work by teaching and training staff in greening VET through ‘green champion’ or ‘green ambassador’ schemes.



The position of **in-company trainers** (as well as other staff who might have a mentoring role) is different from that of school-based teachers and trainers.<sup>68</sup> In a VET context, teachers are pedagogical experts, while in-company trainers bring in detailed business/occupational knowledge and skills, and typically a narrower range of pedagogical competence. In many countries, in-company trainers’ roles are typically in need of professionalisation. They are much less likely to receive pedagogical training and official certification of their role than school-based teachers. This provides an important and challenging context for potential measures to support the greening of in-company trainers such as short CPD courses. Other potential measures include joint learning opportunities with school-based teachers, participation in green teacher networks and ‘role swaps’ with teachers.

As Cedefop pointed out in 2022, while European countries have many initiatives on sustainability in VET in general, they have relatively few initiatives on how to prepare VET teachers and trainers for the integration of the green dimension in VET.<sup>69</sup> Amongst the inspiring practices showcased in this Compendium, measures to support the professional development of teaching and training staff are often included as part of green VET development packages (such as the example of the integrated set of supports introduced in **Finland** – see [Lighthouse: Implementing holistic strategies and practices for permanent change](#)). There are also specific examples included in the inspiring practices.

In **Albania**, as part of introducing [green elements for VET curricula](#), environment and sustainable development issues are part of VET teacher training standards, pre-service training programmes and continuous professional development programmes. General education teachers at vocational schools are also trained on integration of green concepts (and not only) in their respective subjects.

In **Cyprus** an online workshop, ‘**VET goes GREEN**’, has been developed to introduce teachers and trainers (in all areas of VET including apprenticeships and lifelong learning) to the rationale for and concepts underpinning sustainability in VET. The action shows how VET teachers and trainers can equip their trainees (students) with skills that will help them contribute to green development. There was a specific focus on technical professions and teaching methods that combine practical with theoretical teaching and learning.

*“Teachers and trainers may learn ‘on the job’, co-creating their learning with students.”*

68 European Commission, Directorate-General for Employment, Social Affairs and Inclusion, Broek, S., Pagliarello, C., Vroonhof, P., et al. (2017) *Teachers and trainers in work-based learning/apprenticeships: final report*. Luxembourg: Publications Office of the European Union. <https://data.europa.eu/doi/10.2767/34652>

69 Cedefop (2022). *Teachers and trainers in a changing world: building up competences for inclusive, green and digitalised vocational education and training (VET): synthesis report*. Luxembourg: Publications Office of the European Union. Cedefop research paper, No 86. <http://data.europa.eu/doi/10.2801/53769>



Denmark has launched a [subsidy for the Centre for IT in the teaching of vocational education](#) for the preparation and testing of new teaching courses and materials with a focus on sustainability and green transition. The Centre for IT in the teaching of vocational education acts as a professional beacon across all VET.

In **Germany**, the national initiative '[VET for Sustainable Development](#)' ran from 2020 to early 2023 to train in-company trainers. A range of projects was funded including: the development of a 'Box of Ideas' to offer assistance with the implementation of the nationwide standard of 'environmental protection and sustainability;' and modules to enable the development of business models based on sustainable management principles. Both (in-house) face-to-face and (remote) digital learning were used.

In **Luxembourg**, as part of the [technician's programme 'Smart technologies'](#), teachers in one school (the Lënster Lycée International School (LLIS) in Junglinster) set up a specific 'sustainable group,' in which they learn about sustainability together with their students. Learning takes place through projects, discussion rounds, in extracurricular places of learning and in everyday situations crucial for the implementation of sustainable development.

In 2022, the Regional Ministry of Education, Culture and Sports of Castilla-La Mancha in **Spain** launched a set of [training courses for teachers related to clean energy and energy saving](#). Run annually, the training is carried out by the trainers of an energy company, and teachers are expected to transfer their new knowledge and skills to their classrooms.

**Transnational mobility** projects can also play a role in boosting skills for the green transition of teaching and training staff. The [Erasmus+ project 'Itinérís'](#) taken forward by SFPME and IFAPME in **Belgium-Wallonia**, shows how Erasmus+ funding could be used to boost trainers' green skills by observing practices in Finland. The objective 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 included visits to training centres and to construction companies.



*“Transnational mobility projects can also play a role in boosting skills for the green transition.”*



## Activating VET learning venues

An important component of greening how people learn concerns the creation of **greener learning venues**. Greening the learning environment is an important part of creating an immersive setting that promotes green mindsets and behaviours.

While the greening of teaching and learning can proceed in small, incremental steps as simple as putting up posters on green topics in classrooms or workplaces, it has been suggested that more effective and thoroughgoing greening will be achieved only when a VET school adopts a ‘whole institution’ approach based on a green ethos and encompasses every aspect of their organisation and operations. As UNESCO/UNEVOC has pointed out:

*“A strong basis of green values and ethics, combined with knowledge, skills and competencies, is an important foundation [for VET schools] ... This greening culture must permeate the entire personnel of the institution, from the most senior administrator to new recruits. The culture must be understood, consistent and prominent in both policy and practice.”*

UNESCO, 2017, Greening TVET, p. 41



In ‘green VET schools’ **all infrastructure and practices** are considered from a sustainability perspective. Institutional values and practices are reviewed and adjusted, and all staff and students are involved in determining the green priorities of the school. Sustainability plans are used to set objectives and specific tools are used for monitoring and measurement, such as energy efficiency and carbon footprint assessment tools, and audit techniques for assessing procurement principles. Sustainability guidelines are developed and used to provide all staff with knowledge about how to green their activities. Practical measures include taking steps to reduce waste and improve recycling, make more efficient use of energy, apply green principles to procurement, and enhance green spaces so as to provide a better environment that can also be used as part of a greener curriculum – ‘greening the campus.’ It is vital that VET school sustainability plans integrate professional development plans for their teaching and training staff. Schools often have some responsibilities for professional development and there needs to be coherent links to national developments in this area, which ideally would include in-company trainers too.



Equally, it is essential to consider the **employer dimension** in greening teaching and learning. Evidently, there are opportunities for ‘spill-overs’ and ‘cross-fertilisation’ between schools and workplaces in VET to support the green transition, e.g. by sharing green technologies.<sup>70</sup> But consideration can also be given on how to create ‘sustainability-oriented learning venues in companies,’ such as those piloted in **Germany** in the context of a programme conducted by the Federal Institute for VET (BIBB) called ‘Vocational education and training for sustainable development 2015–19’. An analysis of these projects concluded the following:

“Sustainability, particularly general and sustainability-oriented apprenticeship, should be based on the needs of the company and society, the challenges of the company, and the specific work and business processes ... The design of sustainability-oriented learning venues in apprenticeship requires a holistic organ-isation development process that encompasses all levels of a company, from the strategic level ... to the design of learning and working environments, to teaching and learning situations.”<sup>71</sup>

70 Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*.

71 Weber, H. and Wittig, W. (2022) Learning venues in apprenticeship as a key to sustainable development, in Cedefop and OECD (2022). *Apprenticeships for greener economies and societies*.



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## Taking action at VET school level

In Latvia, the Riga State Technical School not only seeks to integrate green thinking into teaching and learning, but also into the everyday tasks and practical activities of the school, thereby seeking to reduce its ecological footprint – e.g. by transitioning to cleaner energy sources and implementing the ‘3Rs’ – reduce, reuse, recycle. In addition, green innovations are pursued with external partners. Through joint efforts with leading innovation companies, a prototype of a solar battery canopy has been created for charging the school’s electrical cars. Provision for unmanned aircraft pilot training for the needs of economic sectors (construction, energy, railway) has also been integrated into the curriculum of programmers, with the air space for drone control training being adjustable in compliance with state civil aviation agency requirements for organising unmanned aircraft training.

Another institution, Bulduri Horticultural Secondary (Vocational) School is not just an educational institution, but also a company which, since 2016, has been implementing various innovative green approaches and business ideas. It also has strong links to higher education and research institutions, which opens up possibilities for progression. Its plant biotechnology laboratory enables VET students to train in a scientific research environment, and it also has the only smart garden in Latvia through which students can develop their ornamental plant knowledge and practical cultivation skills in real conditions, while also exploring the latest autonomous watering and lighting systems and robotic plant monitoring systems.

### For more details see fiche:



**Bulduri Horticultural Secondary (Vocational) School.**



**The Riga State Technical School.**

National Green Skills Competence Centres are being set up in **Austria**, and the [Green Village Training Centre](#) (GVTC) established at the Higher Technical College BULME in Graz was the prototype. The Green Village concentrates on green technology in every course of initial VET and CVET offered by the school and gives students the chance to become familiar with all types of renewable energy through hands-on experience of equipment loaned by industry.

In **Denmark**, a [special subsidy for providers of vocational training](#) is used to develop local activities to support the green transition such as teachers’ professional development, working with companies, preparing teaching materials and investing in equipment to lower carbon dioxide emissions.

In **Estonia**, a series of [‘Green Talks’ webinars](#) has been conducted to raise awareness of green issues and support greener policy-making in VET by addressing the needs of policy-makers, leading employers and the national VET team. As a bottom-up initiative from VET experts that mostly represents VET institutions, the webinars were part of an initiative to provide ‘design-thinking training’ aimed at adopting creative and innovative approaches to the development of green skills and the promotion of the green transition. As part of the initiative, regular short vision webinars ‘Green Talks’ (*Rohejutud*) were created for a wider audience, mainly on the topics of green transition in VET – including the circular economy, hydrogen economy and the quality of the living environment.



An inspiring practice from **France** shows how the remit of the [health and citizenship committee of each school](#) has been expanded to include environmental education – an important structural change empowering schools to embrace the green agenda. For example, under the new arrangements, a vocational upper-secondary school in the Toulouse region has developed a project to upgrade its courtyard from simply a grassy space to a living space with high biodiversity that could enhance the well-being of the student community.

At Maria Regina College and Mosta Zokrija Secondary School in **Malta**, there is a focus on [reducing the carbon footprint in agribusiness education](#). In a move to reduce the use of synthetic fertilisers, a biogas digester has been installed, which captures gases so they can become a source of greener energy. Students are involved during all parts of the project and are given practical hands-on tasks to use and monitor the system.

In **Spain** the '[Renewable Present](#)' project in Aguas Nuevas, Castilla-La Mancha, seeks to green VET on two levels. First, it seeks to develop a culture of sustainability in all areas of VET at the school through the application of ISO 14001 Environmental Management. Secondly, individual disciplines in the school are greened, so that there is a project in the avionics department to develop hydrogen battery-powered drone prototypes. In agriculture, Internet of Things (IoT) technologies are being developed to control agro-ecological facilities such as through the automation of agricultural irrigation using probes and photovoltaic energy.

In Santurtzi, in the Bilbao Metropolitan Area of **Spain**, the '[Green Entrepreneurial Schools](#)' initiative is a circular economy project created by the San José de Calasanz school, which focuses on strengthening the curricula of entrepreneurial skills by including a module on 'sustainable entrepreneurship'. With close links to the TKNIKA circular economy platform, activities of students and teachers include not only generating business ideas and developing sustainable educational entrepreneurship projects, but also carrying out eco-design studies of the centre and its exterior space.



*“Students are involved during all parts of the project and are given practical hands-on tasks to use and monitor the systems.”*



## Focusing on green social goals

Although VET is distinguished from other forms of education by its intrinsic links to the labour market and hence to economic goals, it also has important social functions. VET's client base is frequently composed of learners with low to middle skills who come from disadvantaged backgrounds, and VET is often seen as a means of combating early school leaving. It is also often actively engaged in developing the competences of people from disadvantaged communities, such as migrants and refugees.

In this context, VET has an important role to play in ensuring a **just and inclusive green transition** in which the benefits of greening are distributed fairly in society. VET learners stand to benefit from putting in place pathways into new green employment opportunities (especially for young people) or skills upgrading in relation to green skills (for adults).

The green transition also opens up possibilities to reach beyond traditional stakeholders and to **engage with a wider group of actors in society**. Doing this can widen the possibilities for learning beyond the mainstream curriculum by drawing on environmental expertise in local communities.

*“VET has an important role to play in ensuring a just and inclusive green transition.”*



## Providing opportunities for green skills development for disadvantaged communities

Although the social inclusion aspects of the green transition in VET do not feature prominently in the inspiring practices, they indicate the great breadth of the possibilities that VET can develop.

In **Poland**, [120 Sectoral Skills Centres](#) are being developed as Centres of Vocational Excellence that will include green industries such as different forms of renewable energy and waste management. Their remit includes developing opportunities for people with disabilities to access suitable training paths that will enable them to enter employment in such industries.



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### Ensuring an inclusive green transition through VET

It is possible to use employment opportunities in the green economy to improve the employability of both refugees and the communities that are hosting them. Starting in 2019, VET and skills certification has been implemented for Syrians and Turkish host communities in Türkiye in the renewable energy sector including solar power and wind energy.

Activities have included: the development of a 247-hour training programme that takes place in a blended learning format; the creation of online learning materials, the sustainable renovation of learning spaces; the provision of relevant renewable energy equipment; and the holding of workshops with the private sector to identify company skill and training needs as well as to discuss internship and employment opportunities. In addition, a programme has been developed to train teachers and trainers, along with an 'inclusive classroom practices' seminar.

#### For more details see fiche:



Increasing employability for Syrian refugees and Turkish host communities in the renewable energy sector.

*“It is possible to use employment opportunities in the green economy to improve the employability of both refugees and the communities that are hosting them.”*



## Linking with civil society to develop co-curricular activities

Local actors and NGOs active in environmental sustainability have knowledge and expertise that can be a valuable resource for VET institutes and teaching and training staff. Local environmental issues can provide a focus for active enquiry and discovery by students through engagement with local environmental groups, parents, etc., which also impacts positively on local communities.

Such ideas were first developed amongst universities, which sought both to capitalise on students' engagement with environmental issues and to offer them the opportunity to develop wider skill sets through **extracurricular or co-curricular activities**.<sup>72</sup> In light of their popularity and success, consideration should be given to how they can be transposed into VET. Opportunities include setting up student green clubs, involving learners in determining the sustainability priorities of VET schools, running schemes to improve sustainability practices on campus and helping in local community environmental activities. Such activities provide complementary learning experiences outside – but linked to – the mainstream curriculum and help students develop core green skills. Some universities have developed ways of acknowledging such activities and skills through 'green ambassador' schemes,<sup>73</sup> awards and diploma transcripts.

A number of the inspiring practices mentioned elsewhere in the Compendium involve actors from civil society including Luxembourg's technicians' programme in smart renewable energy, which includes inputs from Greenpeace ([Section 3 Developing the technical skills required](#)), and the practice from Murcia in Spain where a Fair Trade NGO is involved ([Section 5 Project-based learning](#)).

An inspiring practice from **Cyprus** shows how NGOs and civil society organisations can play a key role in a national initiative to tackle food waste. The key objective of the '**LIFE-FOODPRINT**' project is to directly involve stakeholders from the food and hospitality industries of Cyprus as well as social actors such as local authorities and NGOs in creating a 'Collaboration Network' for 'social food donation.' The project involves consultation with stakeholders followed by the implementation of training for professionals and students from the food and hospitality sectors.



*“Local environmental issues can provide a focus for active enquiry and discovery by students.”*

72 See, e.g., McCoshan, A. and Martin, S. (2014) *From strategy to implementation: the second evaluation of the Green Academy Programme*. York: Higher Education Academy. <https://www.advance-he.ac.uk/knowledge-hub/strategy-implementation-second-evaluation-green-academy-programme>

73 It is worth noting that the World Wide Fund for Nature (WWF) has for many years run a 'green ambassador' scheme for schools.



## Implementing networks and platforms for collaboration

Providing ways in which actors involved in VET can share and exchange their experiences and good practice examples can be a beneficial way of supporting the green transition. Collaborative networks and platforms are a popular tool in this respect in many areas of education, bringing together teaching and training staff, and VET institutions. In the green transition they can also benefit from the involvement of organisations involved in education for sustainable development more broadly, civil society groups and NGOs. It is not always necessary to build networks from scratch – apprenticeships in particular usually offer established platforms for such collaboration, which can be refocused to address pressing green transition related challenges or extend their composition to include new stakeholders. Amongst the practices in this Compendium, we can find examples of local, regional and national networks and some with an intended global reach.

In the examples presented in this Compendium, networks are often set up as part of wider projects. For example, the [Green Village Training Centre](#) in Graz in **Austria**, as well as implementing renewable energy curricula in the electrotechnical engineering college involved, also involved the building up of a ‘Green Transition’ education network with institutions in sectors beyond secondary education level – i.e. with primary schools as well as technical universities and universities of applied science.

*“Actors involved in VET can share and exchange their experiences and good practice examples.”*



Similarly, an important element of the '**LIFE-FOODPRINT**' project in **Cyprus** has been to bring together relevant actors from all sectors – public, private and civil society – to tackle the issue of food waste through the development of training courses. Its 'Collaboration Network' for 'social food donation' is intended to strengthen the collaboration between all actors of the food supply chain, which is crucial in achieving more sustainable food systems and practices. The network gives access to online materials and networking events.

Implemented in the Basque Country, **Spain**, **TKNIKA's circular economy platform**, launched<sup>74</sup> in 2018, is a digital platform that supports the development of projects for TKNIKA's Circular Economy Network comprising three VET centres and other actors in the public and private sectors. The platform involves students and teaching staff of VET centres involved in the catering, maritime and fisheries sectors.

The Compendium also offers examples of networks and platforms that have been in existence for several years and which were established in their own right, rather than as parts of other projects. In **Luxembourg** an **exchange platform** has been developed since 2010 to connect professional actors and to enable them to share practices and training materials on education for sustainable development. The exchange and information platform connects organisations and institutions on both national and global levels, and from both the educational community and the interested public. The network's website hosts training opportunities and educational materials and examples of good practice and experiences, as well as offering a space for building joint interdisciplinary educational projects.



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### Building exchange networks

The BilRes network was launched in 2014 to enable stakeholders in Germany to exchange ideas and knowledge on the topic of resource efficiency and conservation. It aims to bring together as many actors as possible within and outside the education system who are critical to integrating resource education into the various areas of education (school education, vocational training, higher education, further education) as well as in politics, business, social partners and civil society.

Key activities are organised to support the exchange and development of educational materials and best practices. One area of focus is the careful and efficient use of raw materials, for which an award has been developed for student projects. The BilRes Travelling Exhibition has developed two educational games to help develop students' competences in resource efficiency.

For the field of VET, the provision of resources and teaching materials for training staff is of particular interest. For example, materials on 20 training occupations have been designed to support teachers in developing 'raw material competence' in trainees. In 2019, the BilRes network was recognised as an 'outstanding educational initiative for sustainable development' by the Federal Ministry of Education and Research (BMBF) and the German Commission for UNESCO.

**For more details see fiche:**



Network 'Education for Resource Conservation and Efficiency'.

74 The Basque Centre for Research and Applied Innovation in VET.



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