

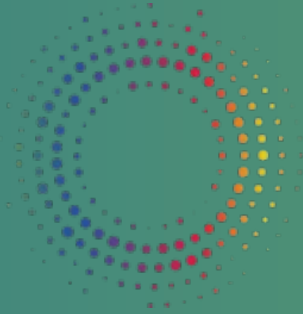
GREETA

GREENING
RESPONSES to
EXCELLENCE through
THEMATIC
ACTIONS

**GREENING OF VOCATIONAL
EDUCATION AND TRAINING:
PROCESSES, PRACTICES AND
POLICIES**



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PREFACE

“Right here, right now is where we draw the line. The world is waking up. And change is coming, whether you like it or not”

Greta Thunberg, UN Climate Summit, September 2019.

The interlinked green and digital transitions are creating a need for new skills and knowledge that are essential to building a sustainable and digitally enabled economy. It is becoming increasingly clear that decisive actions are needed to reduce carbon emissions and utilise new technologies in the best way to safeguard our planet’s future.

In recent years, there has been a shift towards incorporating green practices and sustainability along with new technologies into vocational education and training (VET) programmes. This greening of VET aims to equip learners with the knowledge, skills and mindsets needed to contribute to an environmental sustainable way of working, producing and living.

The European Skills Agenda, the European Education Area, the 2020 Council Recommendation on VET, as well as the Osnabrück Declaration, all include clear references to vocational excellence as a driving force for reforms in the VET sector.

The greening of VET represents an important step towards a more sustainable future. It is no longer a question asking why to engage in the greening of VET, but how to embed greening into the entire VET system. This requires a significant mobilization of resources and capacity in VET and to succeed in this endeavour, an unwavering commitment to achieving VET excellence is essential.

The European Training Foundation (ETF) - the EU agency supporting EU neighbouring countries to reform their education and training systems in the context of the EU’s external relations policies – acts as an important facilitator for partnerships, peer learning and practice sharing in vocational excellence. To tap into the knowledge accumulated globally, the ETF Network for Excellence – ENE – is a global network of centres of vocational excellence (CoVEs).

These centres are committed to excellence and in identifying and imparting relevant, high quality and specialised technical skills. In contributing to regional skill strategies, they promote employment and regional development. They often work closely with employers

to foster innovation, applied research, entrepreneurship and provide opportunities for initial training as well as the continuing up-skilling and re-skilling of adults.

CoVEs worldwide have, irrespectively their different framework conditions, a shared sense of urgency in responding to the green and digital transitions and an interest in learning from sustainable practices.

The green initiative - GRETA – Greening Responses to Excellence through Thematic Actions – supports greening of VET and is implemented in the global frame of ENE. The present report provides insights into the greening processes, practices and policies. It is aimed at VET stakeholders invested in strengthening the development of VET and VET excellence.

The ETF would like to thank the ENE members and in particular the core GRETA group of CoVEs from Armenia, Georgia, Latvia, Serbia, Slovenia, Spain, Türkiye and Ukraine for their active involvement in peer reviews and for sharing of practices. We admire the commitment of the Ukrainian centres despite their difficult circumstances following the full-scale military aggression of the Russian Federation against Ukraine on 24 February 2022. We are grateful for the contributions and presentations provided by international practitioners and projects at GRETA's thematic learning sessions. We give recognition to our strategic cooperation with UNESCO-UNEVOC, the Danube Strategy Platform and the European Vocational Training Association.

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Abbreviations

Cedefop	European Centre for the Development of Vocational Training
CoVE	Centre of Vocational Excellence
DG	Directorate General
DigComp	Digital Competence Framework for Citizens
DTI	Danish Technological Institute
ENE	ETF Network for Excellence
ETF	European Training Foundation.
EU	European Union
GreenComp	European sustainability competence framework
GRETA	Greening Responses to Excellence through Thematic Actions
NGO	Non-governmental organisation
SDGs	Sustainable Development Goals
STARS	Sustainability Tracking, Assessment, and Rating System
STEAM	Science, technology, engineering, arts and mathematics
TVET	Technical vocational education and training
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNEVOC	UNESCO Vocational education
VET	Vocational education and training

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1. Introduction

The European Training Foundation's Network for Excellence - ENE - was launched in 2020 and is supporting centres of vocational excellence (CoVEs) towards excellence in relevant and quality skills delivery through strategic development partnerships. The global ENE network has more than 270 members from more than 40 different countries – and it is still growing.

Vocational excellence implies a comprehensive and inclusive conceptualisation of skills provision – addressing innovation, pedagogy, social justice, lifelong learning, transversal skills, organisational and continuing professional learning and community needs. The ENE network supports both established and emerging CoVEs to access, share and absorb good practice.

There is no common definition for CoVEs, and they are as diverse as the vocational education and training centres they represent. They come in all shapes and sizes, each with its own unique purpose, structure and functions. From vocational schools to training centres, CoVEs are mostly individual entities seeking to connect with the private sector and help shape the future of VET (ETF, 2020a).

CoVEs stand out from other VET institutions for several reasons. Firstly, they tend to specialise in a particular vocational area, such as green technologies, digital skills, or health care, which allow them to develop expertise and provide high quality vocational training. Secondly, CoVEs collaborate closely with industry partners, other VET institutions, and stakeholders to develop innovative training programmes. Finally, CoVEs have an international focus and aim to establish partnerships and collaborations with other CoVEs globally, enabling them to stay up-to-date with the latest trends and developments in their field.

These unique characteristics make CoVEs valuable players in the VET sector, providing high quality training that meets the needs of students, industry and society. Furthermore, because of their distinctive characteristics and commitment towards progress CoVEs can be powerful engines encouraging changes to the whole VET systems.

Within ENE, the green VET initiative, GRETA – Greening Responses to Excellence through Thematic Actions – focuses on skills development and supports the greening of VET as response to the green and digital transitions. It conducts peer reviews, provides structured peer learning, practice sharing and policy advice.

The green transition concerns reducing carbon emissions, improving energy efficiency, and promoting renewable energy sources, while the digital transition involves the integration of digital technologies in society.

Skills for the green transition, or green skills, require a comprehensive set of knowledge, abilities, values, and attitudes to excel in and support a sustainable and resource-efficient society. Green skills encompass both technical knowledge and transversal skills, as well as knowledge, values, and attitudes that enable professionals to effectively use green technologies and processes and make pro-environmental decisions in both their work and personal lives.

The greening of VET refers to the gradual process of aligning training practices, culture, and institutional operations with the principles of environmental sustainability. This involves ensuring that VET programmes and qualifications equip learners with the knowledge, skills, and values needed to support the green transition. The process of greening is gradual and is influenced by digital advancements and innovations. It affects all aspects of an institution's educational and training activities.

GRETA was established as ENEs green initiative in October 2021 when 14 CoVEs from EU neighbouring countries (Armenia, Georgia, Serbia, Türkiye and Ukraine) together with 4 CoVEs from EU members states (Latvia, Slovenia and Spain) joined the initiative. These CoVEs are hereafter referred to as the GRETA core group. Annex 1 provides a list the CoVEs.

GRETA applies a whole institutional approach to the greening of VET, by which environmental sustainability is not just a topic to be taught in VET programs, but also a fundamental principle to be integrated into the policies, practices, and culture of VET institutions. It recognizes that environmental sustainability is a cross-cutting issue that requires a holistic and integrated approach involving a range of VET stakeholders. This approach also helps VET institutions to identify and address systemic barriers to sustainability, and to engage all stakeholders in the transition towards a more green and sustainable future. The whole institutional approach provides a framework to continuously evaluate and improve sustainability practices, and to measure the impact of efforts to become more sustainable over time.

A series of interlinked peer learning activities on the greening of VET was designed and implemented in the period October 2021 – April 2023, in cooperation with the Danish Technological Institute. Annex 2 provides a detailed overview of the peer learning activities.

Plans for new activities to be provided by GRETA have already been made for the period starting in July 2023 and continuing throughout 2024.

During the initial phase of GRETA (October – December 2021), the core group conducted self-evaluations to gauge their progress towards the greening of VET. This provided the basis for engaging in peer learning activities, which involved a structured peer review process and thematic peer learning sessions co-designed by the core group.

In the second phase (January – April 2022), the core group was divided into four sub-groups based on interests, experience, and learning requirements, each undertaking thorough peer reviews, including online

peer visits. A total of 14 CoVEs participated in the peer reviews, and their results of the peer views were shared among the core group. Some CoVEs from the core group developed green action plans following these activities, which generally have supported participants in critically reflecting on their own practices while also helping them to identify their strengths and challenges regarding the greening of VET.

The third phase (May 2022 and April 2023) involved collaboratively designed peer learning sessions centred around specific themes. The purpose of these sessions was to exchange knowledge and experiences with a larger group of peers and projects regarding the challenges faced and potential strategies to advance the greening of VET. Open to all ENE members, they focused on the exchange of knowledge and best practices within five greening dimensions of the whole institutional approach applied in GRETA. The sessions provided a platform for peer learning, with an average attendance of 100 participants from ENE who actively engage in discussions about how to excel in the greening of VET. More information is about the session are provided in the box below.

By using the organised peer reviews and thematic peer learning activities, implications of the greening of VET have been identified and innovative practices in various economic sectors and occupations have emerged.

Against this background, the present report analyses practices and the challenges in the processes for the greening of VET and provides policy recommendations on how to advance in sustainability and green skills development.

Chapter 2 provides a detailed description of the whole institutional approach to the greening of VET, which is the methodological framework used in the GRETA activities. The approach identifies five dimensions that are addressed in greening efforts.

Chapters 3 to 7 examine opportunities and challenges for greening initiatives within each of these dimensions. Next to highlighting the activities of GRETA core group in each dimension, the chapters also

present relevant practice examples that were originally shared during online thematic sessions.

Finally, the concluding chapter offers policy recommendations to the different stakeholders playing a critical role in addressing the challenges to the greening of VET.

1.1 The GRETA skills context

Global production is currently undergoing two simultaneous and interlinked transitions; the green transition and the digital transition. Also referred to as the twin transition, these transitions aim to transform production and consumption practices sustainably, while leveraging digital technologies to improve energy and production efficiency. The green transition focuses on reducing carbon emissions, improving energy efficiency, and promoting renewable energy sources, while the digital transition involves the integration of digital technologies in society. The green and digital transitions can complement each other, but can also clash on certain aspects. The green transition aims to decouple economic growth from environmental harm to tackle climate change. On the other hand, the digital transition is driven by enterprises seeking economic gains through digital technologies, which consume electricity and resources and generate waste. Only if managed well, digital technologies can support the green transition.

Governments together with social partners, employers' and workers' organisations, are essential in ensuring fair and inclusive green and digital transitions as these transitions bring significant changes to the way of living and the job market, requiring new skills and competencies impacting employment opportunities.

The UN 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, established the global framework for achieving an integrated sustainable development model by 2030 among the Member States.

As an EU policy response to the green transition, the European Green Deal serves as an umbrella for a wide range of initiatives addressing the need to reduce the carbon footprint of the European population and achieve environmental sustainability. The Green Deal policies have multiple objectives. These include transition the energy supply from fossil fuels to renewables and encourage sustainable transport modes such as rail and inland waterways. They also seek to reduce air and water pollution, promote sustainability in the European food system, harness industrial spearheads in the twin transition, and provide financial support for new technologies, sustainable solutions, and disruptive innovation. It encompasses a range of measures, including investing in cutting-edge research and innovation, creating new green jobs, reducing pollution, and enhancing resource efficiency. Additionally, a strand of the Green Deal, the



European Climate Pact, addresses European citizens directly by providing the opportunity for individuals to make pledges for actions to promote sustainable practices. Recognising the potential of green skills in driving sustainable change, the pact has made skills development one of its core priorities.

Complementing the European Green Deal is the Green Deal Industrial Plan, an initiative designed to help the industrial sector embrace economic competitiveness while prioritising environmental responsibility. By emphasising innovation, resource efficiency, and green skills development, the plan aims to support industries as they navigate the green transformation. The Industrial Plan includes an allocation of €750 billion through the Next Generation EU recovery instrument, laying a foundation for the green transition. The Net-Zero Industry Act aims to simplify regulations for the manufacturing of important green technologies while also providing opportunities for up-skilling and re-skilling the workforce through renewable skills partnerships and net-zero academies.

The EU's commitment to a sustainable future extends beyond its borders through Green Deal diplomacy and the Green Diplomacy Network. These actions aim to engage with international partners, promoting climate action and environmental protection globally. By sharing best practices and fostering cooperation, the EU is working to ensure that the green transition leaves no one behind.

It is predicted that the global economy could lose up to 71 million jobs if skills development is not prioritized during the shift towards a circular economy. However, strategic policies and investments in reskilling could reverse this trend and even result in a net growth of 18 million jobs in the energy sector alone. To ensure a successful transition, it is crucial to acknowledge that over 1.47 billion jobs worldwide rely on a stable climate and that the advancement of technology will create new job opportunities that require green skills development. (World Economic Forum, 2022).

The green transition impacts various sectors and occupations in distinct ways, and there is a need to adjust to new skill demands. Niche

occupations, including those in research and development, sustainability training, and green career counselling, will also require new skill sets. Moreover, the transformation of all occupations to become more sustainable will demand the integration of a range of qualities, abilities and values. Technical skills for the green transition include adapting and implementing processes and technology, while transversal skills are more holistic and linked to thinking and acting green. (Cedefop, 2021).

Examples of specific skills for the green transition include:

- Energy efficiency: The expertise to optimize energy use and minimize waste in buildings, transport systems, and industrial processes.
- Renewable energy technologies: The knowledge and technical skills necessary to install, maintain, and operate renewable energy systems, such as solar, wind, and hydropower.
- Circular economy: The capability to design and implement closed-loop systems that reduce waste and promote the efficient use of resources.
- Sustainable agriculture: The skills and knowledge required to develop and implement sustainable farming practices that protect natural resources, support biodiversity, and minimize pollution.
- Environmental management: The capacity to evaluate, manage, and monitor environmental risks and impacts in different settings, including businesses, government agencies, and non-profit organisations.
- Green marketing and communication: The skills needed to communicate sustainability-related messages effectively to various audiences, such as consumers, policymakers and stakeholders.

Currently, there is a clear shortage of relevant skills required for the green transition, which is a global issue, particularly prevalent in Europe, according to the Centre for Global Development. However, only a few countries prioritize the development of VET to achieve their national adaptation plans' climate goals, and even fewer countries have clear

strategies for promoting technological advancements and skills for the green transition systematically (UNESCO-UNEVOC, 2021).

A policy action set out in the European Green Deal is GreenComp, a European initiative that aims to identify and promote the development of key competencies and skills required for the green transition. According to GreenComp, the following are some of the most important skills required for the green transition (Bianchi, et al., 2022):

- Digital skills: The use of digital technologies, such as data analysis and simulation, is increasingly important in the green transition. This requires individuals with strong digital skills, including proficiency in computer programming and data analysis.
- Interdisciplinary skills: The green transition involves a range of sectors, from energy and transportation to agriculture and manufacturing. Individuals with interdisciplinary skills, such as an understanding of both technical and social aspects of sustainability, are in high demand.
- Entrepreneurial skills: The green transition requires individuals with an entrepreneurial spirit, who can identify and create new business opportunities in the green economy. This includes skills in innovation, risk-taking and project management.
- Sustainable management skills: Sustainable management skills, such as an understanding of environmental impact assessments and life-cycle analysis, are critical for making informed decisions in the green transition.
- Communication and negotiation skills: Effective communication and negotiation skills are essential for building partnerships and engaging with stakeholders, including government, industry and communities.

It is evident that to enable the green transition, it is not only technical skills related to reducing energy, material, and water consumption or preserving biodiversity that are crucial. Transversal skills also play a significant role. A green mindset is equally important, as it involves adopting values and attitudes that prioritize sustainability and resource efficiency in

every aspect of life. Having a green mindset means understanding how environmental, social, and economic systems are intertwined and making choices that promote a well-balanced relationship between them.

A comprehensive tool for the green transition is the integration of the taxonomy of skills for the green transition into the European Skills, Competences, Qualifications and Occupations (ESCO) framework. It identifies 381 skills, 185 knowledge concepts, and 5 transversal skills in ESCO that are crucial for a successful and equitable green transition of the labour market. The taxonomy serves as a valuable point of reference for the development of green training programs in VET.

Firstly, the ESCO portal allows access to the taxonomy for a closer examination of green skills and knowledge concepts, such as which sectors and occupations they are linked to. Additionally, the taxonomy defines which skills and knowledge concepts are essential or optional for greening a specific occupation and identifies skills for the green transition that can be applied across different occupations. Lastly, the taxonomy categorizes green skills and knowledge concepts based on education standards such as the International Standards Classification of Education (ISCED-F). With this information, VET providers can identify and define skills to integrate into their curricula and training programs to support the green transition.

Relating to digital skills, the DigComp is the framework developed by the European Commission to define digital skills for individuals to fully participate in the digital society. It provides a common reference for assessing and developing digital competencies across Europe. The DigComp framework consists of competencies in areas like Information Literacy, Communication, Digital Content Creation, Safety, and Problem Solving. It describes skills at different proficiency levels. In relation to VET, the DigComp framework promotes digital inclusion and literacy and serves as a roadmap for designing training programs, curricula, and evaluating digital proficiency. The framework is widely adopted, bridging the digital skills gap and empowering individuals to succeed in the digital era.

The DigCompEdu framework, also known as the European Framework for the Digital Competence of Educators, provides a comprehensive guideline for educators to enhance their digital skills and competencies. It serves as a reference point for educational institutions to ensure that educators possess the necessary digital skills to effectively integrate technology into teaching and learning.

The GRETA initiative focuses on skills development and supports the greening of VET as response to the green and digital transitions.

By adopting a collaborative approach to peer learning, CoVEs can explore and test new training programmes and greening practices as well as exchange on key challenges and how to drive the greening process forward.

2. Greening of VET: the whole institution approach

The greening of VET is a process that entails aligning training practices and institutional operations of VET institutions with the overall concept of sustainability. It means ensuring that VET programmes and qualifications prepare learners with the knowledge, skills, and values necessary to work in sustainable industries. This process is incremental and influenced by digital developments and innovations. The greening of VET reaches into all aspects of an institution's educational and training activities and could lead to an incremental and systematic change process.

GRETA applies a whole institutional approach to its peer the greening of VET and it is tailored to the specific characteristics of CoVEs.

It is based on the guidelines provided by UNESCO-UNEVOC emphasising the importance of integrating sustainability and green skills into all aspects of VET institutions, including policy, planning, curriculum development, teaching and learning, management, and operations. These guidelines also highlight the need for multi-stakeholder engagement and collaboration, including partnerships with industry and social partners (UNESCO-UNEVOC, 2017).

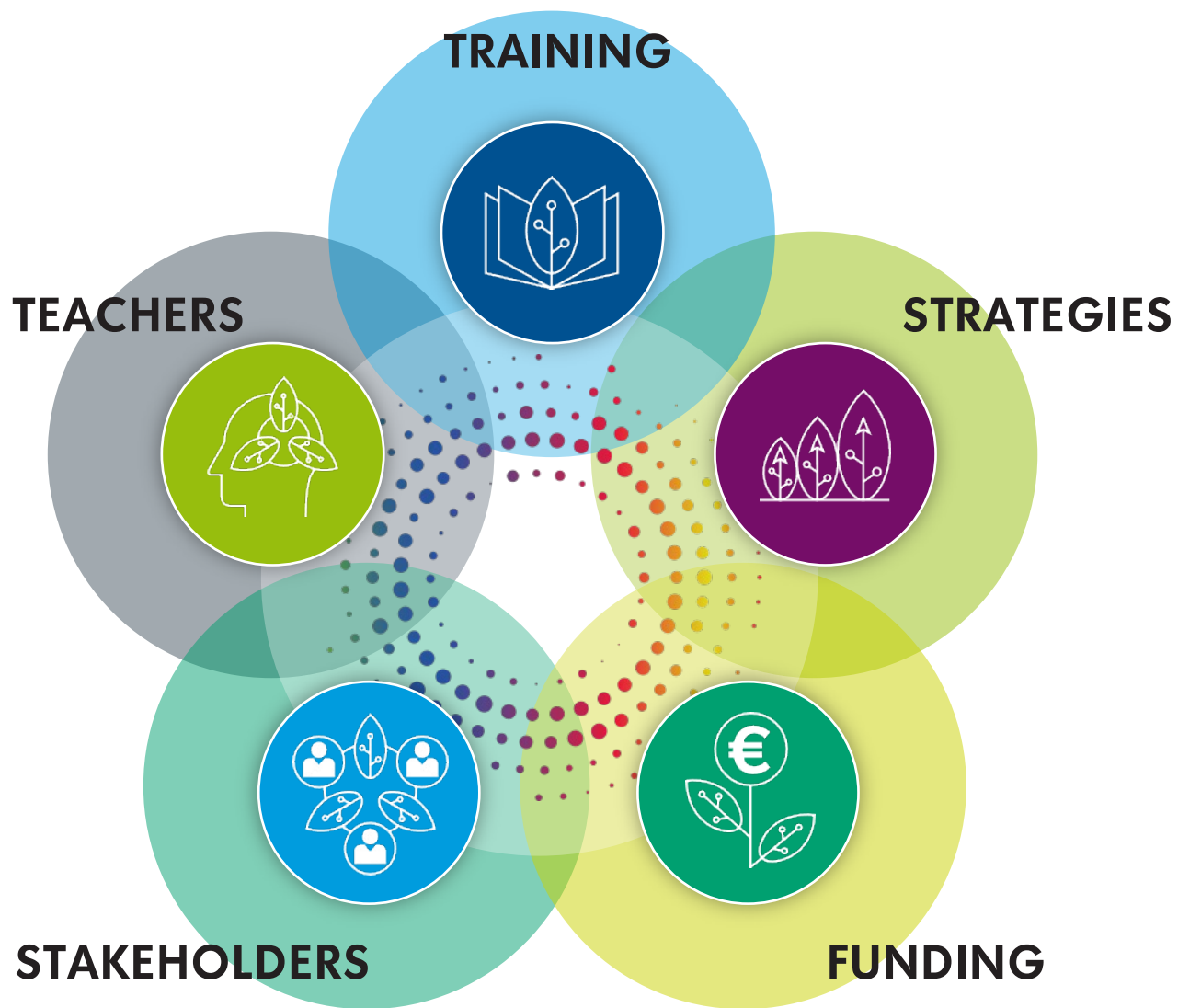
The whole institution approach recognises that the greening of VET requires a comprehensive and integrated approach, considering all aspects and elements of the institution's culture and operations. For VET institutions, this means that sustainability is not just a subject to be learned but rather a way of 'living what we learn': The school's facilities and buildings may have sustainable use of energy and resources, community partnerships with external businesses and stakeholders can promote sustainability, the curriculum integrates sustainability into subjects, and teachers and staff create a learning environment that develops skills for sustainability (Rieckmann, et al., 2017).

The figure overleaf illustrates GRETA's whole institutional approach and its five dimensions of greening.

Moving clockwise, the figure depicts the five dimensions of the whole institutional approach in the greening of VET, along with the rationale for each dimension:

- **Training:** Greening the curricula and training programmes is essential for providing learners with green skills for the labour market, and also for changing values and mindsets. Greening the curricula may include anchoring sustainability goals in non-green programmes or introducing new green programmes.
- **Teachers:** Teachers play a critical role because they are responsible for delivering education to students. The whole institutional approach emphasizes the importance of professional development and training for teachers to ensure they have the necessary skills and knowledge to deliver high-quality green education.
- **Stakeholders:** The whole institutional approach recognises the importance of partnerships between VET providers and a wide range of stakeholders in order to support the green transition, including parents, government officials, knowledge institutions and, the business sector. Each of these stakeholders brings unique perspectives and resources that can contribute to the success of the green transition. Also, the alignment of skills delivery with the regional and national green policies is included in this dimension.

Figure 2 1: The whole institutional approach to greening of VET



(Source: European Training Foundation)

- Funding: The development and implementation of green initiatives, such as those related to the greening of curricula or teacher training, requires resources – for instance with regard to acquiring necessary instructional materials or access to relevant technologies. The greening of VET thus also depends on dedicated financing and the availability of funding opportunities for initiatives supporting this process.
- Strategies: A systematic approach to the greening of VET requires the development of greening strategies. VET providers can develop such strategies by formally defining priorities, objectives, and timelines, for instance in regard to greening their campus or addressing the four greening dimensions outlined above.

Self-assessments completed by the GRETA core group, as well as peer reviews were structured according to the different greening dimensions in the approach. The results of the peer reviews were used to further fine-tune the elements of the approach. The thematic peer learning online sessions in GRETA that took place between May 2022 and April 2023 also addressed the greening dimensions.

The following five chapters unfold the greening dimensions of the whole institutional approach and examine opportunities and challenges for greening initiatives based on activities and lessons learnt from the GRETA initiative.

3. Greening curricula and training programmes



To successfully navigate the green transition, it is imperative to cultivate a diverse skill set, comprising technical and transversal skills, including those related to the utilization of new technologies.

A systematic provision of green skills within VET depends on the development and implementation of curricula that either green existing training programmes or lead to the creation of new training programmes for emerging jobs in the green economy.

There are differences as to how the term ‘curriculum’ is applied in different national education systems. It can be defined as a detailed description of the objectives, content, duration, expected outcomes, learning and training methods of an education or training programme. (ILO, 2019).

The fundamental element in the process of greening curricula is the relationship between curricula and competency standards. Competency standards reflect the needs of the labour market, while curricula translate those needs into specific VET training programmes. Competency standards focus on the level of competence required to perform effectively in an occupation. On the other hand, curricula may include other elements due to legislation or specific VET practices and infrastructure not covered by competency standards. Within curricula, learning outcomes express the expected results. The actual delivery of skills depends on the pedagogical methods and training approaches used, including apprenticeships.

The incorporation of social partners and social dialogue is crucial in guaranteeing that competency standards and curricula align with industry demands and evolve with changing skill requirements. Social partners, including employers and employee representatives, provide valuable insights into the necessary skills and knowledge required to succeed in the workforce. Social dialogue ensures the integration of various perspectives, fostering buy-in, and ensuring the quality and relevance of training programmes. As a result, involving social partners and social dialogue in competency standards and curricula development can effectively prepare individuals for successful careers by aligning training programmes with labour market needs.

When working on the development of green curricula, VET institutions can draw inspiration from existing resources defining specific skills and competences linked to the green transition. One example is the sustainability framework GreenComp, mentioned in section 1.1. It provides guidance to educators on promoting specific transversal skills through education programmes to help learners develop the knowledge, values and skills needed to ‘think, plan and act with empathy, responsibility, and care for our planet and for public health’ (Bianchi, et al., 2022) .

Another, more comprehensive example, also described in section 1.1, is the taxonomy of skills for the green transition that has been integrated into the European Skills, Competences, Qualifications and Occupations (ESCO) framework. ESCO provides VET providers with the necessary information to identify and define skills that can be incorporated into their curricula and training programs to facilitate the green transition.

3.1 Practice examples from GRETA

According to GRETA self-assessments and peer review activities, nearly all CoVEs offer at least one training programme that equips students with skills for greening traditional occupations. These efforts to integrate lessons on sustainability and environmental awareness in the general curriculum are an essential step towards creating environmentally conscious students.

For example, blacksmith students have explored the recycling of school materials as an alternative to using new raw materials, integrating the principles of the circular economy that aim to minimize waste and resource depletion by keeping products and materials in use for as long as possible. By applying these principles to their craft, the blacksmithing students learned how to reduce their environmental impact while also developing new skills and techniques.

Similarly, electrician students across the GRETA core group have used case-based learning to gain a better understanding of sustainable heating solutions for homes. This type of learning involves analysing real-life scenarios and making decisions based on available information. By applying this approach to their field, electrician students can develop the skills necessary to provide more sustainable advice to future customers.

In addition to these examples, we see in the GRETA core group how the concepts of green skills also include renewable energy technology, sustainable agriculture, eco-tourism, and green building design.

The following text box provides examples of the GRETA core group's efforts to actively incorporate green skills into their curriculum for traditional occupations.

Text box 1: Examples from the GRETA core group – integration of green skills into traditional occupations

Higher Vocational School No 3, Mukachevo (Ukraine)

The module 'Basics of Environmental Knowledge' is a comprehensive programme that integrates environmental awareness into different subjects across the curriculum. It is designed to equip students with the knowledge and skills necessary to make informed decisions about environmental issues and take action to promote sustainability and conservation in their studies. One of the key topics covered in this module is the use of environmentally friendly materials and raw materials. This includes an understanding of sustainable production practices, the use of renewable resources, and the minimization of waste and pollution in the production process.

Another important aspect of the module is compliance and enforcing energy-saving requirements. This involves teaching students the importance of reducing energy consumption, using energy-efficient appliances and equipment, and implementing strategies to conserve energy in homes and businesses. Additionally, the module covers the rational operation of electrical equipment. This includes subjects on the safe and efficient use of appliances and devices, as well as promoting energy-saving behaviours. Finally, the module focuses on the determination of energy-efficient use of natural energy resources. This involves exploring the different sources of renewable energy, such as solar, wind, and hydroelectric power, and understanding how they can be harnessed to reduce reliance on fossil fuels and mitigate climate change.

Odessa Centre of Vocational Education (Ukraine)

Three training courses have been developed and implemented: 'Fundamentals of Energy Efficiency', 'Fundamentals of Energy Conservation' and 'Fundamentals of Energy Management'. These training courses aim for the students to become more aware of how to minimize the environmental footprint through energy-efficiency measures.

The 'Fundamentals of Energy Efficiency' course is focused on improving the energy performance of buildings and processes through various measures such as improving insulation, installing energy-efficient lighting, and optimizing heating and cooling systems. Students in this course learn about energy-saving technologies and strategies to reduce energy waste and lower energy bills.

The 'Fundamentals of Energy Conservation' course aims to train students on the importance of energy conservation and the impact of energy consumption on the environment. This course focuses on developing habits that reduce energy consumption such as turning off lights and electronics when not in use, optimizing transportation modes, and using energy-efficient appliances. The students learn about the potential environmental benefits of reducing energy consumption and practical ways to implement energy-saving practices in their daily lives. The 'Fundamentals of Energy Management' course is designed to equip the students with the skills and knowledge to develop and implement energy management programs. The students learn about energy audits, data analysis, and performance metrics, and how to use this information to identify opportunities for energy savings and reduce energy consumption. The course also covers energy management systems, policies, and regulations, and how to integrate energy management into the overall business strategy.

Kvasyliv Vocational Lyceum (Ukraine)

Efforts have been made to integrate lessons on sustainability and environmental awareness in its general curriculum to highlight the importance of ecological orientation, the interaction of society and nature, human health and environmental problems. The aim is to develop an understanding of the complex relationships between humans and the environment and the impact that our actions have on the natural world. The curriculum includes topics such as climate change, biodiversity, pollution, waste management, and resource conservation. By incorporating these topics into the general curriculum, students are provided with a comprehensive understanding of environmental issues and the importance of sustainability. This approach is efficient in raising awareness of the impact of human activity on the environment and fostering a sense of responsibility among students to take positive action towards environmental protection.

Construction College 'Construct2' (Georgia)

The college offers a long-term programme with a focus on sustainability. It includes the following: basics of environmental protection, environmental protection and climate changes, waste management, water and air pollution. It aims to provide learning on the importance of reducing environmental impact and preserving natural resources. The programme includes key topics of environmental protection such as ecology, conservation, and sustainable development. Another important focus area is environmental protection and climate change. Students learn about the causes and effects of climate change, as well as strategies to reduce greenhouse gas emissions and mitigate the impacts of climate change. Waste management is another crucial component where students learn about different types of waste, such as plastic, electronic waste, and hazardous waste, as well as strategies to reduce waste production, increase recycling rates, and safely dispose of waste.

Vayots Dzor Regional State College (Armenia)

The college has developed a module in green skills in organic agriculture, which is provided in the programme leading to the culinary occupation. The module aims to learn students pursuing culinary occupations about the importance of organic farming and its impact on the environment. It covers topics such as the benefits of organic farming, soil health, crop rotation, natural pest control methods, and the impact of organic farming on the environment. It also covers sustainable farming practices such as composting, water conservation, and waste reduction. By integrating this module into the culinary occupation programme, students will be able to understand the importance of sustainable agriculture and its impact on the food industry.

Tink Technology and Humanity Colleges (Türkiye)

The colleges do not train towards occupations but provide education within entrepreneurship and ICT-related skills. The college offers a course in the reuse of 'e-waste', i.e., outdated appliances and their parts. In addition, they use alternative teaching methods such as outdoor education or 'values education'. Within the curricula of the traditional subjects, they support education with various artistic activities (games, theatre, music, painting) and with hands-on, problem-based activities such as working on practical solutions for reusing the e-waste. Finally, they incorporate projects that demonstrate how technology can contribute to sustainability.

(Source: GRETA peer review)

At the same time, some CoVEs of the GRETA core group also offer training programmes that deliver skills for emerging occupations in the green economy, such as solar photovoltaic panel installers.

The following text box below provides selected examples.

Text box 2: Examples from the GRETA core group – training programmes for emerging occupations

Vayots Dzor Regional State College, (Armenia)

This college is taking significant steps towards developing a faculty of renewable energy, power plant installation repair, and service. This faculty will offer VET programmes that will equip students with the knowledge and skills necessary to work in the renewable energy industry. The programmes will cover a wide range of topics related to renewable energy, including solar power, wind power, hydropower, and geothermal energy. Students will learn how to install, operate, and maintain various types of renewable energy systems, as well as gain an understanding of the principles behind them. Additionally, the programmes will provide training on power plant installation repair and service, which will enable students to work in the maintenance and repair of power plants. This training will cover everything from basic electrical and mechanical systems to advanced troubleshooting and diagnostic techniques

Hlyboka Professional Lyceum, (Ukraine)

This lyceum has introduced four new environmental education courses in ecology, energy management, energy and materials savings, and ecologically rational operation of industrial equipment. The ecology course covers environmental challenges and sustainable practices, while the energy management course focuses on energy efficiency and reducing energy consumption. The energy and materials savings course teaches students about sustainable resource use and waste reduction. Finally, the course on ecologically rational operation of industrial equipment teaches students how to reduce the negative impact of industrial activities on the environment. These courses demonstrate the

school's commitment to promoting environmental awareness and responsibility, which are vital for addressing environmental challenges.

TINK Technology and Humanity Colleges, (Istanbul, Türkiye),

All courses at these colleges have been digitalised and lesson content greened with the 17 goals of sustainability defined by the UN's Global Green Deal. This shift showcases the college's dedication to preparing their students for a sustainable future. By digitalizing all their courses, the college has reduced paper waste and energy consumption associated with printing, mailing, and storage. This approach not only saves resources but also provides students with access to learning materials at any time, from anywhere, using electronic devices such as laptops and smartphones. Moreover, integrating the 17 goals of sustainability into the lesson content of every course at the college ensures that students have a solid understanding of the environmental, social, and economic issues that the world is facing today. These goals include ending poverty, reducing inequality, combating climate change, and promoting sustainable consumption and production patterns.

(Source: GRETA peer review)

The majority of the GRETA core group has implemented extracurricular activities to promote a green mindset among their students. One of the main reasons cited by the CoVEs for using this approach is the lack of autonomy to adapt and create green curricula, which in these cases are centrally developed at the regional or national level.

These extracurricular activities involve non-formal or informal learning and play an important role in fostering green attitudes in both students and teachers. The aim of these activities is to stimulate students' curiosity, by allowing them to experiment, learn from mistakes and develop a general green mindset, by making sustainability an integrated part of

the education activities. This includes courses offered to students in collaboration with external organisations (e.g., NGOs), as well as activities where students are involved in practical work to improve the environment on campus or in the wider community. The effect of these activities is twofold: the environment is improved when waste is collected and recycled, when rivers are cleaned, or when trees are planted. At the same time, students become aware, not only of issues related to environmental sustainability but also of their capability to act for improvement.

The text box below presents examples of extracurricular activities implemented by CoVEs that are part of the GRETA core group.

Text box 3: Extracurricular activities by CoVEs in GRETA to promote a green mindset among their students

Vayots Dzor Regional State College (Armenia)

This college has launched, with assistance from UNICEF, an Idea Lab operating as a dedicated space for students to explore and develop their creative thinking abilities. In addition to fostering creativity, the Idea Lab also focuses on learning students about waste management and recycling. By equipping students with these skills and knowledge, the Idea Lab aims to empower them to become responsible global citizens who are aware of their impact on the environment and equipped to make positive changes in their communities. Furthermore, by entrusting a group of students to share their newfound knowledge with their student peers, the Idea Lab creates a ripple effect, spreading the message of sustainability and encouraging more individuals to get involved in environmental conservation efforts.

Anatolian Vocational Technical High School (Türkiye)

Prof. Dr. Necmettin Erbakan from this school has implemented a range of extracurricular activities in line with its zero-waste

strategy. Staff and students from different departments have, for instance, collaborated in collecting and repairing broken computers and printers that were sourced from a neighbouring university and other public institutions. This activity not only reduces electronic waste but also provides opportunities for learning and skill development in areas such as repair, maintenance, and troubleshooting. It also promotes the reuse of materials, reducing the need for new resources and ultimately reducing the carbon footprint of the institution.

Further, students were involved in cleaning the school campus and participated in projects where waste materials were recycled and turned into new products. In this way, used metal barrels were turned into benches and old tires were transformed into flower beds. It provides opportunities for students to learn about waste management, recycling, and upcycling techniques.

Other activities entailed the collection of surplus apples from local producers, which were used by students and teachers to produce apple cider vinegar with the waste pulp being used as fertiliser. This demonstrates the potential for resource efficiency and the use of renewable resources. It also promotes learning in the use of organic and natural products, reducing the need for chemical fertilisers and pesticides, which can have negative impacts on the environment.

Together these extracurricular activities are an overall proactive approach towards promoting sustainability and nurturing green skills among staff and students. The focus on resource efficiency and circular economy principles, and the use of renewable resources are important efforts towards a more sustainable future. The activities help to raise awareness about the impact of human activities on the environment and encourage responsible behaviour towards natural resources.

Higher Vocational School No 3, Mukachevo (Ukraine)

This school organises 'green challenges' for its students. With the help of its social media profiles, the school encourages students to participate in activities demonstrating environmental care and sharing the results. Examples include the building of bird feeders from recycled plastic, increasing the use of reusable bags and food containers, as well as a drawing competition with nature and its protection as a theme. On its social media channels, the school has also run informational campaigns aimed at students on various relevant topics on topics, such as water conservation and renewable energy sources. The organisation of 'green challenges' and the use of social media campaigns aimed at promoting environmental awareness among students have facilitated the development of several green skills. These skills include practical skills related to sustainability, communication and collaboration skills, leadership skills, digital skills, and communication skills related to sustainability.

(Source: GRETA peer review)

The text box below contains an example of how the Ogre Technical School in Latvia – one of the CoVEs in the GRETA core group – has worked on greening its curricula by integrating the compulsory learning module 'Green skills' into all offered training programmes.

Text box 4: Integration of the 'Green Skills' module into training offered at the Ogre Technical School, Latvia

The Ogre Technical School (Latvia)

The Ogre Technical School is one of the biggest VET schools in Latvia with more than 1,400 students. It has four educational departments, namely 'Forestry, Wood Products and Hunting',

'Computer Science, Electronic and Administrative Work', 'Design and Art', as well as 'Hotel and Restaurant Services'.

In 2021, the Ogre Technical School released its Investment and Development Strategy setting the 2027 target for the school to become a Sectorial Centre of Excellence and Innovation, based on the pillars of personalisation, lifelong learning, internationalisation, and green education.

Curriculum development and integration of the 'Green skills' module

The CoVE has focused since 2013 on the development of training programmes that are structured according to modules. While initially collaborating with industry partners on developing new modular training programmes, the Ogre Technical School has been restructuring all of its training programmes using this approach since 2016.

In the same year, it became compulsory for all VET schools in Latvia to integrate the 'Green skills' module into their curricula. The module had originally been introduced as a national initiative and its content was last updated in 2020 to better match with EU environmental priorities. The 'Green skills' module aims at providing students with the ability to carry out professional activities in a sustainable manner by acting with respect for the environment and in support of energy- and resource efficiency. In short, the module is to help provide students with a green mindset.

While some VET providers in Latvia have chosen to include it as a separate module, the Ogre Technical School embeds the content of the 'Green skills' module in all its training programmes by integrating it into other modules. Students of 'Heavy vehicle technologies', for instance, are taught basic principles of environmental protection and sustainable practice in the module

'Society and human security'. By being presented with national environmental policies and regulations as well as through practice-based lessons, students learn about the importance of conserving natural environments when working with agricultural, forestry or construction machinery. They learn about different ways to collect and dispose of waste materials responsibly, such as leaked machine oil, while also learning about resource management through lessons on material life cycle principles and the organisation and reuse of resources.

(Source: Ogre Technical School)

Another practice example is the greening of an individual training programme offered by the Danish education provider NEXT Education Copenhagen. The project 'Apprentices for Sustainability' has examined how the United Nations Sustainability Goals can be translated into vocational training skills that enable carpentry students to contribute to a sustainable transition of their craft. It was launched as a pilot project in 2020 following several years of demand by carpentry students to get involved in sustainable development by exploring new and more responsible ways of building with wood. While the project is described in greater detail in the text box below, it has led to the creation of a qualification programme for carpenters allowing them to specialise in sustainable construction (Rangan & Olsen, 2021).

Text box 5: On the greening of the carpentry programme at NEXT Education Copenhagen, Denmark

NEXT Education Copenhagen

NEXT Education Copenhagen is a Danish education provider that offers 40 VET programmes and a range of upper secondary education and upskilling programmes. According to its 'Strategy 2025', NEXT Education Copenhagen aims to improve its educational services by focusing on three key areas. These

include the promotion of thinking and acting more sustainably by integrating the United Nations Sustainability Goals into all offered programmes. Next is creating learning environments that allow for experiments with different approaches to learning and teaching, and providing its students with the transversal skills deemed essential for the positive development of society in the future, such as competencies linked to collaboration, innovation, and critical thinking (NEXT Education Copenhagen, n.d.).

'Apprentices for Sustainability' project

In 2020, a group of carpentry students at NEXT Education Copenhagen gathered signatures to support a greater focus on sustainability in their education. Within 24 hours, the group had received support from 80 students and five large construction companies. This was the starting point for the pilot project 'Apprentices for Sustainability', which has led to the integration of green skills in the carpentry programme at NEXT Education Copenhagen. As mentioned previously, students enrolled in the programme can now receive qualification for a sustainable carpenter with the first graduates expected in 2025.

'Apprentices for Sustainability' addressed important issues related to the green transition, since the construction industry accounts for a significant share of energy-related climate impacts (e.g., steel and concrete production), and toxic and harmful substances have been used in building materials for several decades. On this background, the project helped carpentry students to learn how to build with construction methods that can reduce climate impact by more than 100%. This was possible by using wood from sustainable forestry and other bio-organic materials, while also using building designs that allow for carbon storage. In general, the environmental sustainability of this approach depends on available resources in the region where construction is undertaken, such as access to sustainable forests and low-emission transport of building materials.

The implementation of the project yielded three significant insights. Firstly, empowering students to develop their capacity for sustainable development is crucial. As the project was fuelled by the students' enthusiasm to contribute to the green movement, it was vital to provide them with resources and tools to establish sustainable practices that resonate with them. Secondly, the project has demonstrated that VET can act as a driver for the green movement. By participating in the project, students with apprenticeships in construction companies as part of their education can become advocates and promote new practices related to sustainability in construction. Lastly, the project's success hinged on leveraging existing research, such as the use of bioorganic materials in construction, to create building instructions for craftsmen to foster greater sustainability.

(Source: NEXT Education Copenhagen)

3.2 Key challenges

During peer reviews, peer learning activities, and various presentations in the context of GRETA, a range of challenges were highlighted with regard to the greening of curricula and training programmes. Two challenges emerged prominently among others: firstly, the tension between school autonomy and the need for national curricula, and secondly, the misalignment between company culture and the green economy targets, often observed by CoVEs in the GRETA core group.

Lack of autonomy in the management of curriculum change was repeatedly observed by COVEs in the GRETA core group. In some countries, VET curricula are primarily specified at national level, leaving limited room for individual VET providers to adapt their training programmes towards a greener direction. VET providers wishing to be involved in green skills provision without sufficient autonomy in regard to curriculum development may be forced to integrate transversal green skills into existing programmes or implement a wider range

of extracurricular activities – as exemplified in the previous sections. However, additional demands linked to these activities can lead to teacher and student overload.

The lack of industry exchange, particularly with regard to private companies, was highlighted by several CoVEs, in relation to companies not aligned with greening practices within their sector or occupation. Establishing partnerships with industry stakeholders is recognised by CoVEs crucial for identifying current and emerging skill needs, gaining insight into industry trends, and developing relevant curricula. Without these partnerships, there is a risk of outdated curricula and limited opportunities for work-based learning, apprenticeships, and other forms of practical learning. This is however, challenged because for many of the CoVEs in the GRETA core group there is no basic legislation of VET supporting the idea of partnership.

Furthermore, the lack of a local decision-making process and financial autonomy of VET providers is a barrier for ensuring the sustainability of public private partnerships. These partnerships would provide students at CoVEs with opportunities to learn green skills in an authentic environment.

Therefore, it can be difficult to establish partnerships with enterprises in support of greening curricula and training programmes. This challenge is linked directly to another issue, namely difficulties to secure necessary financing. Where industry support is limited, VET providers may have to rely on public funding, for instance, in regard to upskilling teachers and trainers or collaborations with research institutes and other external partners in support of green skills provision. At the same time, the availability of relevant public funds is likely to depend on government policies and strategies pertaining to workforce development in the context of the green transition.

Furthermore, it is difficult to establish where the primary responsibility for the development of green curricula and training programmes should be placed. While the initial impulse must come from national or regional governments – for instance in the form of strategies for the greening of VET that emphasise the need for green skills provision – the GRETA core group have shown that initiative can emerge from the VET providers in experimental forms. In the most successful examples, the bottom-up experimentation is taken up and upscaled.

Institutionalisation may therefore follow experimental initiatives, whereby collaboration with partners, including other VET providers, industry, experts in sustainability, and public authorities is needed. Similar processes of bottom-up innovation are observable in other spheres or programmes of VET learning; they are facilitated by public-private partnerships, provided these partnerships' purpose is to achieve long-term outcomes and benefits for the learners (ETF, 2020c).

This issue is also linked to the degree of autonomy VET institutions have in terms of developing and adjusting curricula and training programmes. In cases where training providers are required to follow curricula specified at the national or regional level, policy measures – for instance by relevant education authorities – are needed to promote the integration of skills for the green transition into VET.

4. Professional development of teachers and trainers



The continuing professional development (CPD) of teachers and trainers is of crucial importance for the greening of VET. Preparing teachers and trainers for green skills delivery through training courses, peer learning activities, and sharing best practices, is an integral part of a whole institutional approach to ensuring that VET meets the needs of a green economy and society.

In general, VET teachers and trainers need to live up to a range of professional aspects that require ongoing training and development. They need to know the professional processes within the subject they teach, master preferred teaching methods, and work well with students, colleagues, and employers. However, as soon as they are expected to contribute to the greening of VET, the professional responsibilities of teachers and trainers are extended. For instance, while they continue to be responsible for staying informed of the latest technological advancements or changing skill demands in the sector that they provide education for, teachers and trainers may also be required to gain knowledge on practices that can help transition this sector to greater environmental sustainability. They need to stay up to date with relevant environmental policies and standards. Especially when industry partners do not prioritise sustainability and show little interest in access to green skills, teachers and trainers may need professional training to receive inspiration and insights into relevant approaches and practices elsewhere.

Additionally, VET teachers and trainers are also required to take on new roles in relation to career guidance whereas the work-based learning and apprenticeships create demand for them to improve their pedagogical skills and strengthen and improve coordination of their work with teachers.

4.1 Practice examples from GRETA

The peer reviews in GRETA highlight that the upskilling needs of teachers vary significantly, depending on their specific focus areas such as skills, technologies, or sectors that contribute to the greening of vocational education and training (VET). The increasing use of digital technologies to shape more sustainable practices in different industries and sectors requires that VET teachers receive training that covers relevant emerging technologies and practices that can be applied to green these sectors and occupations.

Furthermore, VET teachers and trainers also need upskilling regarding the promotion of transversal green skills among their students. Providing students with a green mindset that enables them to think and act in more sustainable ways both within and outside of professional settings is a significant part of the greening of VET. Next to technical skills, teachers and trainers are thus also required to promote general green skills and values, for example, regarding encouraging responsible ways of consumption. This requires them to have a certain amount of scientific knowledge, for instance about the benefits and costs of green actions.

Most of the CoVEs in the GRETA core group collaborates with industrial partners and other external training providers to identify the relevant upskilling needs of educational staff, design and deliver training programs, and access their effectiveness. This approach enables educators to keep up with the latest trends and best practices in sustainable development and to effectively integrate them into their teaching practices.

Another approach to CPD is self-learning by teachers and trainers. This involves taking the initiative to seek out information and resources on sustainability issues and green skills and integrating them into their teaching practices. Examples of self-learning include attending conferences, workshops, and webinars, reading relevant literature, participating in online communities, and networking with other educators.

Both approaches to CPD in the greening of VET are valuable and complementary. Collaboration with external training providers ensures that educators receive up-to-date and relevant training, while self-learning enables educators to take ownership of their professional development and tailor their learning to their individual needs and interests. Together, these approaches help ensure that teachers and trainers are equipped with the knowledge and skills necessary for the greening of VET.

The text box below contains an example of teacher training activities by one of the CoVEs in the GRETA core group. The Šolski Center Nova Gorica has been proactive in addressing environmental issues and has taken a collaborative approach to finding sustainable solutions. The participation of teachers and trainers in these projects has not only helped them develop new skills but also enabled them to share their knowledge and expertise with their students.

Text box 6: Green professional development of teachers and trainers at the Šolski Center Nova Gorica, Slovenia

About the Šolski Center Nova Gorica

The Šolski Center Nova Gorica is the third largest VET centre in Slovenia offering diverse educational programmes and lifelong learning training in mechanical engineering, computer science and informatics, electronics and energy, wood processing and design, agriculture and horticulture, health and care, as well as transport and logistics. The CoVE focuses on skills provision in line with the green and digital transition.

Activities by the CoVE on green professional development of teachers and trainers

Collaborating with agricultural experts and nature conservation technicians, the Šolski Center Nova Gorica address the problem of invasive species which cause damage to agricultural crops and natural vegetation. The project aimed to reduce the harm caused by invasive species and sustainably control the pests. Teachers and trainers participated in the project, learned about the different ways to control pests and how to prevent them from causing damage. They were also trained on how to use environmentally friendly methods to control pests, which can help to reduce the use of harmful chemicals.

Apart from the project on invasive species, the teachers and trainers also participated in other projects related to nature preservation and ecosystem monitoring. In these projects, they developed skills related to earth and water analysis, with support from regional public service agencies and national research institutes.

The Šolski Center Nova Gorica has also benefited from participating in national and international partnerships, such as a consortium of biotechnical skills. These partnerships have helped to enhance the professional development of the educational staff by providing opportunities for networking, knowledge sharing, and collaborative learning.

(Source: Šolski Center Nova Gorica)

During the GRETA peer learning sessions, various examples of best practice were shared, including the 'Green Spearheads' project. As described in greater detail in the text box below, the project is a collaboration between the Danish Technological Institute (DTI, a research and technology company) and seven Danish VET providers. Under the

leadership of experts from the Centre for Building and Construction at DTI, it focuses on strengthening the knowledge of teachers and trainers regarding sustainable practices in the construction sector.

Text box 7: Developing and implementing green professional development in the project 'Green Spearheads'

The Danish Technological Institute

The Danish Technological Institute (DTI) is a research and technology company based in Denmark that was founded in 1906. With around 1000 specialists, it provides expertise in a wide range of areas, including production, materials, environmental technology, business development, energy, agro technology, meat research, and more. DTI offers support in developing and implementing high-tech solutions in Danish companies, with a particular focus on the technological knowledge needed for the green transition.

Developing and implementing Green Teacher Training in the project 'Green Spearheads'

The project 'Green Spearheads' is a partnership between the Centre for Building and Construction at DTI and seven Danish VET providers. Two teachers from each participating VET institution were directly involved in the project. They provided qualifications for different trades within the construction sector, including carpenters, masons, and concrete finishers.

With the help of DTI expertise on sustainability and resource efficiency within building and construction, a training programme was developed for the participating teachers. It was partly based on existing knowledge of how Danish construction companies intend to contribute to the green transition. The first module of the training programme focused on general aspects of sustainability and the circular economy to help participants adopt a green

mindset. To ensure that the content of the training programme was highly relevant, efforts were made to match it with the professional expertise of the teachers and the qualifications they focused on. The remaining six modules, which comprised on-site training as well as workshops, covered new building materials, hazardous materials, recycling, environmental assessments, as well as relevant regulations and requirements for documentation.

The general approach was for participating teachers to engage in learning activities and afterwards use outcomes to develop related content for courses at the VET provider where they teach. As part of this process, they were asked to do additional research and to reflect on how they can transform acquired theoretical knowledge into practice. This approach was meant to lead to at least one new 'green' training course at each represented VET school.

'Green Spearheads' was partly funded by five Danish labour market organisations, including the Danish Confederation of Industry, the Federation of Danish Workers, and other private associations. They paid for substitute teachers that temporarily replaced the teachers participating in the project while they were occupied by lessons or related homework. The motivation for the project was driven by a combination of environmental concerns and economic interests. The organizations recognize the importance of sustainability and reducing carbon emissions to mitigate the impacts of climate change, which aligns with the Danish Climate Act (with the target to reduce Denmark's emissions by 70 percent in 2030 compared to 1990 and climate neutrality by 2050). Moreover, the organizations see investments in sustainable initiatives as promoting innovation, creating new job opportunities, and gaining a competitive advantage in the global market.

(Source: DTI)

4.2 Key challenges

Based on self-assessments and peer reviews conducted within the GRETA core group, it was found that none of the CoVEs have a well-established and systematic approach to green teacher training. Instead, continuous professional development tends to be fragmented and relying on individual VET institutions to identify the needs of teaching staff and provide appropriate provisions. The GRETA core group has recognized the need for support and guidance to ensure that all teachers and trainers receive training that provides them with relevant knowledge and skills to promote the greening of VET.

However, achieving this goal poses several challenges. One of the main challenges is the financing of adequate teacher training, as previously discussed in the context of developing and implementing green training programs. Additionally, teachers and trainers require green professional development tailored to the specific industry sector or qualification they focus on. Some industry sectors may have limited interest in the development of more sustainable practices, which increases the dependency of VET providers on external partners capable of supporting green teacher training.

Furthermore, policymakers with responsibility for devising incentives and support measures for the professional development of teachers must take into account the mismatch between older and younger generations in terms of awareness and knowledge of the importance of the green transition. VET providers also need to consider and plan upskilling initiatives that ensure both teachers with a sense of urgency around the green transition and those without are enabled to pass on green skills to their students.

5. Green partnerships

A key feature in defining CoVEs is their focus on developing and delivering vocational education and training (VET) through partnerships and collaborations. These partnerships can bring together different stakeholders, such as government bodies, educational institutions, and employers, to form regional partnerships aimed at developing the workforce. CoVEs may also collaborate with other CoVEs and external stakeholders across borders to exchange ideas and inspiration on adapting skills provision to evolving economic and social needs (European Commission, 2021).

In the context of promoting the greening of VET, partnerships and collaborations remain crucial. This section will focus on two types of green partnerships: regional and international. Regional partnerships involve bringing together stakeholders in a specific region to work towards sustainable development goals. International partnerships, on the other hand, involve collaboration across borders to exchange knowledge and best practices on promoting sustainability in VET. By forming these partnerships, CoVEs can promote the greening of VET and contribute to building a sustainable future.

By utilizing a collaborative approach, CoVEs have the ability to experiment with novel training methods, cutting-edge technologies, and teaching practices, and then disseminate their discoveries to the broader VET community. This bottom-up approach for developing solutions to the challenges faced by the VET sector can result in more effective and relevant training programs for students, greater alignment between the needs of industry and VET, and ultimately, lead to system change.



Figure 2.2: Skills ecosystem - partners involved and their responsibilities



(Source: Authors' illustration based on the concept of 'Skills ecosystems' as proposed by Finegold, 1999)

5.1 Regional green partnerships

CoVEs can participate in collaborative networks of institutions and actors, working together to create 'skills ecosystems' at a local or regional level, with the objective of enhancing workforce development and skills.

The diagram in Figure 2-2 above displays the different participants with their respective responsibilities within these networks. While VET providers and employers typically take part in these networks, there are other potential partners such as professional or sector associations, universities, research centres, trade unions, local and regional government agencies, as well as community representatives and non-governmental organizations (NGOs).

In a regional skills ecosystem, stakeholders benefit from each other. For instance, enterprises need VET skills to stay competitive and innovate, while VET providers rely on enterprises to influence their curricula. Universities and research centres also impact skill demands and their provision by VET institutions through research and development. Public authorities provide the institutional frameworks and resources for training and education, relying on VET providers for workforce development. Green partnerships allow for mutual inspiration and co-creation of green skills training and learning methods.

CoVEs can provide high-quality vocational skills and stimulate local business development through partnerships with stakeholders. They can also contribute to regional development and industrial clusters by supporting smart specialisation strategies that bring together public authorities, academia, skill providers, and industry in identifying and promoting individual priority sectors (European Commission, 2017). In many cases, the development and implementation of such strategies have led to environmentally oriented activities and innovation-driven green transition agendas within different European Member States (see, for instance, Harding, et al., 2021).

Social partners and social dialogue are crucial for achieving VET excellence in green skills through regional skills committees. These committees bring together experts and stakeholders from various sectors to identify the skills required for a low-carbon and resource-efficient economy. They promote collaboration, address skills gaps, and share knowledge to ensure individuals and communities have the necessary skills to succeed in the changing job market.

Finally, partnerships with external stakeholders, such as public authorities and industry associations, are important with regard to securing funding for greening efforts and initiatives.

5.1.1 Practice examples from GRETA

Many of the CoVEs participating in GRETA regularly collaborate with public and private partners on specific projects as well as in long-term partnerships. Among the typical partners are other VET or training providers as well as employers, research institutes, and local or regional authorities. The results of the peer review visits indicate that some of the CoVEs in the GRETA core group have well-established stakeholder networks, highlighting their ability to engage partners in collaborations as a particular strength. Successful skills ecosystems involve ongoing communication and engagement with the public authorities to ensure that training programs are accessible and aligned with regional growth strategies.

However, regional green partnerships involving CoVEs from the GRETA core group are relatively rare. Some CoVEs have received funding from public authorities for the greening of their campus, for instance, to increase its use of renewable energy sources and energy efficiency. Others, as exemplified in section 2.1.1, collaborate with public institutions, businesses, or NGOs on extracurricular activities with a focus on environmental sustainability.

The text box below provides examples of relevant partnerships that selected CoVEs in the GRETA core group have engaged in.

Text box 8: Examples of green partnerships

Construction college Construct2 (Georgia)

This college was established as a public-private partnership between the Georgian Ministry of Education and Science and the construction company BK Construction. The partnership aims to address the skills gap in the construction industry and provide vocational training to students interested in pursuing a career in construction.

BK Construction, being a key partner of the college plays an important role in the development and management of the centre. The company provides valuable insights to the college regarding emerging skill needs and technologies in the construction sector, which helps the college to

design its curriculum and training programs accordingly. As a regional partner, BK Construction has also supplied the construction college with sustainable and energy-efficient building materials. These materials are used by students to get hands-on training, enabling them to acquire the necessary skills and knowledge to work with the latest construction technologies and materials. This partnership has not only helped the students to gain practical experience, but it has also contributed to promoting sustainable construction practices in Georgia. Furthermore, the partnership helped to address the skills gap in the construction industry by providing students with high-quality vocational training.

The partnership between Construct2 and BK Construction has been invaluable in developing the VET programme on bricks produced solely from natural raw materials. BK Construction shifted to using aerated concrete blocks in 2021, which are safer and more eco-friendly. Construct2 has revised its bricklaying programme to include training on these blocks, empowering

students to stay competitive in the industry. This partnership demonstrates the value of academia-industry collaboration in driving innovation and creating lasting value.

Higher Vocational School No 7 Kalush (Ukraine)

This school collaborates with regional enterprises in the construction sector. They have provided the CoVE with bio-based building materials enabling students within construction to learn about climate-responsible practices. The VET provider has also collaborated with public authorities on the installation of solar panels on the roof of its campus.

The collaboration offers an opportunity for students to gain practical knowledge and experience in the field of sustainable construction practices, which is increasingly in demand in the industry. Working with bio-based materials enhances the students' understanding of the importance of environmental responsibility and provides them with knowledge of how to use these materials in construction. The students also learn about the unique characteristics and challenges of bio-based materials, which prepare them for working with these materials in the industry. This type of hands-on experience provide a foundation to develop critical thinking and problem-solving skills.

Furthermore, the collaboration with public authorities on the installation of solar panels on the roof of the campus provides students with practical knowledge and experience on the regulatory frameworks on renewable energy. The installation and maintenance of solar panels equips students with technical knowledge and problem-solving skills. The students learn about the economic and environmental benefits of renewable energy sources.

Mykolaiv Higher Vocational School No 21, (Ukraine)

This school has worked with regional business partners to support the professional development of its teachers and trainers. Educational staff responsible for the CoVEs electrical engineering programme visited different enterprises to gain experience in their approaches to achieving greater energy efficiency. Additionally, the CoVE has participated in energy-saving initiatives by local government, such as installing energy-saving light sources across its campus and implementing information campaigns on energy-saving aimed at students. This new knowledge is applied to the classroom, providing students with practical and up-to-date information that can improve their learning outcomes and job prospects.

Additionally, working with local government on energy-saving initiatives help raise awareness among students and staff about the importance of energy conservation. By installing energy-saving light sources across its campus and implementing information campaigns on energy-saving, the CoVE is not only reducing its energy consumption but also promoting sustainable practices that can benefit the wider community.

Higher Vocational School #3, Mukachevo, (Ukraine),

This school has partnered with private enterprise Lika Comfort to transition towards a more sustainable and green economy. Lika Comfort has donated equipment and technology for sustainable energy systems and also helps to define the necessary skills needed for installing and maintaining them.. This public-private partnership between Higher Vocational School #3 and Lika Comfort is promoting environmental sustainability by making the school more environmentally friendly and providing students with practical experience in sustainable energy systems.

The enterprise is also a contributing partner in terms of defining what skills are needed in relation to installing and maintaining more sustainable energy systems. The school management and Lika discusses how specialists in energy efficiency can be trained that the company can employ after finishing their education at the company. The partnership not only promotes sustainability but also enhances the employability of graduates while promoting the development of a skilled workforce.

(Source: GRETA peer review)

During the GRETA thematic session on regional green partnerships, one of the contributions highlighted the development and implementation of a smart specialisation strategy in the Värmland region of Sweden. The strategy, which was developed by the government agency of Region Värmland in collaboration with Karlstad University and other private and public sector organisations, aims to promote economic growth in the region in a sustainable way and in-line with the twin transition. It is described in more details in the text box below.

Text box 9: Smart specialisation in Region Värmland

Region Värmland

Region Värmland (Sweden) is a government agency responsible for publicly funded regional development, healthcare, culture, education, and public transport in the Värmland County, Sweden.

The county has around 274 300 residents with the majority living in the largest regional town of Karlstad. Värmland has a large and traditional industrial base, characterised by companies specialised in pulp and paper, steel and engineering (Länsstyrelserna, 2022).

Smart specialisation in Region Värmland

Region Värmland has collaborated since 2010 with the Karlstad University on innovation activities linked to regional development.

This partnership did not only lead to the creation of the Academy for Smart Specialisation at the university in 2015, but also to the development and implementation of the Smart Specialisation Strategy for the Värmland region in the period 2015-2020. The initial strategy focused on five areas, namely forest-based bioeconomy, health innovation, advanced manufacturing, solar-centred sustainable system solutions, as well as nature, culture, and place-based digital experiences.

Since 2020, Region Värmland and Karlstad University have continued their formal partnership and further developed the regional smart specialisation approach with involvement from private and public sector organisations. As part of these efforts, Region Värmland initiated a mapping of the region's specific skill needs in the following ten years within the priority areas of the regional smart specialisation strategy. It has also examined how educational institutions, including VET providers, could address these needs. Region Värmland published its Research and Innovation Strategy for Sustainable Smart Specialisation 2022-2028 in March 2022 (Region Värmland 2022).

One aspect of Region Värmland's smart specialisation approach with a strong link to the development and promotion of green skills, is related to the forest industry and its focusing on efforts to use raw materials in innovative and more sustainable ways. Region Värmland has also explored how the engineering industry can be developed in a greener direction. For instance, a project on implementing more sustainable energy systems in the sector that run partly on locally sourced forest raw materials.

(Source: Region Värmland)

Another example of a regional green partnership is the collaboration between the Danish VET provider Green Academy and the Danish landscaping company OKNygaard.

As described in the text box below, the partnership was established to address the company's need to upgrade its employees' skills and equip them with relevant green skills. The partnership between the Green Academy and OKNygaard highlights how industry partners can help ensure that teachers remain updated on subject knowledge and contribute to the development of effective training programmes.

Text box 10: Green partnership between the Green Academy and landscaping company OKNygaard

The Green Academy

Green Academy (Denmark), located near Denmark's second-largest city Aarhus, is a VET school that provides a diverse selection of training programmes and qualifications relating to agriculture and land development. These programmes include landscaping, gardening, floristry, foresting, farming, and animal care. The Green Academy provides training in both Danish and English and actively participates in sustainability projects, such as the European Platform on Urban Greening (see section 6.1) and the integration of the United Nations Sustainable Development Goals into its programmes. Additionally, the Green Academy has a longstanding and robust tradition of collaborating closely with industry partners.

The Green Academy's partnership with OKNygaard

OKNygaard one of Denmark's largest landscaping companies with up to 650 employees during peak season, sought the Green Academy's help in providing their employees with skills in

biodiversity and climate change adaptation. The Green Academy responds by providing a needs analysis tool to the company and seeking advice from the local public authority to map

upcoming skills needs. They then drafted a curriculum for a two-day biodiversity training course, which was revised with feedback from OKNygaard.

Throughout this process, the teachers at the Green Academy collaborated closely with representatives from OKNygaard, which contributed to the upskilling of teachers and the development of new teaching resources. This partnership also enabled the Green Academy to establish connections with other national and international VET providers and experts in the field of biodiversity.

To expand the impact of the training course, the Green Academy has successfully offered it to other companies, and teachers from other educational institutions attend the course to observe how it is being taught. Some of OKNygaard's employees who helped create the course are now involved in teaching it at the Green Academy.

(Source: Green Academy)

Another example of successful VET practice comes from Tknika (Spain), a research centre focused on applied research and innovation in VET in the Basque country of Spain. The project called Woodnika, which united members of the Biosciences and Sustainability unit at Tknika with partners from the University of the Basque Country and the local wood industry. The initiative is described in more details in the text box below.

Text box 11: Regional collaboration in the Woodnika project

Tknika


Tknika (Spain) is a VET centre established by the Basque Deputy Ministry of Vocational Education and Training to promote innovation, creativity, and entrepreneurship in vocational education and training (VET) centres across the region. Innovation and applied research are at the core of Tknika in its ongoing efforts to place Basque vocational training at the forefront of Europe. The centre works closely with enterprises to develop skills in vocational training.

Regional collaboration in the Woodnika project

The Woodnika project is led by researchers from the Biosciences and Sustainability Unit at Tknika, and focuses on promoting skills for sustainable development in various areas, including smart building and sustainable construction.

The project involves around 20 employees and brings together students and teachers from different VET centres, including forestry, wood construction, and welding, who worked together with private partners to build a Tiny House. This mobile home is designed for energy-efficient living and built sustainably.

One of the main objectives of the Woodnika project was to rejuvenate the wood industry in the Basque Country by exploring innovative and sustainable ways to utilise locally sourced timber. To achieve this, Tknika collaborated with the University of the Basque Country and industry partners to conduct research on the



durability and suitability of different types of wood for specific products. The partners also worked together to develop training programs that would equip students with the skills needed to create various wooden products, ranging from wooden frames for sunglasses to wood-based filament for additive manufacturing.

As a result of the Woodnika project's success, Tknika was able to develop a degree in wood specialisation, which a private VET provider in the Basque region subsequently offered.

(Source:Tknika)

5.1.2 Key challenges

There are various challenges involved in establishing and maintaining regional (green) partnerships. Firstly, it requires a collaborative and inclusive approach, as well as a commitment to ongoing communication and engagement.

Several CoVEs in the GRETA core group, for instance, have noted that it is difficult to engage employers in green initiatives because they are not prepared to spend time and resources towards such efforts. This is further challenged by the speed and pace of the digital transition.

A key issue that was emphasised is the initiation of regional green partnerships. While VET providers have a growing role in contributing to the green transition, they should not be solely responsible for establishing green collaborations. During GRETA's peer learning sessions, it was highlighted that regional public authorities have an important role to play in this regard.

In the context of larger partnerships, lack of clarity regarding each stakeholder's role and responsibility in achieving a common green goal, and/or coordination falling short of expectations may impede progress.

Further challenges that emerged during peer learning discussions are related to coordination and the lack of robust mechanisms for social

dialogue and skills committees. Without such mechanisms, it can be difficult to ensure that the voices of all social partners are heard and taken into account in the development of training programs. This can lead to a lack of buy-in from social partners, which can ultimately undermine the success of the training programs.

Likewise, other CoVEs have underlined that it can be difficult to secure the necessary funding for regional collaborations focused on greening VET, including the resources required to manage relevant project and acquire necessary equipment.

5.2 International green partnerships

The drivers for international partnerships, specifically in the context of international green partnerships involving VET providers, businesses, NGOs, and other stakeholders, are multi-faceted. These partnerships are essential for fostering the creation, dissemination, and application of knowledge necessary to support the greening of VET. International partnerships can contribute to improving the reputation, teaching quality, and attractiveness of VET, while also being crucial for the alignment between actors at the systemic level.

These partnerships allow foster mutual inspiration and green co-creation, leading to the development of teaching and learning methods most suitable for promoting green skills. International partnerships can operate at various levels, including fostering a green mindset among students, teachers, and management of VET institutions through mobility initiatives, where collaboration can be in the form of visits and interactions across borders.

At the individual level, international green partnerships can help improve the social engagement of students and provide them with exposure to international organizations. At the institutional level, partnerships enable cultural and knowledge exchange, leading to greater diversity, inclusion, and intercultural competencies, all of which are essential for future society and the workforce.

Ideally, internationalisation is ingrained in the mission and values of CoVEs as part of their overall strategy for achieving and maintaining a level of excellence.

5.2.1 Practice examples from GRETA

In addition to participating in international peer learning activities within GRETA, several CoVEs in the GRETA core group have gained experience from other international partnerships – although not necessarily in the context of green initiatives.

For example, the Vayots Dzor Regional State College (Armenia), received help with implementing dual VET programmes as part of an international partnership involving the Armenian Ministry of Education and the GIZ (Gesellschaft für Internationale Zusammenarbeit) on behalf of the German government. The Coskunöz Education Foundation (Türkiye) has participated in several international projects funded by EU and development agencies. Most recently, it participated as an associated partner in the Erasmus+ project Sector Skills Strategy in Additive Manufacturing (SAM).

The Šolski Center Nova Gorica (Slovenia), introduced in section 4.1, is a CoVE among GRETA core with more extensive experience regarding international green partnerships. Some of its international activities were presented at a thematic session in GRETA, as described in text box 13.

Text box 12: Participation of the Šolski Center Nova Gorica (Slovenia) in international green partnerships

International green activities of the Šolski Center Nova Gorica

The Slovenian CoVE has been actively engaged in international partnerships focused on greening since 2010, including participation in GRETA and the European Platform on Urban Greening (EPLUG, see chapter 6), as well as membership in

several international networks that focus on VET, including UNESCO-UNEVOC and the European Vocational Training Association (EVTA).

Participating in international partnerships provides the Šolski Center Nova Gorica with an opportunity to disseminate what is happening at the grassroots level and to contribute to the forming of strategies and policies in the field of greening when working with international associations, such as EVTA.

As a VET institution, the Šolski Center Nova Gorica is dedicated to promoting sustainability and sharing good practices in VET that help to promote the greening of training programmes and VET institutions themselves.

Through Erasmus+ projects, the Šolski Center Nova Gorica has explored various approaches to allow students and teachers to work on experiential learning, including student mobilities to allow students to gain green skills in different settings across Europe. For example within the Talent Journey project, the CoVE contributed to the development of transnational vocational curricula, with a focus on integrating both transversal and technical green skills in the courses developed.

(Source: Šolski Center Nova Gorica)

During a GRETA peer learning sessions, a specific example of an international green project was highlighted, the LIFEFOSTER project, which has received co-financing from the European Commission's LIFE Programme. The project is led by the Italian VET providers network ENAIP NET and focuses on reducing waste within the food industry by raising awareness about the problem of food waste and optimal food storage. As described in text box 14, this is partly to be accomplished by providing education to trainee chefs, kitchen staff, and front-of-house restaurant personnel during their training placements.

Text box 13: The international green partnership LIFEFOSTER

The project partners:

The LIFEFOSTER project is an international partnership between different types of organisations, including VET providers and associations from France, Italy, Malta, and Spain, as well as the Malta Business Bureau and the University of Gastronomic Sciences of Pollenzo, Italy. LIFEFOSTER is managed by ENAIP NET, a non-profit consortium and one of the largest networks of Italian VET providers.

The LIFEFOSTER project:

Every year, a large amount of food is wasted, which could have been consumed, but is consciously discarded during the retail or consumption phases. Food waste represents a poor use of resources and has a significant climate impact in terms of greenhouse gas emissions as well as land and water use. LIFEFOSTER seeks to address this problem and to contribute to the United Nations Sustainable Development Goal on responsible consumption and production by helping achieve a 50% reduction of the amount of food wasted per capita.

Part of the LIFEFOSTER approach to reducing food waste is informing and better preparing the current and future workforce in the restaurant industry. The project raises awareness about food waste as a main global challenge which can be prevented or reduced by adopting more sustainable practices. To this end, trainers, students, and professionals in the restaurant industry are trained in the adoption of food waste prevention practices. The project's strategy is based on the concept 'rethink, reduce, reuse'.

LIFEFOSTER developed a model for VET to address the food waste problem, which involved four steps: 1) defining the problem; 2) identifying the drivers of food waste; 3) adapting and implementing an action plan that addresses selected drivers; and 4) monitoring progress and results. Within this framework, training modules addressing the food waste problem were created for specific professional profiles in the restaurant industry, including chefs and waiters. As part of the LIFEFOSTER project, around 600 trainers and 6 500 students in France, Italy, Malta, and Spain have been trained in food waste prevention practices so far. Furthermore, three online courses have been developed, and they have been attended by 3 500 people.

The starting point for LIFEFOSTER's success was the training of a small transnational group of trainers who, through collaboration, helped to strengthen a sense of community in and around the partnership. Trainers were motivated by the meaningfulness of tackling food waste, which was crucial for long-lasting results.

(Source: ENAIP NET)

5.2.2 Key challenges

The greening of VET through international partnerships may encounter challenges related to differences in national and regional VET systems, as well as varying levels of expertise among potential partners in implementing green practices. However, it also presents an opportunity to gain insight into different systems for inspiration and peer learning.

Funding and resource disparities may hinder these partnerships, thereby impacting the participation of students, teachers, and management in green activities. While different funding options exist, administrative barriers and complex application processes can impede securing the required resources. Furthermore, initiating green partnerships can be complicated due to difficulties in understanding applicable terms and requirements.

6. Funding green initiatives

Funding is crucial for the green and digital transitions of VET for several reasons. Firstly, it is necessary to design and develop high-quality green skills training programmes that meet the needs of learners and employers. This includes investing in curriculum development, instructional materials, and new technology to ensure that VET students and adult learners receive up-to-date and relevant training. Secondly, funding is also necessary to ensure that VET institutions have the necessary infrastructure and equipment to provide skills training. This includes updating and greening existing facilities and equipment, as well as building new ones, to accommodate the training needs of the green economy. Support to the professional development of VET trainers and teachers also requires funding. This includes providing them with training and resources to stay informed on the latest developments in the green economy and to ensure that they are equipped to deliver high-quality green skills training programmes. Lastly, funding can be necessary to provide financial support to learners who may face financial barriers to accessing green skills training programmes. This includes providing scholarships, grants, and other forms of financial aid to ensure that everyone has an equal opportunity to benefit from the green transition.

As part of the GRETA initiative participating CoVEs and experts have shared examples of alternative sources of funding. One example is Institut de Formation aux Métiers des Energies Renouvelables et de l'Efficacité Énergétique Tangier (IFMERE) in Morocco, a training institute and CoVE dedicated to renewable energy and energy efficiency professions. IFMERE is organised as a public-private partnership and this legal construction allows IFMERE to generate revenue by selling continued training courses and consultancy services in the form of technical expertise to the industry at market prices. Approximately 25 % of IFMERE's total budget is covered by income generated from the private sector, and the institute can increase its funding by selling more courses or services.

Text box 14: Example on funding at IFMERE

IFMERE

Institut de Formation aux Métiers des Energies Renouvelables et de l'Efficacité Énergétique Tangier (IFMERE) is a leading VET institution in Morocco that equips students with green and transversal skills relevant for the green transition. Its overall mission is to contribute to Morocco's national energy strategy by providing the renewable energy sector with initial training courses for technicians specialised in renewable energies and energy efficiency, and continuous training for industry employees. IFMERE also participates in research and laboratory tests, and provides technical assistance and consultancy services for the industry.

IFMERE offers three different VET programmes for initial education within solar energy systems, wind power systems, and energy efficiency. Each programme has a duration of 2 years including modules of in-company training for a total of 4 months. The curriculum is developed in close cooperation with the industry and continuously updated in accordance with new demands. For adult education, IFMERE offers a variety of fixed courses as well as tailor-made courses, including courses within photovoltaic solar systems, solar thermal systems and wind systems (including the Global Wind Organisation Certified Training for Wind Energy), energy efficiency, biogas, and electricity as well as courses providing transversal skills like quality assurance, security and environmental skills.





IFMEREE is one of the Institutes of Delegated Management (DMIs) in Morocco, all of which are organised as public-private partnerships. Under the partnership agreement for the establishment of IFMEREE, the Moroccan State takes charge of the construction and equipment of the institute's campuses and delegates their management to a public limited company with a supervisory board and a management board.

IFMEREE's annual operating budget is a mix of public and private funding. IFMEREE's legal status as a public-private partnership means that the Moroccan state compensates IFMEREE for the educational services provided to the government. Besides government funding, IFMEREE generates income from continuing training courses sold to private companies and from services provided for the industry. While the majority of the income comes from public funding, IFMEREE is gradually increasing the share of private funding, which requires a willingness in the market to pay for services provided by IFMEREE and an increase in demand for competence development for employees in the energy sector.

(Source: IFMEREE)

The example demonstrates how a CoVE can generate funding from alternative sources besides national budgets. The following section explores how funding from the European Commission's Erasmus+ programme can support the transition to green VET.

Erasmus+ programme

The European Commission considers the dissemination of good practices and the fostering of collaboration in VET essential ingredients to achieving the green and digital transitions and fighting unemployment and labour shortages by closing the skills gap. Therefore, it offers several funding opportunities to support projects that share that vision, including the Erasmus+ programme.

The Erasmus+ programme, which has an estimated budget of EUR 26.2 billion, is a significant contributor to the European Green Deal and recognises the importance of skills in supporting the green transition. The current programme runs from 2021 to 2027 and consists of three key actions, with a focus on the second key action, which is linked to cooperation among organizations and institutions.

With almost double the budget of its predecessor programme (2014-2020), Erasmus+ places strong emphasis on international mobility and cooperation in VET and adult education. It is managed by the European Commission, the European Education and Culture Executive Agency (EACEA), and National Agencies in Programme countries, as well as National Offices in some partner countries.

The Erasmus+ programme has four key priorities: inclusion and diversity, digital transformation, environment and the fight against climate change, participation in democratic life, common values, and civic engagement. The Commission prioritises project applications that positively address these themes. Eligibility criteria for Erasmus+ calls depend on the specific call, but generally, EU member states and third countries associated with the programmes are eligible. It may also be possible for entities from other third countries to be eligible in duly justified cases and in the Union's interest.

The Erasmus+ programme 2021 – 2027, includes a new action under the title 'Partnership for Excellence', with the purpose of funding the CoVE initiative with an indicative budget of EUR 400 million for the establishment of 100 international CoVE networks by 2021. The CoVE initiative also supports the implementation of the European Green Deal, the new Digital Strategy, and the new Industrial and SME Strategies, as skills are key to their success. The aim is to foster VET excellence by creating innovative and responsive VET institutions that can quickly respond to the needs of the market and society, specifically in regard to the green and digital transitions. Other funding opportunities include Capacity Building Projects in the field of VET, Partnerships of Innovation, and Partnerships for Cooperation.

The European Commission has established a platform to search for Erasmus+ projects, where one can explore project outcomes and stories and find inspiration for future projects.

6.1 Practice examples from GRETA

Based on insights gained from peer learning activities in GRETA, many of the partnership's core members face difficulties in securing necessary funding for green initiatives. However, as demonstrated in the chapter on green partnerships, some CoVEs collaborate with industrial partners to gain access to relevant resources and equipment, while others utilise available EU funds, such as Erasmus+.

During GRETA's peer learning sessions, several examples of Erasmus-funded initiatives were shared. One such example is the European Platform for Urban Greening (EPLUG), which focuses on climate adaptation measures in urban environments. More information on EPLUG is provided in the text box below.

Text box 15: The Erasmus-funded green initiative EPLUG

EPLUG

The European Platform for Urban Greening (EPLUG) is an Erasmus-funded initiative focused on urban greening, climate adaptation, biodiversity, and citizen wellbeing. The project aims to enhance the knowledge and skills required to address these issues and broaden expertise among professionals across Europe. The partnership includes members from six EU countries: the Czech Republic, Denmark, Spain, Finland, Netherlands, and Romania, comprising 16 partners including VET providers, research institutes, and business partners.

EPLUG employs various methods to develop relevant training opportunities for VET teachers and design innovative curricula for

students and employees in the field of urban green landscaping. The initiative features a unique approach to this problem by developing an experience centre on vertical green landscaping called 'Wonder Woods' in the Dutch city of Utrecht. It is a tall apartment building with hanging gardens and plants along its balconies and outer walls. This vertical forest is a perfect example of how the job profile of gardeners and landscapers may evolve in future urban environments.

Extensive research and development are required for successful urban greening of this kind, along with a cultural shift towards greater integration of urban greening into the planning and construction of buildings and infrastructure. One example is the headquarters of the European Medicines Agency (EMA) in Amsterdam, which features an inside, vertical green wall with 21 by 60 meters of greenery. Integrating plants in this manner allows for crossovers between floristry and interior design, while also being beneficial to the wellbeing of those visiting and working in the building.

EPLUG fosters the international exchange of ideas and experience by inviting professionals from other countries such as Finland and Spain to visit the Dutch company that designed and implemented the green wall at the EMA headquarters. In addition, EPLUG organizes webinars to share knowledge and expertise online.

(Source: The European Platform for Urban Greening)

Another relevant example is the European VET Excellence Platform for Green Innovation (GREENOVET). It is an international green project co-funded by Erasmus+ that aims to promote green skills among VET students and teachers through the establishment of CoVEs within four different countries. GREENOVET is described in more details in the text box below.

Text box 16: The Erasmus-funded green initiative GREENOVET

GREENOVET

The European VET Excellence Platform for Green Innovation (GREENOVET) fosters VET excellence in green innovation across Europe, enabling an innovative, inclusive, and sustainable economy. The project is co-funded by Erasmus+ and brings together regional VET providers at different levels, local companies, sector and employer representatives, regional governments, as well as regional innovation agencies. National ministries and social partners are also involved to ensure coordination and coherence across governmental levels.

Its main objective is to develop capacities for green innovation for teachers and students in all EQF levels, industry representatives, and companies. This will be achieved through the establishment of Centres of Vocational Excellence (CoVEs) in four regions: Styria (Austria), Leiria (Portugal), Vaasa (Finland), and Skopje Region (North Macedonia). These centres aim to bring together a wide range of regional, national, and international partners (higher education institutions, providers of vocational education and training at EQF levels 4-8, employers, research centres, and business associations) to develop skills ecosystems that contribute to regional economic and social development, innovation, and smart specialisation strategies. GREENOVET has a total of 18 regional partners from the four regions.

GREENOVET project runs from 2020 to 2024, and its main deliverables include:

- Development of an international cooperation platform for Vocational Excellence in Green Innovation

- A white paper on a model of the structure of regional Green Innovation CoVEs
- Development of an analysis tool for measuring innovation and education capacities of VET providers
- Training programmes for VET education teachers, lecturers, and trainers
- Establishment of an International Quality Assurance for VET excellence in Green Innovation

(Source: GREENOVET)

6.2 Key challenges

In order to prepare students and workers with the necessary skills to meet the changing demands of the job market in the context of the green transition, significant investment is required to create new programs, infrastructure, and resources for VET. However, despite the importance of this investment, there are various challenges in securing funding for the green transition of VET. These challenges have been highlighted by participants in GRETAs peer learning sessions and are supported by research from UNESCO-UNEVOC (2017)

One of the primary obstacles is the limited funding available for VET, which makes it difficult to allocate sufficient resources for the development and implementation of green curricula and training programs. Furthermore, funding is often distributed unevenly across different regions and institutions, resulting in discrepancies in the availability and quality of green VET programmes.

Another issue is the lack of incentives for institutions to invest in green VET programs, as there may be greater demand for traditional programmes. These challenges make it challenging to implement effective green VET programmes and to ensure that all students have access to high-quality training that prepares them for the changing job market.

Additionally, as highlighted by the GRETA core group, short-term funding is typically prioritised over long-term funding, which can hinder the development of green VET programmes. This emphasis on short-term outcomes, particularly job placement rates, can discourage investment in the longer-term advancement of these programmes.

7. Greening strategies

Institutional greening strategies enable VET providers to establish goals, priorities, and timelines for developing and implementing their green initiatives in a structural manner and in partnership with external stakeholders.

Such strategies may involve commitments to attain sustainability certifications for campus facilities or integrate relevant frameworks, such as the United Nations Sustainable Development Goals, into curricula and training programmes. The greening of the campus itself can have a significant impact on the delivery of green skills within VET institutions. By implementing sustainable practices in the physical infrastructure and facilities of the institution, students gain hands-on experience and develop practical skills in sustainability and environmental management. Furthermore, students can be encouraged to take the lead in promoting environmental sustainability on campus as seen in the GRETA core group in relation to the examples of extracurricular activities described in the section 3 on 'Greening curricula and training programmes'.

While comprehensive greening strategies of VET providers may address all dimensions of the whole institutional approach as applied in GRETA and examined in this report, greening strategies are likely to have a specific rather than a holistic focus due to the complexity of the task.

This approach enables VET providers to make incremental progress in the greening of their institutions and educational services.

Several VET providers in the GRETA core group have initially focused their greening strategies on the greening of campus buildings and environments, installing solar panels, implementing facilities for waste management and recycling, and acquiring energy-efficient equipment.



The management of VET institutions is responsible for developing institutional strategies, including those focusing on green initiatives. VET institutions that already have some experience in working strategically with greening can further develop their capacities in this area through relevant upskilling activities. Some green activities may be short-lived and involve a limited number of VET teachers and students, such as extracurricular activities, competitions or study visits. However, other green initiatives, such as the development of green curricula and training programmes or the upskilling of teachers in support of green skills provision, are likely to be complex processes that require careful planning, and ongoing management and monitoring of progress made.

VET institutions may take different approaches to track the implementation of actions defined in greening strategy. As part of the peer learning activities in GRETA, some of the participating CoVEs developed action plans on green initiatives based on the SMART approach which involves detailed definitions of specific green goals, how they intend to be achieved and by what time (Leonard & Watts, 2022).

Another tool that VET providers can use to establish a baseline for their own development is the ENE self-assessment tool, which, includes a section on 'Going green – supporting sustainable goals' (ETF, 2022). VET institutions seeking formal evaluations and approval of their greening process, can apply for external certifications, such as the Association for the Advancement of Sustainability in Higher Education based in the United States of America (USA) and Canada offers accreditation under the Sustainability Tracking, Assessment, and Rating System (STARS). The system is a transparent, self-reporting framework helping colleges and

universities measure their progress within sustainability. by considering several dimensions, including the integration of sustainability into the curriculum and campus culture, and the planning and administration of sustainability initiatives by management (AASHE, n.d.).

7.1 Practice examples from GRETA

Several of the CoVEs in the GRETA core group developed green action plans during the first phase of GRETA, defining specific greening goals and individual actions necessary to achieve them., along with timeframes for completion. Examples of the action plans developed by CoVEs are presented in the text box below.

Text box 17: Green action plans developed by CoVEs in the GRETA core group

Odessa Centre of Vocational Education (Ukraine)

This centre has developed an action plan to prioritise green skills in its curriculum and provide relevant upskilling for teachers and trainers. For example, the CoVE intended to integrate content on energy efficiency and environmental protection into subjects such as 'Special technology' and 'Industrial training'. It also plans to equip agricultural students with skills in climate-responsible practices, such as introducing them to technology for greater resource efficiency, such as microcontrollers for soil irrigation.

Regarding teacher training, the Odessa Centre of Vocational Education plans to provide additional skills to its educational staff through dedicated training courses covering green themes and technologies that will be introduced into the CoVE's training programmes.


Ogre Technical School (Latvia)

has defined greening goals related to the professional development of teachers and partnerships with external stakeholders in its action plan. According to the plan, the CoVE intends to provide teachers with training courses and workshops promoting green skills and practices. The content of these upskilling initiatives was planned to differ and be adapted to teachers from different training programmes within forestry, mechanical science, woodworking, catering, as well as design and art.

To increase its ability to provide students with green skills, the CoVE also plans to engage external stakeholders, such as business partners and industry associations in identifying practices and technologies supporting the green transition that should be introduced to students.

Anatolian Vocational Technical High School (Türkiye)

Finally, Prof. Dr. Necmettin Erbakan focused in the action plan of this school on promoting a green mindset among students and their parents and to support students in acquiring green skills through collaborations with external partners. In terms of the first-mentioned focus area, the CoVE intends to form a team of teachers and trainers that can improve the school's recycling programme by engaging students in the re-use of waste materials. One of the actions in this context was, for instance, to obtain fertiliser from organic waste and to use it in soilless agriculture. The CoVE also plans to develop a workshop for parents informing them about more environmentally sustainable forms of consumption. In terms of promoting green skills among students, the CoVE will collaborate with training staff from the



regional forest directorate to increase the knowledge of students on environmental protection and nature conservation. The greening of VET is driven by a growing demand for green skills that can be linked to changing policy environments and legislative requirements demanding greener industry practices.

(Source: GRETA Action Plans)

This integration of green skills into VET programmes is a reflection of the country's overall commitment to sustainable development and environmental protection. An important factor in this context are initiatives at the national level supporting the greening of VET and making it visible part of the wider sustainability agenda.

7.2 Key challenges and opportunities

However, developing greening strategies, whether institution-wide or focusing on specific dimensions, can be a complex process that requires coordination among various stakeholders such as students, teachers, and external partners. It is essential to ensure that the objectives and actions outlined in a greening strategy are meaningful and clearly communicated to relevant parties. However, there may be resistance to change from some stakeholders, such as teachers or industry partners, making it challenging to implement green initiatives. To successfully implement greening strategies, the support of all stakeholders is necessary. However, the additional administrative burden linked to developing and revising greening strategies may be a challenge, especially when involving several managers and administrative staff.

The GRETA core group also shared examples of how teachers utilise the greening of campus as an opportunity to address environmental concerns and learn students topics such as renewable energy, sustainable agriculture, and waste reduction methods. Through implementing green practices on campus, teachers can serve a role models and help cultivate an understanding of the significance of sustainability and environmental responsibility.

On the other hand, lack of guidelines for developing greening strategies has been a common issue among the GRETA core group, partly because the provision of green skills and values is not significantly promoted at the policy level. This aligns with the findings of a 2021 global study by UNESCO, which revealed that almost half (47%) of the national curriculum frameworks in 100 reviewed countries made no reference to climate change. The study also examined the profiles of 20 countries in terms of climate change communication and education, finding that 70% of these countries had frameworks to support climate change communication and education in TVET (UNESCO, 2021).

8. Conclusions and policy recommendations

The global context

More than 1.47 billion jobs worldwide depend on a stable climate and that new job opportunities requiring green skills development will emerge due to technological advancements. The shift towards a green economy could lead to a loss of 71 million jobs globally, but strategic investments in reskilling could reverse this trend and create a net growth of 18 million jobs in the energy sector alone. Technical and transversal skills, including implementing sustainable processes and thinking and acting green, will be necessary for the transformation of all occupations towards sustainability.

As the green and digital transitions bring significant changes to the job market, CoVEs has an important role in working with relevant stakeholders to drive forward the greening of VET in order to provide opportunities for initial training as well as the continuing up-skilling and re-skilling of adults. By incorporating sustainable practices and new technologies into VET, CoVEs are crucial in create a workforce that is knowledgeable about environmentally friendly practices and can implement these practices in their daily work.

The processes and practices

The greening of VET is a process that entails aligning training practices as well as institutional operations of VET providers with the overall concept of sustainability. This process is incremental and influenced by digital developments and innovations. Greening reaches into all aspects of an institution's educational and training activities as well as its institutional operations and culture.

GRETA's primary approach is peer learning involving an exchange of experience, practices, and innovative approaches to further excel in the

greening of VET using the whole institutional approach. It has proved to be a useful tool to excel further in the greening of VET.

The GRETA core group has engaged in self-assessments, peer reviews and peer learning sessions providing both new insights and inspiration for the greening of VET. The approach helps identify and address barriers to greening and engages stakeholders towards a green future. Overall, it fosters a culture of ongoing learning and development, leading to excellence.

GRETA has demonstrated the relevance of the five dimensions of the whole institutional approach when it comes to the greening of VET. The process of the greening of VET remains challenging whether it is approached through a comprehensive institutional strategy or by targeting specific individual dimensions. VET providers may have a specific rather than a holistic focus in their greening strategies to make incremental progress. The peer reviews show that a comprehensive greening strategy is not a precondition for starting a greening process. A greening process can very well begin by employing a limited number of approaches, like teacher training or greening the curriculum. However, to align and assess the institutional approach with national agendas and industry requirements, VET providers need to develop, implement, and monitor more comprehensive greening strategies.

CoVEs are characterized by their focus on partnering and collaborating to develop and provide VET. GRETA has also highlighted the importance of cooperation with businesses and private sector in comprehending the skills and knowledge needed for green jobs. Therefore, it is crucial to engage in green skills ecosystems, create training programs that address specific needs, provide practical experiences to students, and offer access to new technology. To effectively address the skills for the future, it is essential to involve social partners and engage in social dialogue, as

they have a vital role in ensuring that VET systems provide relevant and quality training. Social dialogue brings together representatives from different sectors to discuss and develop strategies for promoting skills development driving forward the green and digital transitions.

Below are the key issues identified in relation to each dimension through GRETA peer learning process shortly summarised:

- The 'Greening of curricula and training process' dimension involves integrating green skills into the VET system by updating and adapting existing programmes as well as developing new ones that address emerging green technologies and qualifications. Peer learning practices have highlighted the importance of a green mindset that enables individuals to think and act in a responsible and sustainable way. The success depends on the quality and accuracy of competency standards, which describe the skills requirements for different occupations and how this is reflected in learning outcomes of curricula and training delivery. However, lack of autonomy in curriculum change and limited industry exchange hinder the development of green curricula. The GRETA core group mainly promotes green skills and green mindset through extracurricular activities due to a lack of autonomy in regional or national curricula. These activities foster green attitudes in students and teachers through non-formal or informal learning, encouraging experimentation and sustainability as part of education. Students work with external organizations and engage in practical environmental improvement projects. These activities benefit both the environment and students' awareness of their own capability to act for improvement.
- Relating to the 'Teachers' professional development' dimension, CoVEs worldwide recognize the need for support and guidance to ensure that all teachers receive training that equips them with relevant knowledge and skills to promote the greening of VET. It is considered as the key dimension accelerator for greening of VET. Currently, there is no well-established and systematic approach to green teacher

training and continuous professional development is fragmented and relies on individual VET institutions' initiatives. Financing and tailoring training to specific industry sectors are key challenges. On the other hand, collaboration with external training providers and self-learning by teachers are valuable and complementary approaches to continuing professional development in the greening of VET, which help ensure that teachers and trainers are equipped with the knowledge and skills necessary for sustainable development.

- The 'Interaction with stakeholders and engagement in skills eco systems' can be challenging due to difficulty in engaging employers and securing funding. VET providers may not be solely responsible for initiating partnerships, and lack of clarity in roles can lead to coordination issues. Public authorities play an important role in addressing these challenges. The GRETA core group collaborate with various stakeholders, such as VET providers, employers, research institutes, and local authorities. Some CoVEs have established strong stakeholder networks, while others have received funding or collaborated on environmental sustainability projects. Regional green partnerships are rare. Ongoing communication and engagement with public authorities are crucial for successful skills ecosystems aligned with regional growth strategies. Peer learning examples have identified that CoVEs may also offer an opportunity to support enterprises in moving forward in their green production as CoVEs can be a source of knowledge and expertise. They can share practices contributing in reducing environmental impact of business processes and production. Furthermore, GRETA has through its peer learning placed emphasis on the vital role of involvement social partners and social dialogue play in addressing the future skills needs. Through social dialogue, representatives from different sectors can development joint strategies for promoting skills development and driving forward the green and digital transitions.
- The 'Funding opportunities and financing of green initiatives' dimension presents a challenging picture, as funding is often limited, unevenly

distributed, and short-term priorities can hinder the implementation of effective green VET programs and equitable access to high-quality training. Significant investments are needed to create new programs, infrastructure, and resources for VET to prepare students and workers for the changing job market in the context of the green transition.

- ‘Strategies for greening of VET institutions and their operations’ enable VET providers to develop and implement green initiatives in a structured manner with the involvement of external stakeholders. The management of VET institutions is responsible for developing green strategies and can further develop their capacities through upskilling activities. A greening strategy can empower VET providers to continuously monitor and assess its greening progress, as long as defined objectives and actions towards achieving these are regularly revisited and adapted when relevant. Some green activities are short-lived and involve a limited number of teachers and students, while others require careful planning, ongoing management, and monitoring. Several CoVEs in the GRETA core group focus on greening campus buildings and environments, such as installing solar panels, implementing waste management and recycling facilities, and embedding sustainability into extra-curricular activities. The greening of campus has an important role to play in developing green mindsets through alternative learning methodologies.

The policy recommendations

The peer reviews and peer exchanges have identified key challenges related to individual greening dimensions and also to highlighted how these dimensions are interrelated. Through peer learning, stakeholders have exchanged best practices on how to excel in greening of VET.

For policymakers and policy shapers (VET providers, employers, workers’ organisations, and public authorities) – the whole institution approach is a useful tool for identifying systemic barriers hindering the greening of VET and how these may be addressed.

To foster the greening towards excellence, policy makers must consider the current state and aspirations of CoVEs in their countries. To ensure that objectives are achievable and relevant, CoVEs must engage in negotiation with their stakeholders, including local and national governments, employers, social partners, and funding bodies. By prioritizing collaboration and cooperation, policy makers and CoVEs can work together to achieve vocational excellence in the future.

Based on the analyses, peer reviews, and practice experiences, as well as the peer exchanges during the GRETA thematic learning sessions, the following policy recommendations have been identified to promote the greening of VET.

Aligning green skills strategies with national and regional green transition plans

A key prerequisite for a successful transformation towards a greener economy is the provision of adequate and sufficient green skills.

Coordination of national policies across different sectors, including education, environment, and industry, can foster a unified approach to address the challenges and opportunities of a more sustainable VET system. This can ensure that environmental considerations are embedded into VET policies and practices and are given the necessary attention and resources.

Furthermore, such coordination can enable the development of coherent policies and strategies that promote environmental sustainability in VET. For example, it can facilitate the integration of sustainability principles and practices into the VET curriculum and the design of training programs. It can also promote the uptake of green skills and competencies by VET learners, which are essential for transitioning to a more sustainable economy. Necessary

actions at the national level should include an intensified dialogue with employers to encourage training opportunities and invest in research and innovation to support sustainable technologies and practices.

Encouraging and supporting the development of regional skills ecosystems that can contribute to green skills provision and utilisation is another key recommendation exemplified by CoVEs.

Fostering collaboration between stakeholders

Green partnerships between VET providers, employers, industry associations, and government agencies are crucial for identifying skill needs, developing relevant training programmes, and providing support for green businesses.

Involving social partners in the development of green skills ensures tailored training programs, facilitates the uptake of green technologies, and fosters commitment among stakeholders. Robust institutional mechanisms for social dialogue through establishing structures that facilitate communication and collaboration can support stakeholder involvement. This may include the creation of formal channels for dialogue, such as regular meetings, committees, or working groups, as well as the development of policies and guidelines that support stakeholder involvement in decision-making processes.

Business associations and companies need to actively engage in the greening of VET by partnering with VET providers to develop training programmes that prioritise green skills and knowledge. As demonstrated by CoVEs in the ENE network, this collaboration can help to ensure that the training provided is relevant to the industry's needs while also enabling VET providers to access the latest green technologies and practices used in the field.

Supporting apprenticeships is another critical way to promote the development of green skills and knowledge. Companies can provide work placements, mentoring, and training opportunities to support apprentices in acquiring practical skills and knowledge that are necessary for success in the green economy. Finally, funding is an effective way for business associations and companies to support the development and delivery of green VET programmes. This funding can be utilised to purchase equipment, develop training materials, and offer scholarships to students, helping to promote the accessibility of green training programmes.

Collaborating with universities and research institutions on innovation projects is a key strategy to promote sustainable practices and technologies in various industries. By working together, industry professionals and academics can develop new eco-friendly technologies, which can be integrated into VET programmes. This collaboration contributes to skills development for industry professionals, ensuring that they are equipped with the knowledge and skills needed to promote sustainability in the workplace. Additionally, knowledge exchange between academics and industry professionals can lead to the development of innovative solutions and policies that encourage sustainable practices in VET and other industries.

Greening teacher training and continuous professional development

Through an intentional focus on environmental education and the cultivation of green skills, coupled with the recruitment of educators who possess a deep commitment to sustainability and pertinent expertise, VET institutions can serve as key players in promoting environmentally conscious VET practices. Awareness campaigns or mentorship programs can help bridge the gap between older and younger generations and promote the importance of the green transition.

Policymakers can provide financial support through grants, subsidies, or tax credits to ensure teachers and trainers receive the training they need to promote sustainable practices. Based on the experience from the GRETA peer learning practices, VET institutions can tailor green professional development in cooperation with industry sectors, ensuring that teachers and trainers receive relevant training to promote sustainability in their field. Furthermore, VET providers can plan up-skilling initiatives to ensure that all teachers can pass on green skills to their students, empowering them to promote sustainability in their classrooms.

Incorporating green skills into the VET system

The GRETA peer reviews and the practice examples provided during the GRETA thematic sessions have demonstrated the significance of incorporating green skills into national curricula and frameworks that are required to be followed by VET providers. The key factor in greening curricula is establishing a strong connection between curricula and competency standards.

To ensure training programs align with industry demands and evolving skill requirements, it is essential to incorporate social partners and foster social dialogue in the development of competency standards and curricula.

Also, it is fundamental to establish quality assessment frameworks that measure learners' green competencies, which serve as the foundation for qualification recognition and certification.

Furthermore, the GRETA peer reviews highlight the importance of providing greater decision-making authority to VET institutions, enabling them to exercise more control over their curricula, teaching methods, and resource allocation. This increased autonomy would allow VET providers to better address the needs of the labour market and respond more effectively to the demand for specific skill sets.

Additionally, VET programmes should encourage students to pursue careers in sustainability and green industries. This can be done by providing information on the various career paths available, as well as offering job placement and career guidance services.

Supporting lifelong learning

Investing in education and training programs is essential for upskilling and reskilling individuals, particularly adults, to thrive in a green economy. Governments can support lifelong learning by creating comprehensive national strategies that include recognition of prior learning and accessible vocational education and training programs.

VET providers can develop green skills programs that collaborate with industries and employers and offer financial and practical support to make education accessible to diverse backgrounds. Flexible training programs, delivered online or in-person, aligned with green economy needs through partnerships, foster a culture of lifelong learning. By implementing these strategies, VET systems can excel in providing relevant and effective education and training to adult learners.

Incorporating sustainability principles into VET management and operations

The GRETA core group has outlined specific greening strategies and timelines for achieving sustainable goals. The plan has an impact if it includes details on how to reduce the institutions' carbon footprints, reduce waste, and conserve resources.

Furthermore, environmental audits can identify areas where institutions can make improvements covering a wide range of areas, including energy use, water consumption, waste management, and transportation. Developing a monitoring and reporting system to track progress towards achieving sustainability goals and identifying areas for further improvement is crucial.

VET providers should also lead by example and encourage sustainable practices on their campuses such as using renewable energy sources, reducing waste, and promoting sustainable transportation options. CoVEs involved in GRETA have demonstrated that by taking small visible green steps on campus, like waste separation or installing solar panels, the intentions and willingness to a green transition become very visible for both students, teachers, and partners. Leading by example also involves fostering a culture of sustainability among staff and students, making the greening process visible and relevant for all stakeholders.

Funding as a precondition for action

Funding is essential to support the green transition of VET institutions. Without adequate funding, it can be challenging for VET institutions to make the necessary investments in new infrastructure and equipment, develop new curricula, conduct research activities, attract and retain staff, and engage with communities and businesses.

An effective financing system relies on governance principles, including transparency, accountability and efficiency, that are implemented through rules, procedures and funding mechanisms. This in turn needs to be supported by reliable data and strict budgeting approaches and should be aligned with national green economy priorities and sustainability objectives. Overall, a move to outcome-based funding and making a shift in the purpose of funding can support this.

Lessons for future GRETA actions

Between October 2021 and April 2023 GRETA carried out dedicated thematic actions aimed at promoting green excellence. Through exchanges within the GRETA core group and with other ENE members during the peer learning sessions, it became evident that VET providers

and other stakeholders around the world are interested in peer learning activities and knowledge sharing on greening VET. Despite different frameworks in each country and CoVE, the basic issues and questions are similar. Therefore, it is important to continue sharing practices among practitioners as well as to bring recommendations to the policy level.

The peer learning activities facilitated knowledge and experiences sharing, while peer reviews allowed for reflection on performance and quality improvement. GRETA synthesized insights gained from peer learning activities and peer reviews into actionable recommendations that can inform policy development and implementation. To support this, GRETA intends to broaden the participation of actors involved in greening VET.

This expansion will enable sharing of best practices and knowledge among an even broader range of actors, resulting in the development of more effective policies and initiatives to green VET worldwide. The goal is to promote VET's role in the transition to a sustainable economy by contributing to the development of innovative and effective training programs, research, and curricula that foster sustainable practices and competencies.

Moving from peer learning to the provision of policy advice, GRETA applies a systematic and structured approach taking into account the diversity of stakeholders and their needs, as well as the different contexts and frameworks that shape policy decisions.

GRETA places a particular focus on social partners and social dialogue, as they are essential for the greening of VET, for the development of relevant skills and to ensure a fair and inclusive transition to a low-carbon and resource-efficient economy.

GRETA has outlined its plan to prioritise specific economic sectors, including the construction sector, and emphasise energy efficiency and renewable energy in its upcoming operations for the years 2023 and 2024.

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ANNEX 1

Table of COVEs under the GRETA project:

Country	Town	Region	Name of Centre	Website
Ukraine	Mukachevo	Transcarpathian	Higher vocational school #3 Mukachevo	Вище професійне училище #3 (vpu3.org.ua)
Ukraine	Mykolaiv	Mykolaiv	Higher vocational school #21 of Mykolaiv	Вище професійне училище #21 м.Миколаєва – ВПУ21 (vpu21.com.ua)
Ukraine	Hlyboka	Chernivtsy	Hlyboka professional lyceum	Новини (gpl.co.ua)
Ukraine	Odessa	Odessa	Ukraine: Odessa Center of Vocational Education	Державний навчальний заклад «Одеський центр професійно-технічної освіти державної служби зайнятості» (profcentre.odessa.ua)
Ukraine	Kremenchuk	Poltava region	Ukraine: Higher Vocational School N 7 Kremenchuk	Вище професійне училище #7 (model.poltava.ua)
Ukraine	Kvasyliv	Rivne	KVASYLIV VOCATIONAL LYCEUM	Квасилівський професійний ліцей – кпл (kpl.rv.ua)
Ukraine	Khmel'nitskyi	Khmel'nitskyi	KHMEЛ'NYTS'KYI HIGHER PROFESSIONAL SCHOOL #25	Вище професійне училище #25 м. Хмельницького (vpu25.km.ua)
Ukraine	Kalush	Ivano-Frankivsk	Ukraine: Kalush Higher Vocational school 7	Вище професійне училище #7 м. Калуша (vpu7.com.ua)
Armenia	Elegnadzor	Yeghegnadzor region	Vayots Dzor Regional State College	Վայոց ձորի տարածաշրջանային պետական քոլեջ ՊՈԱԿ (vayocdzorcollege.info)

Georgia	Zestaponi	Imereti,	College "Construct2"	http://www.construct2.ge
Latvia	Ogre	Vidzeme region	Ogre Technical School	Ogre Technical School - International Baccalaureate® (ibo.org)
Serbia	Belgrade	Central Serbia	Aviation Academy	Контакт – Ваздухопловна академија (vakademija.edu.rs)
Slovenia	Nova Gorica	Goriška Primorska	Šolski center Nova Gorica	School Centre Nova Gorica (scng.si)
Türkiye	Bursa	Marmara	Bursa Coşkunöz Education Foundation	Bursa Coşkunöz Eğitim Vakfı Mesleki Eğitimin Geleceği (coskunozegitimvakfi.org)
Türkiye	Çekmeköy Istanbul	Marmara	Technology and Humanity College	Tink – Teknoloji ve İnsan Kolejleri (tinkturkiye.com)
Türkiye	Çamlıtepe	Anatolia	Prof. Dr. Necmettin Erbakan Vocational and Technical Anatolian High School	BATMAN / MERKEZ - Prof. Dr. Necmettin Erbakan Mesleki ve Teknik Anadolu Lisesi (meb.k12.tr)
Spain	Soria	Castilla y León	CIFP Pico Frentes	CIFP PICO FRENTEs (jcyl.es)
Spain	Salamanca	Castilla y León	Centro Lorenzo Milani	Inicio - Centro P.I.F.P. Lorenzo Milani (fplorencmilani.es)

ANNEX 2

GRETA key activities

Time	Key Activities
October – December 2021	<p>GRETA kick-off</p> <p>GRETA was established as ENEs green initiative in October 2021 when 14 CoVEs from EU neighbouring countries (Armenia, Georgia, Serbia, Türkiye and Ukraine) together with 4 CoVEs from EU Member States (Latvia, Slovenia and Spain) joined the initiative.</p> <p>During the initial phase, the GRETA core group engaged in a self-evaluation process to assess their progress towards the greening of VET. This allowed the core group members to reflect on their own practices and identify areas for improvement.</p> <p>At the formal kick-off meeting of GRETA, all the CoVEs in the core group had an opportunity to present themselves through green pitch presentations. This provided a platform for the CoVEs to showcase their strengths, expertise, and interests related to sustainability in VET. These presentations helped to build a sense of community among the CoVEs and facilitated the sharing of ideas and best practices.</p> <p>Overall, the initial phase of GRETA was focused on building a strong foundation for peer learning and collaboration among the participating CoVEs.</p>

<p>January – March 2022</p>	<p>Peer-to-peer learning sessions – online visits and peer reviews</p> <p>To facilitate thorough peer reviews, the GRETA core group of 18 CoVEs was divided into four sub-groups, with 4 CoVEs each.</p> <p>The grouping and peer matching was based on the CoVEs specific interests, experience, and learning requirements.</p> <p>The peer review process involved 14 CoVEs who were each visited online by their peers.</p> <p>The online peer visits were conducted as 14 half-day sessions and included meetings with school management, trainers, enterprises, career counsellors, and students.</p> <p>The CoVEs utilized jointly-validated peer review questionnaires to conduct the reviews and subsequently produced peer review reports. The results of the reviews were shared among the core group.</p> <p>As an outcome of this process, some CoVEs developed green action plans which enabled them to critically analyze their practices and identify areas of strength and weakness in terms of integrating sustainability principles into VET. These activities have been successful in helping participants adopt sustainable practices in their VET programs.</p> <p>Connecting to this, ENE facilitates on an ongoing basis collaboration on future Erasmus+ projects and promotes international cooperation and capacity-building in the VET sector.</p>
<p>April 2022</p>	<p>GRETA Core Group Meeting – Co-designing thematic peer learning sessions</p> <p>The peer reviews and online visits conducted by the GRETA core group allowed them to gain insights into the interests, learning interests, and needs of the participating CoVEs. The results of these reviews were used to co-design six thematic peer learning sessions. By identifying the areas of interest and needs of the CoVEs, the peer reviews provided a foundation for the development of the thematic sessions.</p> <p>These sessions (implemented from May 2022 – April 2023) provides an opportunity for CoVEs to share knowledge and experiences, learn from each other and additional international practices, and meet partners for new projects related to the greening of VET.</p> <p>Peer learning practices sharing provided by:</p> <ul style="list-style-type: none"> ■ Erasmus+ project – GREENOVET ■ European Commission on GreenComp

May 2022	In the context of the European Skills Week May, GRETA received the Vocational Education and Training Excellence Awards 2022 with a special mentioning of the 8 Ukrainian centres of vocational excellence participating in GRETA.
May 2022	<p>#1 Thematic peer learning session:</p> <p>Green continuing professional development – online visit to Denmark</p> <p>Thematic focus on teachers training and continuing professional development as a key enabler to excel in the greening of VET.</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none"> ■ The Danish Educational Secretariat for Industry – ‘Green teacher training through preto-typing’ ■ Centre for Building and Construction at the Danish Technological Institute – ‘Green Spearheads’ ■ Tech College, Aalborg ■ Labour Market Education (AMU), North Jutland ■ European Training Foundation <p>A special intervention was provided by the VET Directorate, Ukrainian Ministry of Education and Science in relation to the role of CoVEs in the recovery of Ukraine</p>

<p>June 2022</p>	<p>#2 Thematic peer learning session:</p> <p>Practices and funding possibilities for green international partnerships</p> <p>A global perspective and approach for VET is becoming increasingly important in the green and digital transitions. Among the key characteristics of CoVEs is a strong international outlook and participation in international partnerships.</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none"> ■ TINK Technology and Humanity Colleges, Türkiye ■ Šolski center Nova Gorica, Slovenia ■ European Commission, VET Unit, DG Employment, Social Affairs and Inclusion ■ Erasmus+ project - European Platform for Urban Greening ■ European Vocational Training Association (EVTA) ■ ENAIP NET – Life FOSTER project ■ European Training Foundation
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September 2022	<p>#3 Thematic peer learning session:</p> <p>Regional skills ecosystems and their importance for the greening of VET</p> <p>In a regional skills ecosystem, stakeholders benefit from each other and green partnerships allow for mutual inspiration and co-creation of green skills training and learning methods.</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none">■ Construction College “College2”, Georgia■ Higher Vocational School #3 in Mukachevo, Ukraine■ CEO of Lika Comfort, Ukraine■ Aviation Academy, Serbia■ Enterprise and Innovation Manager at Region Värmland, Sweden■ EU Strategy for the Danube Region – Priority Area 9 Coordinator, Austrian Federal Ministry of Education, Science and Research■ European Training Foundation
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October 2022	<p>#4 Thematic peer learning session:</p> <p>Green training programmes and their role in addressing green skills demands</p> <p>At the fourth online thematic session, participants took a ‘deep dive’ into competency standard and green training programmes.</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none"> ■ Bursa Coşkunöz Education Foundation, Türkiye ■ Ogre Technical School, Latvia ■ Omnia Education Partnerships (OEP), Finland ■ Sykli Environmental School, Finland ■ Forum for Education for Sustainable Development, Denmark ■ Cedefop ■ European Training Foundation
November 2022	<p>ENE corporate conference ‘Excellence without borders’ - GRETA session</p> <p>The GRETA session in the ENE conference had focus on its innovative peer learning approaches and practices for integrating sustainability principles into VET curricula.</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none"> ■ Construct2, Georgia ■ Šolski center Nova Gorica, Slovenia ■ Green Academy, Denmark ■ OK Nygaard, Denmark

February 2023	<p>#5 Thematic peer learning session:</p> <p>Green strategies – management, vision and greening campus</p> <p>Green strategies may involve commitments to attain sustainability certifications for campus facilities or integrate relevant frameworks, such as the United Nations Sustainable Development Goals, into curricula and training programmes.</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none">■ Vayots Dzor Regional State College, Armenia■ IFMERE, Training Institutes for Renewable Energy and Energy Efficiency, Morocco■ Ta’heal for VET Skills Excellence, Egypt (presentation provided by OEP)■ European Training Foundation■ UNESCO-UNEVOC TVET Centre
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April 2023	<p>#6 Thematic peer learning session:</p> <p>Looking into the green and digital future – online visit to Danish Technological Institute</p> <p>The green and digital transitions require technological knowledge and test facilities that are ready for industrial use and strong partnerships. It also ask for resource awareness of the digitalisation and considerations of artificial intelligence. Social partners plays a crucial role in ensuring that policies and training programmes developed to promote environmental sustainability are relevant and effective. The session offered an online visit to research laboratories at the Danish Technological Institute</p> <p>Peer learning practices shared by:</p> <ul style="list-style-type: none"> ■ Energy and Climate Centre, DTI <ul style="list-style-type: none"> - Concrete Centre - Indoor Climate Laboratory ■ Confederation of Danish Industry ■ Joint Research Centre, European Commission ■ VET Toolbox – Skills for the Green Transformation Toolkit ■ Green Industrial Plan, European Commission <p>Peer exchanges among more than 100 participants from 36 countries.</p>
Future Activities	<p>European Green Week</p> <p>June 2023</p> <p>GRETA represented at the European Year of Skills stand organised by the European Commission, DG Employment, Social Affairs and Inclusion and CoVEs.</p>
July 2023 – January 2025	<p>Plans for new peer learning have been made for the period starting in July 2023 and continuing throughout 2024. They include both online peer learning sessions and in person meetings.</p> <p>Information will be provided and updated through ETF website and ETF Open Space – ENE Open Space – GRETA Open Space pages.</p>

Background information

Blogs

[GRETA: The peer learning network helping vocational education go green! | ETF \(europa.eu\)](#)

[Looking into the green and digital future | ETF \(europa.eu\)](#)

