International Labour Organization

Greening TVET and skills development

A practical guidance tool

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Foreword

The transition to decarbonized and resource-efficient economies and societies requires systematic and holistic engagement on the part of technical and vocational education and training (TVET) systems in response to the changing skills demands of the labour market. Education and training play a key role in equipping the current and future workforce with the relevant attitudes, knowledge and skills to facilitate the green transition. It is therefore critical to strengthen the governance and management structures required to mainstream environmental sustainability in TVET systems and to incorporate the skills required for the green transition in the development and upgrading of competency standards, curricula, training design, delivery and assessments in both initial and continuing TVET.

In this context, the ILO has developed a step-by-step guidance tool for greening TVET and skills development, building on the recent findings of the ILO publication, *Skills for a greener future: A global view*, as well as earlier research, experience and lessons learnt from development cooperation projects in different Member States. This provided the basis for subsequent piloting of the tool in several countries, including Cambodia, Ghana, Thailand, Zambia, Zimbabwe and the Philippines in 2021-2022. Depending on the national context, these piloting activities varied from specific support measures to coaching programmes, while further informing and strengthening the tool itself through the collection of case studies and feedback.

The tool provides "how-to" guidance on designing competency standards and curricula for greener jobs, adapting training delivery and assessments to support greener learning, adapting practices to maintain a greener campus, greening the professional development of teachers and in-company trainers, and sensitizing enterprises. The tool also looks at how to support the greening of skills for the informal economy, as this is particularly relevant for developing countries. Finally, the tool discusses how to mainstream green practices throughout the whole system of initial and continuing technical and vocational education and training. Each section includes key learning points, a theory component, self-assessment tools, inspiring practical examples, hints and tips, checklists and links to useful resources.

The guidance tool takes into account countries at different levels of economic development and has been designed to support countries in taking stock of achievements in respect of greening TVET and skills development and focusing on areas where improvements are still needed. We believe that this practical tool will contribute to a better understanding of how to design, implement, monitor and evaluate the greening TVET agenda in all country contexts, with a view to transforming TVET practices and training and so equipping the current and future workforce with relevant skills for a green, just and inclusive transition.

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Abbreviations and acronyms

ALMPs	Active Labour Market Policies
CBT	Competence-based Training
CPD	Continuing Professional Development
CS	Competency Standards
DACUM	Developing a Curriculum
HIC	High-Income Country
ILO	International Labour Organization
LIC	Low-Income Country
LO	Learning Outcomes
MIC	Middle-Income Country
MSMEs	Micro, Small and Medium-sized Enterprises
NDCs	Nationally Determined Contributions (under the 2015 Paris Agreement on climate change)
NGO	Non-Governmental Organization
OECD	Organisation for Economic Cooperation and Development
OSH	Occupational Safety and Health
PD	Professional Development
RPL	Recognition of Prior Learning
SDGs	Sustainable Development Goals
STED	Skills for Trade and Economic Diversification programme
TNA	Training Needs Analysis
TVET	Technical and vocational education and training
UNESCO	United Nations Educational, Scientific and Cultural Organization
WBL	Work-based learning

Glossary

Unless otherwise referenced, the following definitions and explanations are taken from the glossary in Strietska-Ilina et al., 2011, pp. 171–78 and ILO, 2015b, pp. 10–13.

Apprenticeship

Any form of education and training that is governed by an apprenticeship agreement and enables an apprentice to acquire the competencies required to work in an occupation through structured training consisting of both on-the-job and off-the-job learning that leads to a recognized qualification (ILO 2022).

Circular economy

A model for sustainability in resource use and consumption which supports moving away from an extract–manufacture–use–discard model and embraces the recycling, repair, reuse, remanufacture and longer durability of goods (ILO, 2018).

Climate change

A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. (https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf)

Competency standards

"Benchmarks to assess the knowledge, skills and attitudes required by an individual in order to perform in the workplace" (ILO, 2020b, p. 10). Note however, that: "'Competency standards", "competencies", "competency units", "unit standards" or "units of competency" are terms that are used interchangeably to describe the knowledge, skills and attitudes that a person needs in order to carry out a particular job or activity and at the level of performance required. Competencies generally specify minimum standards and the conditions in which they should be applied (ILO, 2009, p. 2).

Core skills

A set of non-technical skills, such as social and emotional, cognitive and metacognitive, basic digital skills and basic skills for green jobs, transferable across occupations and professions, as well as between low- and high-level jobs. Both core skills and technical skills are required by individuals, if they are to become employable, manage their careers in a fast-changing world of work, use digital technology at work and in everyday life, achieve life goals and contribute to their own well-being and that of their community (ILO, 2021).

Curriculum

"A detailed description of the objectives, content, duration, expected outcomes, learning and training methods of an education or training programme."

DACUM (Developing a curriculum)

A quick and cost-effective method of occupational analysis that uses a focus group to facilitate a storyboarding process in order to conduct a thorough analysis of a given occupation (ILO 2020b).

Decent work

A term that sums up the aspirations of people in their working lives – for opportunity and income; for rights, voice and recognition; for family stability and personal development; and for fairness and gender equality. Ultimately, these various dimensions of decent work underpin peace in communities and society. Decent work is captured in four strategic objectives: fundamental principles and rights at work and international labour standards; employment and income opportunities; social protection and social security; and social dialogue and tripartism.

Embodied learning

A way to teach while involving the whole body, for example teaching mathematics while throwing small bags of sand to each other (Waag technology and society, 2012). A student cannot learn to cook well without the embodied learning of how an ingredient would affect the flavour of the food, or become a hairdresser without the embodied knowledge of how different kinds of hair (curly, coarse…) will turn out when cutting/curling/colouring it.

Experiential learning

The idea that experiences are generated through our ongoing interactions and engagement with the world around us, and learning is an inevitable product of experience. This theory of learning is different from cognitive and behavioural learning theories as it takes a more holistic approach. It considers the role that all of our experiences play in our learning, including our emotions, cognition and environmental factors (https://www.futurelearn.com/info/blog/what-is-experiential-learning).

Green economy

"A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services." (United Nations Environment Programme, https://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/green-economy)

Greening the economy

The process of reconfiguring businesses and infrastructure to deliver better returns on investments of natural, human and economic capital, while at the same time reducing greenhouse gas emissions, extracting and using fewer natural resources, creating less waste and reducing social disparities (ILO forthcoming).

Green jobs

"Green jobs are decent jobs that contribute to preserving or restoring the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency. Green jobs help to improve efficiency in the use of energy

and raw materials, limit greenhouse gas emissions, minimize waste and pollution, protect and restore ecosystems, and support adaptation to the effects of climate change." (ILO, 2016).

Informal economy

Forms part of the market economy in that it produces (legal) goods and services for sale or other forms of remuneration. It covers informal employment both within and outside informal (small, unregistered or unincorporated) entities. Informal entrepreneurs and workers share one important characteristic: they are not recognized or protected under existing legal and regulatory frameworks. The informal economy excludes the criminal economy and the reproductive or care economy.

Informal employment

Informal employment includes both employment in informal sector enterprises and informal employment in formal sector enterprises. It is "all remunerative work (i.e. both self-employment and wage employment) that is not registered, regulated or protected by existing legal or regulatory frameworks, as well as non-remunerative work undertaken in an income-producing enterprise. Informal workers do not have secure employment contracts, workers' benefits, social protection or workers' representation." (ILO 2020c; https://www.ilo.org/global/topics/wages/minimum-wages/beneficiaries/WCMS_436492/lang--en/index.htm)

Just transition

Greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind. It involves maximizing the social and economic opportunities of climate action, while minimizing and carefully managing any challenges – including through effective social dialogue among all groups impacted, and respect for fundamental labour principles and rights. Ensuring a just transition is important for all countries at all levels of development. It is also important for all economic sectors – by no means limited to energy supply – and in urban and rural areas alike (https://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang--en/index.htm).

Lifelong learning

All learning activities undertaken throughout life for the development of competencies and qualifications (ILO 2004).

Occupation

A grouping of jobs which have a repeating set of main tasks and duties across industries. For reasons of classification, occupations are grouped together into narrowly or broadly defined occupational groups on the basis of similarity in the type of work done.

Skill

Ability to carry our mental or manual activity acquired through learning and practice, where skill is an overarching term which include knowledge, competence and experience, as well as the ability to apply these in order to complete tasks and solve work-related problems (Compendium: Skills needs anticipation https://www.ilo.org/employment/Whatwedo/Projects/WCMS_534345/lang--en/index.htm).

Skills development

Understood in broad terms to mean basic education, initial training and lifelong learning.

Skills gaps

A term to describe the qualitative mismatch between the supply of human resources and the requirements of the labour market. "Skills gaps" exist where the existing workforce does not have adequate types or levels of skills to meet business objectives; or where new entrants to the labour market are apparently trained and qualified for occupations but still lack some or all of the skills required.

Skills needs anticipation

Any forward-looking diagnostics used to identify skills needs expected on future labour markets, performed by any type of method, quantitative or qualitative, including interaction, exchange and signalling between labour market actors.

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development includes three components – economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars.

Sustainable Development Goals (SDGs)

In 2015, the 2030 Agenda for Sustainable Development (2030 Agenda) was adopted by all UN member States. The 17 SDGs constituted an urgent call for global action in ending poverty, improving health and education, reducing inequalities, catalysing economic growth, and tackling climate change in both developed and developing countries (Sustainable Development Knowledge Platform: https:// sustainabledevelopment. un.org/sdgs).

Technical and vocational education and training (TVET)

Initial and continuing education and training provided by schools, training providers or enterprises that imparts the skills, knowledge and attitudes required for employment in a particular occupation, or group of related occupations, in any field of economic activity.

Training needs analysis (TNA)

The analysis of the need for training of a specified group (e.g. employees in an enterprise) related to the skills required, e.g. for career advancement, employability, etc. in the workplace (adapted from ILO, 2020b).

Introduction

1

1.1 Purpose of the tool: responding to "code red"

Climate change and environmental degradation pose the greatest common challenge to humanity. As the International Panel on Climate Change (IPCC) has shown, we are now on "code red" as a result of the human impact on the climate, which is driving global warming at an unprecedented rate, threatening biodiversity and the collapse of ecosystems (IPCC, 2021). In turn, these trends pose a severe threat to livelihoods, employment and socio-economic development. They threaten to fall disproportionately on the poorest in our societies. The COVID-19 pandemic has shone a spotlight on such threats. While it caused a temporary drop in pollution levels, it also caused a surge in the use of single-use plastics in the form of protective masks and other health equipment. It has also had dramatic negative effects on employment but there is now an opportunity to "build back better" with more and better jobs and more resilient societies (ILO, 2020a).

The process of redesigning socio-economic systems to ensure their sustainability has begun but it needs to speed up. We can no longer delay taking action to address the challenges we all share. The "greening" of the economy requires a parallel greening of jobs which, in turn, requires us to consider the skills needed and the technical and vocational education and training (TVET) required to provide those skills.[1] In short, we need to see a "greening of TVET".

Greening TVET has a vital role to play in tackling the on-going challenges to our environment. It can not only support the green transformation of our societies and economies: it has the potential to **lead the changes required** by equipping everyone (from those in initial education to those coming to the end of their working lives) with the knowledge, skills and behaviours they can use to transform their workplaces and their communities. Greener TVET has a key role to play in ensuring that the green transition is fair and just by equipping everyone with the skills needed to play an active role in the new job opportunities that will arise. It will also play a key role in ensuring a resilient recovery.

Greening TVET is a **normative process of change that requires approaches that are clear, holistic, systematic and methodical**. It goes beyond looking at the skills now in use in "green jobs" to consider how and why skills should change in the interest of long-term environmental and social goals, not just shorter term economic ones. This adds an important dimension to what needs to happen in TVET: using existing processes and structures not just to reflect the status quo but from a normative perspective and introducing new ones where needed.

The purpose of this tool is to provide **practical guidance on how to develop greener TVET on the part of people involved in the policymaking, design and delivery of TVET**. The tool will be relevant to anyone involved in the TVET system – including public and private actors, teachers and trainers, school leaders, policymakers and social partners (employers and workers' organizations), as well as climate change activists, trainees, employers and workers. The tool is also relevant to everyone, regardless of professional discipline. The nature of the environmental crises we face means that the skills development and training response should not be limited to a narrow range of occupations such as waste management operatives or biogas digester installers; rather, it is **relevant to every job**, since putting into action greener behaviours, like waste reduction, brings benefits to every workplace. It is also **relevant to the existing and new jobs** being created in response to environmental crises.

1 In this document, "skills" is understood as having the ability to carry our mental or manual activity acquired through learning and practice, where skill is an overarching term which includes knowledge, competence and experience, as well as the ability to apply these in order to complete tasks and solve work-related problems (from Compendium: Skills needs anticipation (ilo.org)

The evidence indicates that TVET still has some way to go in responding to the challenge of the green transition. A key finding of the ILO's report, *Skills for a Greener Future*, was that:

> *most countries [...] have not developed a systematic approach to incorporating skills for green jobs into their TVET systems, and into the development or renewal of their TVET qualifications, since 2011. If this is done at all, it is done by incorporating a focus on skills for green jobs into existing policies, strategies, frameworks and/or education systems in general (not TVET only), by including components on skills for green jobs. This incorporation of green components is usually focused on several priority sectors (such as renewable energy and sustainable development). (ILO, 2019, p.165).*

This guidance therefore aims to help stakeholders to **step up the pace of change in TVET**, and will show how a wider circle of actors, not least the social partners, can become equally involved in the process. It provides guidance that is inclusive, being relevant in the widest variety of contexts, from LICs to HICs, from countries with well-developed and effective governance of their TVET systems to those still in their early stages of maturity, and from countries where the formal economy dominates to those where informal employment is the norm.

The tool thus seeks to be **inclusive**, while also being **ambitious**, in order to meet the challenges of the green transition.

▶ Box 1: What do we mean by the green economy and green jobs?

Green economy

"A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services." (United Nations Environment Programme, https://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/green-economy, accessed 29.04.21)

Green jobs

"Green jobs are decent jobs[2] that contribute to preserving or restoring the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency. Green jobs help to improve efficiency in the use of energy and raw materials, limit greenhouse gas emissions, minimize waste and pollution, protect and restore ecosystems, and support adaptation to the effects of climate change." (ILO, 2016a Technical paper. A just Transition to climate-resilient economies and societies: Issues and perspectives for the world of work (Geneva). Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---gjp/documents/publication/wcms_536552.pdf.)

2 See Glossary for a definition of "decent work"

1.2 Added value of the tool

There are already a number of tools and frameworks that provide guidance for TVET development, produced by a variety of international and national organizations. A review of these documents shows that few of them deal systematically with all the key elements, and they tend not to offer guidance on different approaches to implementation. The focus tends to be on competency standards, and to some extent curricula, with less information on training and assessment. There is very little information on training teachers and in-company trainers[3] or sensitizing the private sector that is specifically green, despite the fact that there are general problems in this area that countries are struggling with, for example the professionalization of TVET teachers and trainers or getting employers engaged in work-based learning (WBL) and apprenticeships. In general, most of the focus is on content, for example what competency standards should look like for specific occupations, and the stakeholders who should be involved, rather than process and obstacles/solutions. Many tools and frameworks have been developed ad-hoc and as part of pilot projects and there has been no consideration of how to mainstream them.

This guidance tool seeks to build on these earlier tools, as well as dealing with their aforementioned shortcomings, and to add practical value in a number of ways. First, it takes a **holistic and process-based approach**, dealing with all the key elements of the processes in TVET systems, including competency standards and curriculum design, training provision and assessment, as well as the critical underpinning topics of the professional development of teachers and in-company trainers, and the sensitization of employers and technical supervisors. Secondly, it adopts an **action-research approach** whereby a coaching and learning process is integral to its development (see next section). It includes an serveral different approaches to implementing the tool and gives greater consideration to the question of mainstreaming, as well as how to tackle barriers to implementation. While the tool has been designed as a stand-alone source of guidance, it works equally well as part of a dedicated training and coaching programme.

1.3 How the tool was developed

The development of this tool has been informed by earlier research by the ILO, including the publication in 2019 of *Skills for a Greener Future: A Global View*, as well as technical assistance and policy advice to its Member States, partly in the context of development cooperation projects.

The tool has also benefited from pilot projects in several countries, ranging from specific support measures to coaching programmes on how to use the tool to support developments in greening TVET. These initiatives have also provided further information and feedback for revising, improving and updating the tool.

Specific support measures were provided in Ghana (introductory presentation of the tool to various sectoral bodies), Zimbabwe (introduction to the tool in a Training of Trainers programme and support for institutional action plan development) and Zambia (assessment of greening priorities at a Regional Training Centre). Coaching programmes were organized for Cambodia, the Philippines and Thailand. Due to COVID-19 restrictions, activities were carried out online.

3 The term "in-company trainer" is used throughout the tool since it is widely used and includes trainers in all employment situations, whether in the private or public sectors or in civil society.

1.4 Structure of the guidance tool

The following sections of this tool focus on how to deliver the key elements of the holistic approach. Issues related to the wider system features of governance, funding and the role of social partners are dealt with throughout the report. The structure is as follows:

- Section 2 provides an overview of the approach to greening TVET adopted in this document, how the tool can be used and an overall self-diagnosis tool.
- Section 3 looks at how to ensure that competency standards respond to new demands in the labour market for skills for green jobs.
- Section 4 deals with how to green curricula, in the light of greener competency standards.
- Section 5 shifts the focus somewhat to look at how training can be greened and is mainly concerned with how this might occur at TVET provider level.
- Section 6 completes the examination of the "core" elements of teaching and learning by looking at how to green assessment.
- Section 7 presents a concise analysis of the process of greening TVET campuses.
- Section 8 moves the focus to teachers and trainers and how to meet their professional development needs around greening TVET.
- Section 9 looks at how to sensitize enterprises to the need to green TVET.
- Section 10 provides an overview of the particular issues related to the greening of skills in the informal economy, a key issue facing many countries, especially low-income ones.
- Section 11 completes the guidance tool by looking at how to mainstream greener TVET into TVET systems.

Greening TVET: an overview

2

2.1 The opportunities, constraints and challenges of greening TVET

The greening of TVET faces a wide range of challenges. As the concise overview of **constraints and challenges** provided in the Annex demonstrates, these cover a broad terrain. This guidance tool supports action in a number of areas, as shown in Table 1. The challenges and constraints will vary from country to country, sector to sector and institution to institution, but most of the issues in the table are likely to be found to some degree in almost every country.

▶ Table 1: Constraints and challenges of the greening TVET agenda and how the step-by-step guidance tool can help address them

CONSTRAINTS AND CHALLENGES	HOW THE GUIDANCE TOOL CAN HELP ADDRESS THEM
Lack of systematic, coordinated and practical processes to green TVET	Offers a systematic, holistic and step-by-step approach to greening TVET, including all pertinent activities
Insufficient tuning of TVET to the green transition due to weak processes and structures connecting TVET to the world of work	Shows how processes and structures can be put in place that enable stronger connections to be made between TVET and the labour market, e.g. based around competency standards
Dominance of a narrow approach to greening TVET which tends to be responsive to the immediate needs of the industries most directly affected, e.g. the energy sector, rather than as a broad, long-term process affecting the entire workforce	Adopts a broad approach to the green transition that embraces the goal of raising environmental awareness and greening TVET institutions, workplaces and communities, as well as meeting narrower technical needs.
Weak engagement of relevant actors with the goal of greening TVET	Shows how all relevant stakeholders, including social partners, can make an active contribution to greening TVET
Particular challenges for the informal sector with respect to the green transition, e.g. stakeholder engagement	Explicitly deal with issues related to skills development in the informal economy and informal apprenticeships
Under-representation of groups facing disadvantage in the labour market in green policy and practice	Shows how issues of inclusion and gender can be integrated at all stages of TVET design and delivery
Supply-side inadequacies such as the availability of green TVET teaching and learning materials; training for teachers and in-company trainers; adoption of provider-wide approaches to greening TVET	Provides guidance on topics such as how to green the curriculum, training and assessment, and provider campuses, as well as how to green professional development for teachers and in-company trainers
Difficulty for TVET graduates in applying their skills related to green jobs when employed by the private sector	Sensitizes enterprises on the need and benefits of supporting the green transition, not just those in industries most directly affected, such as energy, but across all sectors

Source: *Based on Annex I, which contains a brief overview of the key constraints and challenges related to the greening TVET agenda.*

The challenges and constraints together point to important common systematic deficiencies in the position of TVET in relation to the green transition. Overall, in many countries the capacity to respond to the green challenge in TVET remains limited, despite the large body of legislation related to the environmental crisis which now exists (ILO, 2019).

Yet, at the same time, the greening TVET agenda offers **opportunities** not only to ensure that programmes, qualifications and provision are fit for equipping people and employers with the skills they need for the green transition, but also to upgrade structures and processes more widely, such as the design of competency standards (CS) and social dialogue mechanisms. It also provides an important opportunity to connect with (national) strategies and programmes related to greening in a wider social and economic sense. This guidance tool will support TVET stakeholders in enhancing TVET systems so that they are able to make a full contribution to the shift towards greener economies and societies.

2.2 Different shades of green

So what do we mean by "greening" in TVET? As we noted in Section 1, TVET needs to become greener in order to support the development of the skills needed for the environmental challenges we face. In a sense, greening TVET is more like a **continual journey**, rather than a trip where the destination is quickly reached: while we now know that climate change is already upon us and no longer a future risk (IPCC, 2021), the jobs and skills in demand will evolve as the climate and environment change, often in ways that cannot be accurately predicted. Greening TVET is therefore a continual process.

The starting points for the greening journey will vary a lot from country to country: countries' skills development and TVET systems are at different stages with respect to their overall performance, and the precise mix of environmental challenges will vary from place to place (of which more below). There will also be variations in the capacity of systems to respond. In this context, this guide conceives the practical steps and activities of greening TVET as being on a spectrum from "light" to "deep" green, where light green activities represent adjustments to existing practices and deep green activities involve more thoroughgoing and systematic transformation of TVET.

Light green activities represent a starting point at which new elements are introduced into competency standards, curricula, training and so on. Light greening of TVET is a relatively passive type of response, which affects only those occupations most directly impacted by environmental challenges and is likely to deal predominantly with technical skills, e.g. to meet the needs of new green tasks, such as wind turbine installation. It will tend to focus on decarbonizing existing production and service delivery processes and on pollution reduction.

In contrast **deep greening** is a more thoroughgoing response to the challenges we face, embracing the development of new ways of thinking and behaving across the workforce. This idea is captured in this quotation from the Skills for Trade and Economic Diversification (STED) programme in Cambodia:

> *The inclusion of the green elements in the competency standards is intended to raise the green awareness of the students themselves, and have them inculcate it as part of their work values later on when they join companies. - Ma. Concepcion E. Sardaña, Chief Technical Adviser to the ILO-SIDA Project on Skills for Trade and Economic Diversification (STED)*[4]

Deep greening includes more systematic revision, innovation and digital elements, involving the adaptation of all curricula and qualifications, and their mainstreaming throughout the TVET system. Deep greening will also involve the adoption of new approaches to teaching and learning, seeking to equip learners with the skills to be active agents of change, so that we can move beyond decarbonization and pollution reduction to pioneering the circular economy (see box 2). This means developing skills in critical thinking, problem-solving, adaptability and collaboration, and introducing new ways of delivering TVET, in particular learner-centred approaches and pedagogical innovations such as project-based learning.

4 http://ilo.org/asia/media-centre/articles/WCMS_631366/lang--en/index.htm

In this tool, this conception of the deep greening of TVET constitutes our "**ambition horizon**" and runs as a thread throughout, being highlighted where relevant to show what it means in particular contexts.

▶ Box 2: What do we mean by the circular economy?

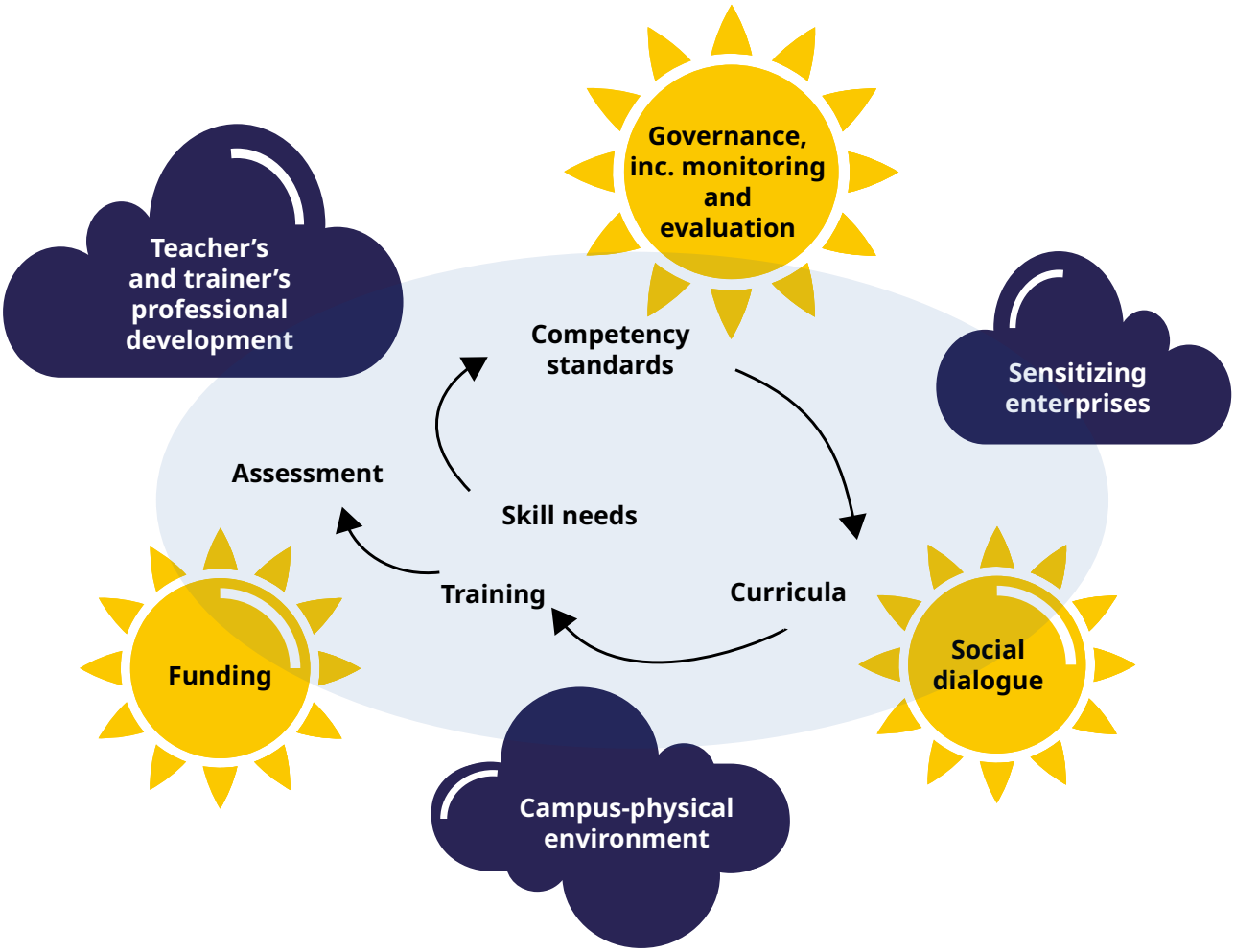
Circular economy

"A model for sustainability in resource use and consumption which supports moving away from an extract–manufacture–use–discard model and embraces the recycling, repair, reuse, remanufacture and longer durability of goods" (ILO 2018).

2.3 Taking a systematic approach

Greening TVET means addressing all the structures and processes involved in designing and delivering TVET, i.e. taking a systematic and holistic approach, as shown in Figure 1.

Figure 1: Key elements of greening TVET



As can be seen, greening involves what might be seen as the core processes of designing and delivering TVET: creating competency standards attuned to industry needs, which means having a solid and systematic approach to identifying skills needs; developing and implementing green curricula; greening training at local level; and developing appropriate assessment packages. It also means ensuring that the physical environments around teaching and learning – TVET campuses – contribute to the development of green awareness and behaviour; that teachers and trainers are equipped with the skills they need to teach green curricula and pedagogies; and encouraging, motivating and stimulating employers and workers to engage with the greening process. It is also essential to consider wider system features, in particular governance (which includes activities such as monitoring and evaluation), funding, and the role of social partners. The box below illustrates how a holistic approach can be implemented in practice.

▶ Box 3: Example of an holistic approach to greening: Zimbabwe's Green enterPRIZE programme

In 2020, Zimbabwe's Green enterPRIZE programme launched a set of new TVET curricula focused on key parts of its green economy - climate-smart agriculture and renewable energy - with the goal of stimulating the market for new products and services and expanding employment opportunities.

Working closely with the ILO, the TVET programmes were developed from 2017 to 2021, and involved close collaboration throughout the process on the part of:

- an inter-ministerial task force led by the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development and supported by several line Ministries responsible for Youth, Women and SMEs, Energy and Agriculture;
- a network of TVET institutions and their faculties;
- representatives of industry and SMEs and technical experts from national and international organizations;
- workers and employers' organizations;
- the National Manpower Advisory Council and the Higher Education Examinations Council.

The programme involved the following phases:

Phase 1 (2017-18) Research on the supply and demand of skills for green jobs, which identified a need to focus on the climate-smart agriculture and renewable energy sectors.

Phase 2 (2018-19) Assessment of the capacity of TVET institutions, which built a network of 30 institutions to offer the training and identified the challenges they might face.

Phase 3 (2019-20) Curricula development and validation, in which industry experts, and TVET and academic professionals worked together to develop five curricula providing learning content and guidance for instructors and trainees, from in-classroom learning to practical work experiences.

Phase 4 (2020-21) Launch/Piloting, which included running Training of Trainers workshops for 60 instructors and industry experts from TVET institutions and other community-based organizations to enhance their capacity to write training manuals, deliver work-based learning and allocate resources to support the pilot phase.

Phase 5 (2021 onwards) Rollout, in which action plans have been launched at TVET level with the objective of reaching out to 2,000 students across the country. The programmes are open to students at any level of education.

The Green enterPRIZE platform is also supporting the establishment of partnerships between training providers and SMEs which can pilot innovative work-based learning programmes in the agricultural and renewable energy sectors.

Source: Evidence gathered during piloting of the guidance tool

2.4 Using the tool

This guidance tool has been designed with flexibility in mind. On the one hand, individual sections, which correspond to the elements in Figure 1, **can be used independently of one another as required**. So, for example, a TVET institution may wish to focus only on sections where they have identified a need, e.g. assessment. On the other hand, the tool recognizes that it is important for countries and institutions to take stock of where they currently stand in respect of greening TVET as a whole, i.e. they need to **diagnose their strengths, assess future opportunities and weaknesses in relation to all the different elements**, as a basis for determining where to focus their attention (see Section 2.5 below). This tool can also be used for this purpose, for which further guidance is given in the final section.

This guidance has also been designed to be **relevant in all country contexts**, including **low- and middle-income countries**. As already indicated, country context is an important factor in the potential for countries to green TVET, given the wide variation that exists in the development of relevant institutions such as frameworks and platforms for social dialogue. Some countries (often high income and some middle-income) tend to have mature TVET systems, in which social partners and employers are key stakeholders in developing programmes and qualifications attuned to labour market needs. These countries are also quite often in the vanguard of developing green technologies and markets for greener products and services. Greening TVET in these countries is often taken care of through existing institutional mechanisms.

In contrast, others countries (many of them low- and lower-middle-income) are in the process of developing more formal TVET systems, in the context of economies that have major informal employment sectors and where the involvement of social partners and enterprises is currently weak. Government institutions in these countries also tend to be weak, leading to poor enforcement of regulations, which then makes it hard to develop markets for green goods and services. These countries are most likely to be affected by climate change and environmental degradation, often relying heavily on polluting primary industries, and their large informal sectors are a challenge to greening skills and training. In this context, greening TVET will be a key aspect of tackling environmental challenges. Greening TVET can also empower and support the greening process for countries transitioning away from high dependence on fossil fuels.

The guidance tool is relevant to **all stakeholders** who should be involved in greening TVET, ranging from teachers, training institutions, in-company trainers and grassroots community organizations to policymakers and employers' and workers' organisations at national or sectoral level. Different stakeholders will, of course, be involved to different degrees in the various aspects of greening TVET set out in the following sections. Hence, there is a box at the start of each section to indicate which stakeholders ought to be involved in each element.

2.5 Taking stock: in overall terms, where are we now?

Initially, users might find it valuable to take stock of their current position and where they may wish to focus their attention in using the tool. The template below asks some key questions that can be used as a starting point for stakeholders in diagnosing their current position and discovering where they need to take action (and corresponding chapters can be used if more details are required, as indicated).

▶ **Table 2: Taking stock of the current position: questions for self-diagnosis**

KEY TOPICS	WHAT ARE OUR STRENGTHS? HOW CAN WE DEVELOP THEM?	WHERE ARE THE GAPS, WEAKNESSES AND BARRIERS TO CHANGE? HOW CAN WE TACKLE THEM?
Identifying skill needs: How far are we currently identifying all the skills needed for the green transition, in both existing jobs and new green jobs? How far are we identifying both technical skills and core skills like critical thinking and problem-solving? (Chapter 3)		
Competency standards: How far have we already developed competency standards related to the green transition? Have we covered all occupations or just new green occupations? (Chapter 3)		
Curricula: How far are curricula meeting not just the need for greener skills, but wider green needs e.g. for a just transition? Do all elements of the curriculum take into account the green transition? (Chapter 4)		
Training: How far do all aspects of training, including work-based learning, meet sustainability needs? How far is training doing things in new ways to meet green transition needs, e.g. drawing on local community resources and expertise? (Chapter 5)		
Assessment: Are current assessment methods appropriate for assessing all skills needs for greening, both technical and transversal? Are methods inclusive? Do assessment and certification support upskilling and reskilling adequately? (Chapter 6)		
Campus: How far do TVET provider campuses provide environments that support the development of greener mindsets and behaviours? (Chapter 7)		

KEY TOPICS	WHAT ARE OUR STRENGTHS? HOW CAN WE DEVELOP THEM?	WHERE ARE THE GAPS, WEAKNESSES AND BARRIERS TO CHANGE? HOW CAN WE TACKLE THEM?
Teachers and trainers: How well equipped are teachers and in-company trainers to deliver the curricula, training and assessment learners need? In what ways do initial training and continuing professional development need to be developed? (Chapter 8)		
Employers and workers: To what extent are employers and workers engaged with the green agenda – not just those most immediately affected (e.g. in the energy sector) but in all occupations? How far are employers engaged at employer level (e.g. in increasing awareness and relevant skills among their workers) and through their representative organizations at sectoral/sub-national/national level (e.g. in governance, skill needs identification, training delivery, financing and raising environmental awareness)? What measures are needed to boost engagement? (Chapter 10)		
Governance, funding and social dialogue: To what extent are our structures and processes fit for greening TVET? (Referenced throughout the tool but see especially Chapter 11)		

Designing competency standards for greener jobs

3

Key learning points

This section will help you to learn about:

- How competency standards can support the green transition
- What the green transition means for skills
- The types of mechanisms that can be used for assessing skills for green jobs
- The content of competency standards required for the green transition
- The methods that can be used to develop competency standards, and the stakeholders that should be involved

Stakeholders to be involved in designing competency standards

- Policymakers
- Individual enterprises and employers' organizations
- Sector bodies, including sector skills bodies
- Workers' organizations
- Environmental NGOs
- Community organizations
- Industry experts and workers
- Government institutions responsible for the design and conceptualization of training
- Institutions responsible for accreditation of programmes/qualifications
- Educational experts
- TVET institutions
- Teachers and in-company trainers

3.1 Introduction: the role of competency standards

The process of designing and implementing TVET that is fit for the green transition comprises several elements, beginning with identification of identifying the knowledge, skills and attitudes/behaviours that people are expected to possess in order to be competent in an occupation. These are known as "competency standards" or sometimes just "competencies". They are key building blocks in high-quality qualifications and programmes. Well-designed competency standards provide the basis for curricula, training packages and assessment methodologies that are well attuned to the needs of the green economy.

▶ Definitions: What are competency standards?

Competency standards are "benchmarks to assess the knowledge, skills and attitudes required by an individual in order to perform in the workplace." (ILO. 2020b. Competency-Based Training (CBT): An Introductory Manual for Practitioners, p. 10)

Note however, that: "'Competency standards', 'competencies', 'competency units', 'unit Standards' or 'units of competency' are terms that are used interchangeably to describe the knowledge, skills and attitudes that a person needs in order to carry out a particular job or activity and at the level of performance required. Competencies generally specify minimum standards and the conditions in which they should be applied". (ILO. 2009. *Making full use of competency standards: a handbook for governments, employers, workers and training organizations, p. 2)*

3.2 "Green jobs" and skill requirements

Competency standards need to accurately reflect the skills needed for the green transition. It is therefore important to have a good understanding of the nature of "green jobs". Table 3 summarizes some key facts about green jobs. Overall, the green transition is forecast to create more jobs than it destroys, mostly affecting existing occupations rather than creating new ones, although some new occupations will be created, especially at higher skill levels.

▶Table 3: Key facts about skills for green jobs

Most of the effect of the green transition is felt in existing jobs rather than in the creation of new ones:

- **In existing occupations** workers need reskilling or upskilling, e.g. many construction occupations now involve the use of green materials, requiring new knowledge and techniques, and all occupations need skills in recycling, waste management, etc.
- **New green occupations** emerge for performing sets of work tasks that require new bundles of skills and tend to emerge at higher skill levels, e.g. solar-panel installers or wind-turbine technicians.
- People in **occupations in traditional industries that are being phased** out owing to their reliance on fossil fuels, such as coal-mining, will also need reskilling or upskilling to help them into new jobs.

The need for greening varies in terms of the skill levels required:

- In **low-skilled jobs**, the greening of skills tends to be generic, involving education in environmental awareness and simple adaptations to work processes in occupations like waste collection.
- In **medium-skilled jobs**, important technical skills changes are needed in existing occupations such as construction (e.g. energy efficiency skills), and for with some new green occupations, such as wind-turbine operation.
- **High-skilled jobs** are the focus of most new green occupations, e.g. climate-change scientists or agricultural meteorologists, and there is significant demand for new skills in existing jobs such as engineering.

There are important variations across sectors

- Particularly important sources of green jobs to date, across most countries, have been the **renewable energy** and the **environmental goods and services** sectors, including waste, energy and water management.
- Employment effects in **construction** tend to be variable, depending on the degree to which existing buildings are greened through retro-fitting or, conversely, where the focus is on ensuring that new construction is greener.
- In other sectors, the employment effects of the green transition are variable and complex. Some **manufacturing** enterprises, e.g in the automotive sector, are gradually switching to electric vehicles, resulting mainly in job substitution, while other manufacturers are producing green products like wind turbines.
- There still seems to be considerable scope to make jobs greener in **agriculture**, which faces major green challenges and is a major employer in most developing countries.
- The potential for green jobs in **transportation, tourism and extractive industries** is yet to be fully realized.

Source: ILO. 2019. *Skills for a Greener Future* (Geneva)

In terms of skill requirements, while only some occupations require specific new technical skills (like those needed to install wind turbines), every occupation requires some change in skills to support the green transition. Indeed, all occupations require a range of core (or "soft") skills, for example general environmental awareness, waste minimization and recycling, which are essential for the greening of all production and services and which can be transferred between jobs.

This being the case, it is worth considering what the green transition might mean in terms of the skills that we all require to be active agents for the greening of the economy. An example of a set of such skills is shown in the box 4. National authorities, in partnership with relevant stakeholders, should consider developing a list of skills of this kind related to their own environmental policies. One weakness often found in the policy framework for meeting skills needs for the green transition is the link between environmental and TVET policy (ILO, 2019). One way of addressing this weakness is to involve all relevant stakeholders, especially the social partners, in determining the core skills that would be needed to achieve a country's environmental goals. Indeed, this could provide the basis for a green reference point against which to review the "green-ness" of the competency standards of existing programmes/qualifications and for developing new ones (discussed below).

▶ Box 4: An example of the types of core skills needed in all jobs to support the green transition

- Environmental awareness and protection; willingness and capability to learn about sustainable development
- Adaptability and transferability skills to enable workers to learn and apply the new technologies and processes required to green their jobs
- Teamwork skills reflecting the need for organizations to work collectively on tackling their environmental footprint
- Resilience to see through the changes required
- Communication and negotiation skills to promote the required changes to colleagues and customers
- Entrepreneurial skills to seize the opportunities of low-carbon technologies and environmental mitigation and adaptation
- Occupational safety and health
- Basic digital skills to enable use of technologies that can reduce environmental impacts

Source: Adapted from ILO, 2019, Skills for a Greener Future, p. 30

3.3 Assessing the needs of employers and individuals in relation to green jobs

There are various ways of developing an understanding of the skills needs of employers and individuals in relation to green jobs with a view to designing competency standards.

The last decade has seen the development of **general mechanisms** for identifying and anticipating skills needs[5] based on the collection of national and regional statistics and the involvement of relevant stakeholders, and such mechanisms have been used as tools in considering the green transition (see examples in the box 5). The involvement of stakeholders, and in particular the social partners, is noteworthy since it is key to developing a more nuanced understanding of skills needs as it brings qualitative insights into the discussion and the adjustment of sectoral and occupational forecasts.

▶ Box 5: Examples of mechanisms for anticipating skills for green jobs

Estonia's System of Labour Market Monitoring and Future Skills Forecasting (Oskuste Arendamise koordinatsioonisüsteem, OSKA)

OSKA produces data to supplement the Ministry of Economic Affairs and Communications' forecasts, with the result that adjustments are made to these forecasts based on OSKA input. With the introduction of OSKA, sectoral forecasts can be made with greater precision, as OSKA offers insights as to the skills needed today and in the future, as well as current mismatches. The implementation of this system has increased the involvement of stakeholders and created a process whereby they can provide input regarding skills anticipation and make recommendations for upgrading competency standards, especially on the part of the private sector and social dialogue partners (representatives of employers and trade unions sit on both the OSKA Coordination Council and the sector skills councils). Representatives of educational institutions influence the process through the OSKA Panel of Advisers. As a result, the OSKA system leads to the development of recommendations concerning curricula and training. In 2021, it produced an overview of skills for the green transition to support key decision-makers and stakeholders in education, training and employment, and especially to help ministries to develop relevant curricula.

5 And the ILO has produced a practical guide to skills needs anticipation for green jobs: https://www.ilo.org/skills/projects/WCMS_564692/lang--en/index.htm

A multi-level approach to identifying skills needs for green jobs:

Costa Rica's National Institute of Apprenticeship

The main tasks of the Costa Rican National Institute of Apprenticeship (Instituto Nacional de Aprendizaje: INA) are the design and execution of training programmes in collaboration with other public and private institutions, and the provision of technical assistance to institutions and companies in the creation and delivery of professional training. In respect of skills for green jobs, the INA provides technical training based on current needs, mainly for organizations and companies for which environmental management is an operative principle (a proactive response to the trend towards a green economy) or for those taking measures to comply with environmental legislation (a reactive response). The INA maintains direct contact with companies in the country in order to identify training needs for occupations in all productive sectors in the shift to a greener economy. Its identification of the skills needed is based on information gathered through three channels

1. Direct requests from companies or workers;

2. Studies of demand conducted regularly by the Institute itself;

3. Agreements or other mechanisms established with chambers of commerce, associations ofenterprises or government bodies

The constant flow of information and feedback ensures a timely response to labour market trends.

Sources: Cedefop, 2018, *Skills for Green Jobs in Estonia: an update*, pp 11-12, https://oska.kutsekoda.ee/en/, and https://oska.kutsekoda.ee/en/estonian-labour-market/oska-overview-of-the-skills-necessary-for-green-and-digital-transition/; and ILO, 2019, Skills for a Greener Future, p. 162

Another approach, albeit a rare one, is to create structures and processes specifically **dedicated to the green economy**. French partners, for example, have created the National Observatory for Jobs and Occupations of the Green Economy (Observatoire national des emplois et métiers de l'économie verte – Onemev),[6] which brings together relevant national ministries and agencies (including the national VET association and public employment service) for dialogue and analysis. It also produces statistics and methodologies to enhance knowledge of jobs and occupations within the green economy. In India, a Skill Council for Green Jobs has been established (see box 6).

6 https://www.statistiques.developpement-durable.gouv.fr/observatoire-national-des-emplois-et-metiers-de-leconomie-verte-rapport-dactivite-2019

▶ Box 6: Taking a coordinated approach in India

In India, the national Government has adopted an holistic approach that coordinates activities across ministries and private sector bodies. The Skill Council for Green Jobs was set up in 2015 under the National Skill Development Mission and is promoted by the Ministry of New and Renewable Energy and the Confederation of Indian Industry. The Council is a not-for-profit, autonomous, industry-led society, incorporated under the Societies Registration Act. Its objective is to identify skills needs within the green business sector and to implement nationwide, industry-led, collaborative skills development and entrepreneur development initiatives. Its governing council includes representatives of government ministries and employer bodies, as well as individual employers. By 2019 the Council had over 500 affiliated training centres across 24 states, and has now certified more than 400,000 training candidates.

In individual sectors, industry-led sector skills councils, responsible for the development of national occupational standards and qualifications, play a key role. For example, in the construction sector the Indian Green Building Council (a private sector institution) and the Bureau of Energy Efficiency (an agency of the Government of India) conduct training programmes for energy managers and grant national certification for energy auditors.

Source: ILO, 2019, Skills for a Greener Future; and Skill Council for Green Jobs website: https://sscgj.in/

Ad hoc or one-off mechanisms are not uncommon, especially in LICs, either to supplement general mechanisms or to fill the gap where they do not exist. This can take a number of forms. For example, committees or expert groups can be brought together for a limited period to consider the need for greening programmes and qualifications in a particular sector or occupation; green themes can be brought into employer surveys; and individual employers and NGOs can identify the need for skills for green jobs (e.g. in Bangladesh, where some NGOs, renewable energy companies, waste management companies and the Infrastructure Development Company Ltd. have been active in this field – see ILO, 2019, p. 160). In LICs, the high proportion of jobs in the informal economy hampers accurate identification of skills for green jobs (see Section 10).

As well as identifying the skills required in green jobs, it is important to identify **individuals' needs and aspirations for TVET for skills development and employment** in relation to the green economy/green jobs. Such information could be a driver for change (e.g. in sectors where employers' response to the green transition is sluggish) and may offer contrasting opinions on the skills required for employability, ensuring that there is not an exclusive focus on the needs of employers.

Individuals' needs can be identified **through training needs analysis** (TNA), a process that can be enhanced by the participation of workers' representatives via trades unions. Adapted to the green transition, TNA can address such questions as:[7]

- What are individuals' aspirations in relation to the green transition and greener jobs in particular?
- What are their gaps in technical and vocational skills and green awareness and behaviour that need to be addressed for employment in the green economy?
- How do TVET pathways need to be adjusted to enable individuals' objectives to be reached?
- What obstacles are there to accessing TVET for the green economy?
- What are the accessibility constraints and what steps should be taken to ensure that TVET equally benefits women, people with disabilities and disadvantaged groups?

7 Adapted from ILO, 2020b

3.4 How to develop competency standards for a greener workforce

A good understanding of skills needs for green jobs provides a sound basis for designing and developing competency standards. It makes it possible to identify both new green occupations and (more commonly) the new skills that are emerging within existing occupations. This information can be used as a starting point for probing deeply into occupations and identifying the knowledge, skills and attitudes/behaviours that people need in order to be "green competent" in the workplace.

Most countries have established procedures and institutional arrangements for developing competency standards, so the key task is to apply these procedures and arrangements to assist with the greening of TVET. To see how this could happen, we should first take a look at the typical arrangements for developing competency standards before exploring how they can be used to achieve greener standards.

3.4.1 General competency standards development processes

The overall process of competency standards development requires the unpacking of an occupation, first into its broad component roles, responsibilities and tasks, then into the detailed competencies of which it is comprised.

The key steps consist in:

- Identifying **the duties/responsibilities and tasks in the work place**. This means carefully identifying the stand-alone aspects of work that need to be performed within a given occupation (the duties), then the specific tasks undertaken to fulfil each duty.
- Further unpacking this structure of tasks and responsibilities to **identify the skills required and the performance level expected**. Skills might be expressed in terms of the knowledge, competence and behaviours needed to reach the required performance level, but this step can also take place as part of learning outcomes development, which is covered in Section 4.[8]

The output from these steps is recorded in a document which may also specify the range of materials, tools, equipment to be used, how achievement of the competency standards is to be evidenced, the resources to be provided during the TVET programme and the types of assessment methods to be used. There may be some overlap between these elements and the content of curricula, and in some countries these elements are included in curriculum documentation, rather than in competency standards specifications (see also Section 4.2). They are also likely to be captured within TVET providers' learning plans and assessment methods, which are dealt with in subsequent sections of this guide.

It is probably clear from the above that while we can identify the basic elements of competency standards development, there is no globally accepted set of steps or terminology. This may lead to some confusion, as described in the box below.

8 In some cases, as in Cambodia, competencies can also be referred to as learning outcomes, which in effect combines the processes of CS and curriculum design into a single step.

▶ Box 7: Terminology: a world of variation

There is much variation from one country to another in the terms used and the activities to which they refer. In some countries a two-stage process is followed, involving an initial occupational analysis (which produces occupational standards, perhaps in a document called an occupational profile) prior to identification of more detailed skills and associated competency standards (which might be captured in a document called a competency profile). In some countries these stages are combined and a single document is produced. This is the case in **India**,[9] where the only term used is "occupational standards", rather than "competency standards". In **Zimbabwe**, "occupational/job profiles" have been produced for several new green occupations, e.g. biogas digester installer, and these set out the tasks and duties required. "Skills proficiency schedules" have then been produced and these documents unpack the tasks and duties into proficiency indicators, related knowledge and essential workplace skills that form the basis for "qualification standards", which set out the required competencies.

3.4.2 Applying existing procedures to achieve greener competency standards

In thinking about how to use standard procedures to green CS, it is worth noting that **competency standards occupy a pivotal position between the world of work and the world of TVET**. They articulate skills needs in a form that TVET practitioners can use to design appropriate curricula and training and assessment packages, and they shift the focus of learning to its outcomes (away from "inputs", such as what has been studied, where and for how long). In this way, CS enable TVET to become more closely attuned to the needs of the labour market and to the emergent new needs of the green transition. **Greener competency standards are the source of greener TVET and should flow like a river through curricula into programmes and learning settings.** Developing greener CS involves using existing development processes to introduce CS for new occupations and to green existing programmes. We look at both of these in the following sections.

As part of these greening processes, national stakeholders may also wish to define a common set of skills for greening all occupations and this could provide the basis for a set of stand-alone competency standards covering the fundamentals of the green transition.

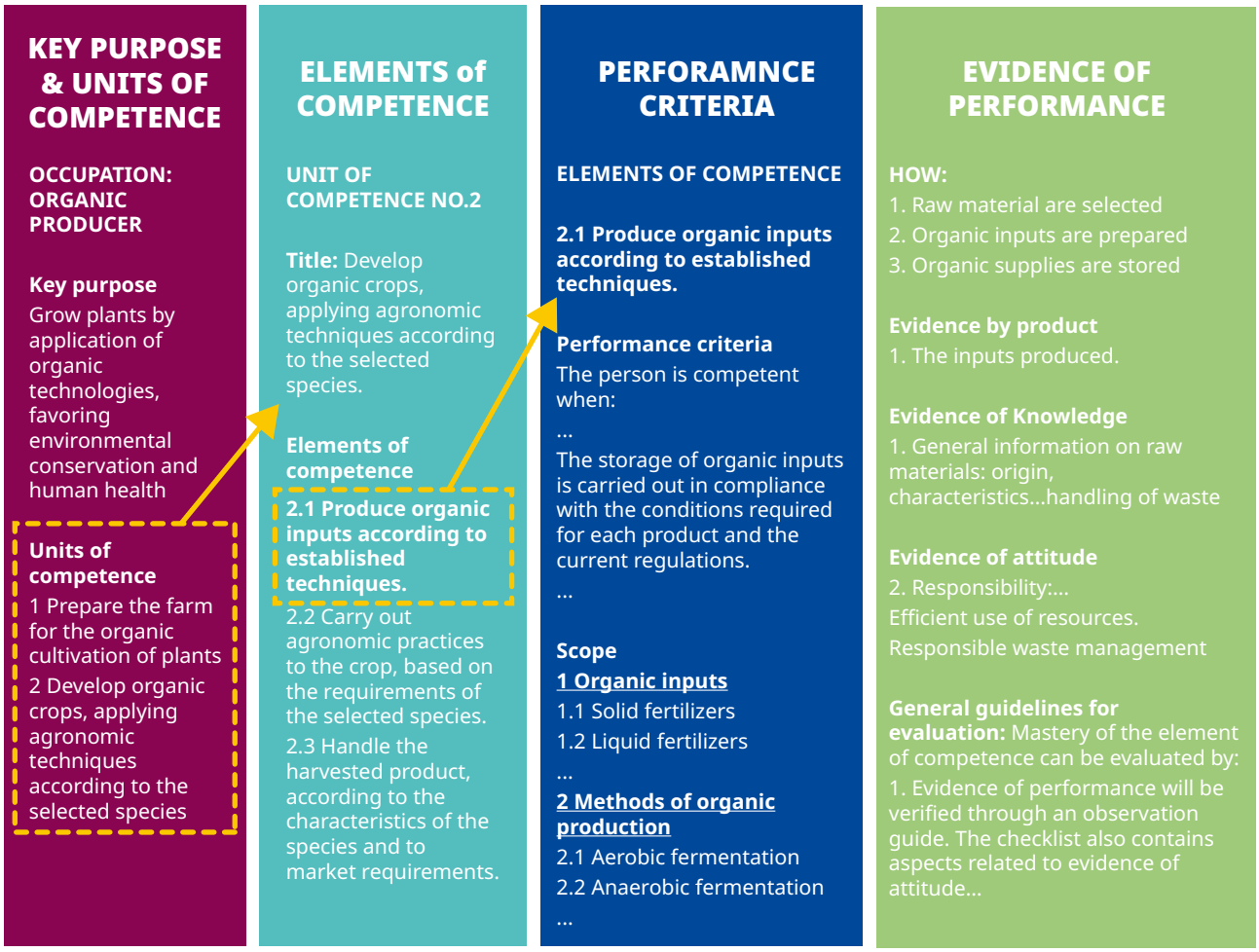
3.4.3 Competency standards for new green occupations

The example below (figure 2) shows a competency standards specification for a **new green occupation** (organic producer). As noted at the start of this section, such occupations are relatively rare. Even in such cases, it is unlikely that the design of CS will start from scratch: new occupations are likely to be developed out of existing occupations and it may be difficult for stakeholders to decide when and how the emergence of new occupations should be reflected in new competency standards. With new occupations, it is therefore likely that existing competency standards can be "borrowed" and appropriately adapted, which avoids the challenge of starting with a blank sheet of paper.

The example below shows one unit of competence related to the occupation of organic producer. Under this unit of competence, three "elements of competence" have been identified, details of one of which are then shown in terms of performance criteria and scope. In the final column evidence for performance is shown.

9 See https://nsdcindia.org/national-occupational-standards

Figure 2: Example of competency standards for a new green occupation: organic producer (FOIL project)[10]



3.4.4 Greening competency standards in existing occupations

Most greening takes place within existing occupations. In such cases, and where a competency specification already exists, greening the competency standards will involve a process of review including identification of Strengths, Weaknesses, Opportunities and Threats (SWOT analysis) related to the green economy, and the gaps where new skills might be introduced.

The figure below (figure 3) provides an example of how new green elements might be included within the typical contents of a competency standards specification for plumbing. In this example, alongside the existing skills, new skills related to the green agenda have been identified, as shown in the third column, which are then expressed as elements of competency. (For another interesting example of the greening of plumbing see the "GreenPlumbers" initiative in Section 5.5.)

10 ILO FOIL/AECIDProject (2010-14) in collaboration with the Regional Network of Professional Training Institutions (Red de Institutos de Formación Profesional - Guatemala, Honduras, El Salvador, Guatemala, Costa Rica, Nicaragua, Panama, Dominican Republic) (undated) Norma Técnica de Competencia Laboral y Diseño Curricular. Ocupación: Productor/a Orgánico/a

Figure 3: Greening plumbing in Cambodia: new competency standards

COMPETENCY	ELEMENTS INCLUDED	SKILLS FOR GREEN JOBS REQUIRED	HOW EXPRESSED AS A COMPETENCY STANDARDS ELEMENT
Prepare pipes For installation	1. Identify and select materials 2. Identify and select tools and equipment ...	Minimize or reduce – material used	5. Minimize waste
Make piping joints and connections	1. Fit-up joint and fittings for PVC pipes 2. Make threaded pipe joints and connection ...	Water leakages	5. Minimize water leakages
Perform minor plumbing works	1. Prepare for plumbing works 2. Rough-in pipes for installation ...	Water – reduce- domestic systems	7. Reduce water use by installing water-saving fixtures – tapware

In this case, the competency standards also specify the performance criteria (what someone is expected to be able to do at this level), the scope or range of variables to which the competence should be applied, and an evidence guide indicating the critical aspects of competency and the underpinning knowledge, attitudes and skills required. These elements are shown in the figure below for the competency standard on waste minimization mentioned in the preceding figure 3.

Figure 4: Greening plumbing in Cambodia: details for a new green element on waste minimization

COMPETENCY: PREPARE PIPES FOR INSTALLATION			
New green element	**Accompanying performance criteria**	**New green additions to range of variables**	**New green additions to evidence guide**
Minimize waste	▶ Materials are used in the most efficient way by making appropriate preparations using calculations and measurement prior to materials selection ▶ Plumbing tasks are completed with appropriate inputs of water, energy and materials, avoiding wastage. ▶ Good design practice of pipe fittings is identified to minimize waste ▶ Approved processes for recycling materials are implemented.	▶ <u>Recyclable materials:</u> Recyclable plastic Paper Cardboard Metals Glass Tin ▶ <u>Waste:</u> Offcuts of material Unused material Packaging Broken and damaged fittings and fixtures Broken and damaged tools	▶ <u>Critical aspects of competency</u> Demonstrated understanding of environmental issues affecting the construction industry Demonstrated understanding of importance of good waste management. ▶ <u>Underpinning knowledge and attitudes</u> 3Rs (reuse, recycle, repurpose) methodology and principles Environmental issues, especially with regard to water catchments, air, noise, efficient use of resources, sustainability and waste minimization Good practice in approach to work area, particularly with regard to 3R implementation ▶ <u>Underpinning skills</u> Ability to understand concepts

During a process of this kind, decisions will need to be made as to how best to deal with the new skills required, e.g. whether green elements should be integrated into existing competency standards and/or whether entirely new groups of skills (sometimes known as "units of competencies") should be defined to sit alongside the existing competency standards. This is not an easy or straightforward decision to make. In Cambodia, competency standards are structured into "core" and "basic". In plumbing, an existing basic competency standard, referred to as "Participate in Sustainable Development Related Activities" and shown in the figure below (figure 5), was upgraded in terms of its green content to make it suitable for the revised standards described above (new elements are shown in bold italics).

Figure 5: Greening plumbing in Cambodia: a general competency standard on sustainable development (new elements in bold italics)[11]

UNIT OF COMPETENCY PARTICIPATE IN SUSTAINABLE DEVELOPMENT RELATED ACTIVITIES	**UNIT CODE: CONS 0206**
UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required to promote sustainable development and environmental protection.	

ELEMENTS AND PERFORMANCE CRITERIA MATRIX
(Terms in the performance criteria that are written in Bold and Underlined are detailed in the range of variables)

ELEMENTS	PERFORMANCE CRITERIA
1. Participate in specific environmental programmes.	1.1 **Programmes/Activities** are identified according to organizations' policies and guidelines 1.2 Individual roles/responsibilities are determined and performed based on the activities identified 1.3 Problems/constraints encountered are resolved in accordance with organizations' policies and guidelines 1.4 Stakeholders are consulted based on company guidelines
2. Identify negative environmental impact in construction industry	**2.1 Basic knowledge of the concepts of global warming and climate change is demonstrated.** **2.2 Examples of how climate change impacts Cambodia are given.** **2.3 Natural resources used in the construction industry are identified.** **2.3 The construction industry's contribution to climate change is identified.**
3. Conserve resources in routine tasks	**3.1 Principles of reduce, reuse, recycle are implemented.** **3.2 Recyclable and non-recyclable items are identified.** **3.3 Negative impacts of single use are highlighted.** **3.4 Alternatives to single-use plastics are identified.** **3.5 Single-use plastic is being eliminated or significantly reduced.**

11 This standard was developed as part of an ILO/SIDA (Swedish International Development Cooperation Agency) project in 2020, following analysis of the gaps related to green jobs in the Level 2 Plumbing Standard. See Kingdom of Cambodia, Ministry of Labor and Vocational Training, General Directorate of TVET (undated) National Competency Standards, Plumbing, Level 2. Integration of Green Skill Elements in the CS on Plumbing.

RANGE OF VARIABLES

1. Programmes/Activities	1.1 School environmental programmes 1.2 Community environmental programmes 1.3 Local government environmental programmes 1.4 Religious group environmental activities 1.5 NGO-led environmental activities

EVIDENCE GUIDE

1. Critical aspects of competency	1.1 Assessment requires evidence that the candidate: explained clearly established workplace safety and hazard control practices and procedures; ***1.2 demonstrated understanding of environmental issues affecting the construction industry;*** ***1.3 demonstrated understanding of the importance of good waste management.***
2. Underpinning knowledge and attitude	2.1 OHS procedures, practices and regulations 2.2 PPE types and uses 2.3 Personal hygiene practices 2.4 Hazards/risks identification and control 2.5 Threshold Limit Value –TLV 2.6 OHS indicators 2.7 Organization's safety and health protocol 2.8 Safety consciousness 2.9 Health consciousness ***2.10 Basic knowledge of climate and environmental issues*** ***2.11 3R methodology (reduce, reuse, recycle) and principles*** ***2.12 Environmental issues, especially with regard to water catchments, air, noise, efficient use of resources, sustainability and waste minimization*** ***2.13 Good practice in approach to work area, particularly with regard to 3R implementation***
3. Underpinning skills	3.1 Practice of personal hygiene 3.2 Hazards/risks identification and control skills 3.3 Interpersonal skills 3.4 Communication skills ***3.5 Ability to understand concepts*** ***3.6 Ability to understand, interpret and apply information, requirements and sustainability principles*** ***3.7 Performing research and analysis, calculation*** ***3.8 Reading / interpreting data and information***
4. Resource implications	The following resources must be provided: 4.1 Workplace or assessment location 4.2 OHS personal records 4.3 PPE 4.4 Health records

5. Methods of assessment	Competency may be assessed through: 5.1 Portfolio assessment 5.2 Interview 5.3 Case study/situation
6. Context of assessment	6.1 Competency may be assessed in the workplace or in a simulated workplace setting. 6.2 Competency assessment must be undertaken in accordance with the promulgated National Competency Standards and the MoLVT competency assessment guidelines.

3.4.5 Greening competency standards: who and how?

Developing the types of competency standards described above – for both new green occupations and existing occupations being greened – requires important decisions as to **how** competency standards should be developed and by **whom.** Countries may already have their own methods for developing competency standards, in which case they should be used for the purpose of greening.

The "how": methods for identifying and defining competency standards

There are ways of identifying and defining competency standards, which involves identifying (changes in) the profiles of occupations. Collectively, these methods are sometimes referred to as **job tasks or job requirement analysis.** Each possible method has its strengths and weaknesses when it comes to greening TVET, as the following typology of the broad types available indicates:[12]

- **Direct observation**: Monitoring and recording of actual tasks and production/service delivery processes. Such methods yield robust (even quantified) data but tend to be time and resource intensive. Arguably, such methods are suitable for describing the status quo but, where the green transition is concerned, it is important to look differently at how products and services might be produced and delivered.
- **Harvesting data and information through group collaboration**: Workshops, focus groups and the use of Delphi technique are ways of achieving consensus concerning the relative importance of work tasks (one such example – DACUM – is shown in the box 8). Methods of this kind can be useful in a greening context to build a consensus about the urgency of environmental crises and the need for systematic and comprehensive approaches, including the need to shift to greener behaviours on the part of all staff.
- **Surveys and interviews**: Design and administer questionnaires to relevant workers, supervisors, etc. Again, these methods yield robust (even quantified) data but are time and resource intensive. They do, however, offer the opportunity to ask specific questions about green issues.

12 Adapted from ILO, 2020b

▶ Box 8: Using job task/job requirement analysis: examples of approaches

Using the DACUM method in Zimbabwe

DACUM (Developing a Curriculum) is a workshop-based method that identifies the duties and tasks involved in a given occupation. The output from a DACUM workshop is a chart showing the various duties and tasks. This provides the foundation for further work to define competency standards.

In Zimbabwe, DACUM charts were produced for a range of occupations during a three-day workshop in March 2020 and were then subject to a stakeholder verification process, which ran until September 2020. The March workshop was run by two trained facilitators and involved a five-person expert panel drawn from industry (a company CEO and two biogas digester builders), a local municipality and the Ministry of Energy, together with three curriculum development coordinators (consultants).[13]

The final chart for biogas system installation identifies 11 duties. Under the duty of "**Maintain Biogas Digester**", nine tasks were identified, including the following.

DUTY	TASKS			
F Maintain biogas digester	F1 Prepare biogas digester maintenance plan	F2 Advise biogas digester users on servicing	F3 Carry out biogas digester general plant inspection	F4 Service biogas digester plant components

Source: Occupational/Job Profile of a Biogas System Installer. Final Draft DACUM chart. October 2020.

Using job task analysis to generate a picture of the time spent doing green tasks

Job task analysis can be applied to national data-sets, such as skills surveys, to generate information on the types of skills required in different jobs. For example, national skills surveys conducted in the UK over several years have gathered detailed data on generic skills, which can be grouped into task or skill domains (see for example Green, F. 2012). A method of this kind has also been adopted in the USA Dictionary of Occupational Titles underpinning the O*NET system, which provides careers advice to students and human resource professionals, and also for Quality and Careers Surveys in Germany.

In 2010, O*NET sought to identify the tasks involved in green jobs as part of its Green Task Development Project. The methods developed there have recently been used experimentally in the UK to produce estimates of the amount of time spent doing green tasks by occupation and sector, using task-level data available in the US O*NET database. While the findings must be treated with caution owing to the assumptions made (e.g. that tasks undertaken within occupations are the same in the USA and UK, and that those considered green in the US are also considered green in the UK), they are nonetheless interesting and demonstrate the potential for applying job task analysis to large data-sets. For instance, the estimates found that:

- around 7 to 8 per cent of the hours worked in the UK were spent on green tasks in 2019, up from around 5 to 6 per cent between 1997 and 2007;
- the proportion of workers spending time doing green tasks is estimated to have increased from around a quarter between 1997 and 2005 to more than a third between 2012 and 2019.
- the proportion of time spent on green tasks varies widely across industries, with production industries tending to have higher proportions.

13 The process was financed by the Government of Sweden, with technical support from the ILO.

Sources:

Green, Francis. 2012. *Employee Involvement, Technology and Evolution in Job Skills: A Task-Based Analysis. ILR Review.* 2012; 65(1):36-67. https://journals.sagepub.com/doi/pdf/10.1177/001979391206500103

Office for National Statistics. 2022. Research into "green jobs": time spent doing green tasks, UK: 1997 to 2019. https://www.ons.gov.uk/economy/environmentalaccounts/articles/researchintogreenjobstimespentdoinggreentasksuk/1997to2019

O*NET Green Task Development Project. https://www.onetcenter.org/reports/GreenTask.html

As previously indicated, these methods need to be adapted for greening purposes. Where occupations have already undergone greening – because the providers of the products and services involved have responded to the green challenge – they may effectively capture the new skills required. But the green transition also requires proactive decisions, which employers and workers may not yet have contemplated. This is where having a clear set of green reference points, as discussed in Section 3.2, becomes relevant: industries and employers may be able to identify new skill needs from the bottom up but some top-down support will also be beneficial to help them to become fully aware of the implications of the green transition. The methods outlined above might benefit from input from **experts on the green agenda** in raising awareness and promoting and future-proofing programmes – in short, to make them as green as possible.

The "who": Stakeholder engagement

Where the involvement of stakeholders is concerned, to be most effective competency standards development should entail a **formal process** that involves all relevant actors in a **structured dialogue** as to how occupations can be made fit for purpose for the green transition. This is important because informal consultations with stakeholders tend to result in the collection of subjective and poorly structured views and opinions as to what skills employees should have or the qualifications they should possess (not in fact covering all the skills required in the workplace). Active methods of structured dialogue make it possible for employers, workers and workplaces to reach consensus on both the individual skills required and the performance levels to be expected – and what training systems need to be developed to produce the new skills demanded by the green transition. The involvement of employers is particularly important (see box 9 below). Social partners have a critical role to play, ensuring that the perspectives of both employers and workers are brought to the task.[14] Involving green experts in these processes as "critical friends" supporting stakeholders in their deliberations may be beneficial. In some countries, these processes are guided by curriculum development professionals appointed by the ministry/agency responsible for TVET and involve participants (employers/workers) from different sectors of industry.

14 See, for example, section 3 of ETF/Cedefop/ILO, 2016. Working at a Sectoral Level: Guide to Anticipating and Matching Skills and Jobs, Volume 3. https://www.ilo.org/employment/Whatwedo/Projects/WCMS_534345/lang--en/index.htm

▶ Box 9: The central role of enterprises in greening training

The involvement of enterprises in developing TVET is vital to ensure that the programmes and qualifications developed are closely attuned to the emerging needs for skills for green jobs. It is vitally important that employers be involved **right from the start** to ensure their commitment and "buy-in". Enterprise commitment and co-ownership of the process of TVET development helps to ensure that programmes and qualifications have credibility and value in the labour market – and will help people to obtain employment in the green economy. Not only do enterprises have an acute appreciation of what skills are required, but they should also be involved in providing workplace learning opportunities for TVET students once new or updated training programmes are launched. At the same time, not all enterprises are willing or able – for a variety of reasons – to get involved in TVET development. Section 9 looks in detail at how to sensitize enterprises and ensure their involvement.

In Zimbabwe, key lessons related to the involvement of enterprises include the following:

- To ensure ownership and active participation, the involvement of industry players must be obtained at the very beginning of the process (selection of occupations, identification of skills needs and occupational and training standards). This initial step motivates the experts from the private sector to provide technical input in the development of curricula, thus enhancing the employability of the students concerned.
- The involvement of enterprises has contributed to a better understanding of the costs involved in the delivery of work-based learning. The introduction of green economy occupations has made it clear that the government alone cannot meet the demand for new skills: the participation of enterprises is crucial to ensure a better alignment and matching between demand and supply and to enable learning to take place in a work-based environment.

Source: Evidence gathered during piloting of the guidance tool.

The nature of the competency standards development process will vary greatly from one country to another, depending on such factors as the differing roles of stakeholders; the institutional arrangements for social dialogue; the existence of sectoral "infrastructure" such as sector skills bodies; and any requirements stemming from the overall TVET system, including national qualifications requirements (more is said more about the latter in the curriculum section). The box 10 provides some insight into the range of approaches that can be adopted.

▶ Box 10: Examples of stakeholder involvement in competency standards development

Development of competency standards for plumbing in Cambodia

Actors involved included:

- Sub-committee of the Competency Standards, Testing and Certification Unit of the National Training Board, Ministry of Labour and Vocational Training
- Industry advisory group
- "Expert workers", including more than 20 site supervisors, managers, foremen and engineers who participated in consultation workshops and meetings; and 20 people involved in validation (site engineers, managers, administrators, academics)
- Four-person secretariat
- Technical workers group (academics)
- Consultants.

An example of regional cooperation: the FOIL project

Under the Project for Strengthening Integrated Systems of Vocational and Professional Training, and Labour Insertion (FOIL, to use its Spanish acronym), the ILO supported professional training institutions in the Central American sub-region (Costa Rica, Guatemala, Honduras, El Salvador, Nicaragua, Panama) and the Dominican Republic in developing labour skills. This work was done in collaboration with the Regional Network of Training Institutions, with tripartite representation, in order to develop cooperation and exchange programmes and to standardize and improve technical professional training in accordance with to labour market needs.

Development of qualification (competency) standards for new green occupations in Zimbabwe

Through the *Green enterPRIZE Innovation and Development* project, stakeholders in Zimbabwe have developed curricula based on occupational and qualification standards in a range of industries (see box in Section 2.3). Besides the active participation of experts from industry, employers' representatives and CEOs of SMEs in the renewable energy and agricultural sector, **the direct involvement of the National Manpower Advisory Council (NAMACO)** was key to ensure the institutionalisation of the entire process. NAMACO is a private body set up by act of Parliament to advise the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development on matters pertaining to education and training policy at a national level. It is a tripartite body involving representatives of the Government, employers and employees.

NAMACO's key areas of work include support to the establishment and review of occupational standards, accreditation, examinations, funding, curriculum quality and relevance, qualification frameworks and standards, access and management of training processes. NAMACO played a key role in *Green enterPRIZE*, working in close consultation with the various ministries involved in setting up a new procedure for developing qualifications, inspired by international best practices and customized to the specific needs of the green economy. More specifically, the major contribution of NAMACO and industry experts consisted in helping to:

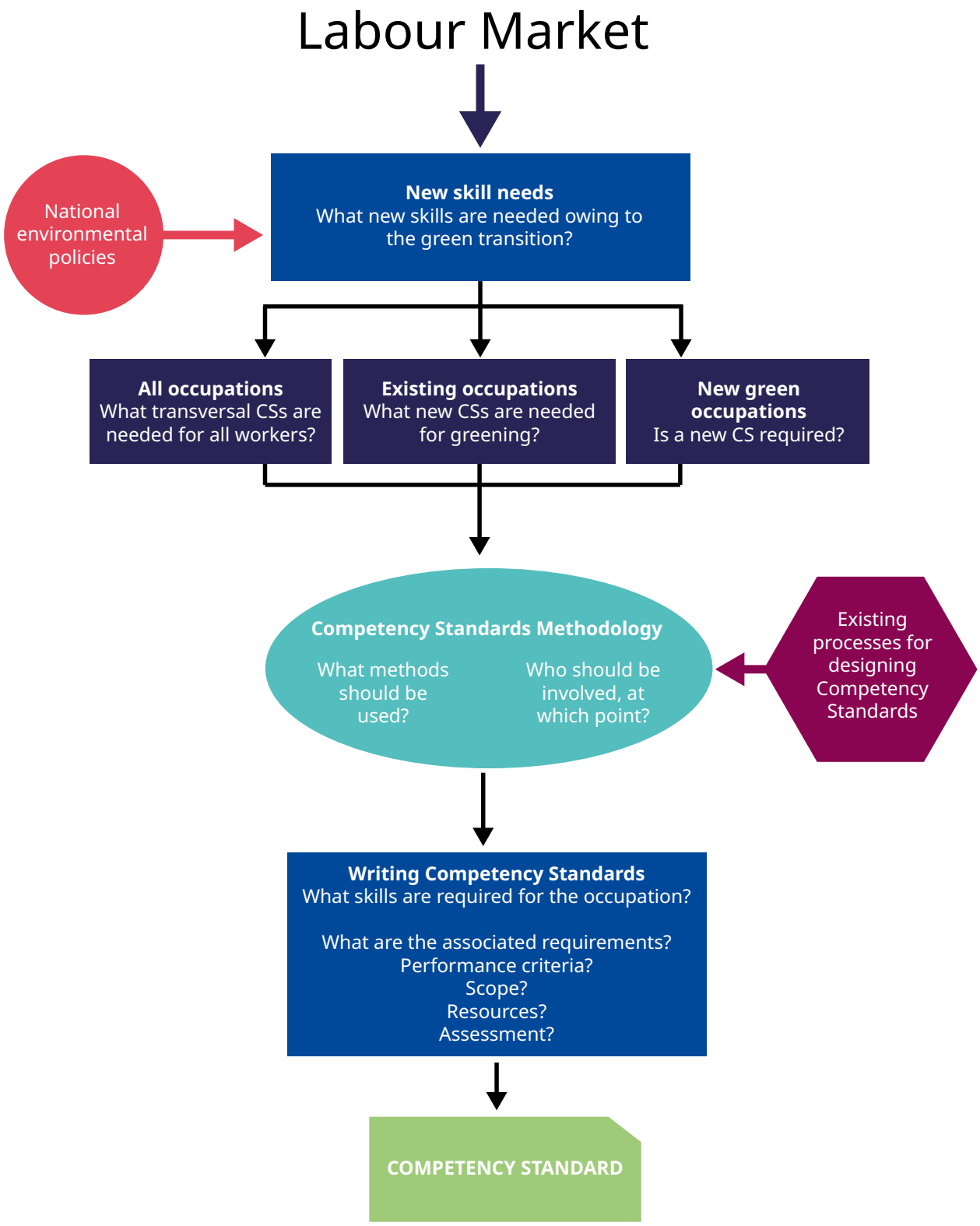
- identify key green economy occupations, based on the findings of the 2018 National Skills Audit led by the Government of Zimbabwe and an assessment of the supply and demand for skills for green jobs in Zimbabwe;
- develop occupational and training standards through the active participation of industry experts in the national DACUM process (for more on DACUM see Section 3.4.5);
- register these occupational profiles in the NAMACO national database;
- verify qualification standards and curricula documents for final validation.

Source: Evidence gathered during piloting of the guidance tool.

3.5 Key steps to greener competency standards

Moving towards greener competency standards involves a number of steps, which are set out in this section and summarized in the figure below.

Figure 6: Overview of process of greening competency standards



The checklist below provides some hints and tips in respect of the main elements of the process.

MAIN ELEMENTS	HINTS AND TIPS
Identify the skills needed for the green transition	Not every country has well-developed skill anticipation systems for gathering extensive quantitative data. Qualitative data on how skills are changing, gathered from industry experts, is equally important. What matters is that you have confidence that the skills needs are clearly expressed.
Identify a common set of skills for greening all occupations	It is important not to focus only on the needs of industries most directly affected by the green transition. All workers need to be equipped with the "green fundamentals", a set of core skills that can be formulated as a set of stand-alone competency standards. They can be linked to your country's wider environmental policies and/or the UN Sustainable Development Goals
Design competency standards to green existing occupations	Most greening takes place in existing occupations. In order to make sure the existing competency standards are fit for the green transition, you could carry out a SWOT analysis to assess how well tuned they are, making sure you cover both technical and core (transversal) skills.
Design competency standards for new green occupations	Stakeholders need to decide, in close collaboration with the relevant industries, when and how new competency standards are required to cover new occupations. It will save time if you use an existing competency standard that is closely related and develop the new competency standards from it.
Make sure you know what workers expect from the green transition	Do not focus exclusively on employers' needs. Workers may have wider needs. Training needs analysis can be used. And trade unions can play a key role in expressing such needs.
Decide which methods to use for identifying and defining competency standards	Methods may already be determined by the wider system for programme and qualifications development and review, but there may also be scope to decide on the mix of methods which best meets the green transition.
Decide who should be involved in identifying and defining competency standards	Again, the wider system may determine which stakeholders to include but, if possible, consider involving a wider circle of organizations and individuals, such as green experts and civil society. We all have a stake in the green transition. At the same time, initial design is probably best done by a relatively small group before sharing with a wider group for consultation.
Write the competency standards	There is a range of issues to consider here, as shown in the figure above. One important issue to consider is how competency standards should be grouped, which might be dictated by the general structure of qualifications, e.g. into core, basic or optional competency standards. Resources and assessment are typically indicative only, allowing scope for local variation (depending on national laws and regulations).

The template below provides a checklist of questions for self-reflection to support the greening of competency standards.

Self-reflection template for greening competency standards

KEY STEPS	KEY QUESTIONS	SELF-REFLECTION SPACE
Identify the skills needed for the green transition	• What sources of quantitative information on employer needs can you use and/or develop to help identify skills needed for the green transition? • What qualitative data sources can you use and/or develop which draw on the perspectives and insights of industry experts? • How can you investigate the worker perspective on skills for greener jobs? • Which stakeholders do you need to involve in skills needs identification? What methods will you use to ensure their engagement?	
Prioritize the occupations and sectors where greening is required	• In which sectors and occupations is the need for the greening of competency standards greatest? Consider issues such as the role of the sector/occupation in the economy in general, future employment creation potential, etc.	
Identify a common set of skills for greening all occupations (the "green fundamentals")	• Which skills do all workers need to help them develop greener mindsets and behaviours? Consider your country's wider environmental policies and/or the UN Sustainable Development Goals.	
Decide who should be involved in developing competency standards	• Which stakeholders should be involved in competency standards development so that as complete a picture as possible is obtained? Consider involving not just social partners, sector bodies, enterprises and workers but also green experts and civil society. • How can different stakeholders best be involved in a structured and systematic dialogue? Who should best be involved in detailed drafting of the standards, which is probably best done by a small group? Who should be included in a wider consultative group?	
For existing occupations: review in light of the green transition	• How far do the competency standards of existing occupations meet the needs of the green transition, in terms of both technical and core skills? Consider carrying out a SWOT analysis. • How should new skills related to the green transition be incorporated: integrated into duties/tasks and/or included via a new group of "free-standing" standards?	

KEY STEPS	KEY QUESTIONS	SELF-REFLECTION SPACE
For new green occupations: design new competency standards	• What are the duties/responsibilities and tasks required in the occupation? • What skills are required to carry out the tasks, and what performance levels are expected? • What methods are to be used for identifying duties, tasks and skills? What mix of direct observation, group collaboration, surveys and interviews can be used, given their costs and benefits? • Consider "borrowing" and adapting existing competency standards from related occupations.	

3.6 From competency standards to curricula and training

At national level, decisions on green competency standards and what they might comprise may reflect not only labour market demand (as discussed above) but also wider policy choices regarding the future of the environment and what should be taught and learned in TVET in order to realize wider social and environmental goals. These decisions may also include education and training considerations, which come into play in devising curricula, training and assessment packages. This is the subject of the following sections.

Links to useful resources:

Competency-Based Training (CBT): An Introductory Manual for Practitioners (2020)

Updated guidelines for development of Regional Model Competency Standards (2016)

Making full use of competency standards: A handbook for governments, employers, workers and training organizations (2009)

National Competency Standards for TVET in Bangladesh

Sustainability competences: A systematic literature review (EC)

Developing and implementing green curricula

4

Key learning points

This section will help you to learn about:

- The relationship between curricula and competency standards, and the different functions they perform for the worlds of TVET and work respectively
- How competency standards are "translated" into learning outcomes and "packaged" within a curriculum
- How to write and group learning outcomes effectively
- How to include and integrate wider green needs that go beyond the demands of the labour market, e.g. related to the just transition
- How to green all the elements of the curriculum, including entry requirements and teaching methods

Stakeholders to be involved in developing and implementing green curricula

- Policymakers
- Educational experts
- Government institutions responsible for the design and conceptualization of training
- Institutions responsible for the accreditation of programmes/qualifications
- Industry experts
- Individual enterprises, employers' organizations and sector bodies
- Trade unions
- TVET providers
- Environmental NGOs
- Community organizations

4.1 Introduction

In this section, we consider how to develop and implement green curricula. While definitions of a curriculum vary from one country to another, this tool uses the definition shown in the box below.

▶ Definitions: What is a curriculum?

"A detailed description of the objectives, content, duration, expected outcomes, learning and training methods of an education or training programme." (ILO, 2019, Skills for a Greener Future)

In short, a curriculum specifies all the key elements of a programme or qualification. National specifications for curricula are commonplace but vary from country to country in their precise content and level of detail. They provide TVET providers, teachers and in-company trainers with a specification or framework for training (discussed in Section 5). In some countries, the elements set out in the box above may not be contained in documents called curricula: other terms may be used, e.g. "qualification specification".

4.2 Relationship of curricula to competency standards

An important element of the process of designing curricula for the green transition is the relationship of curricula to the competency standards discussed in the previous section. Broadly speaking, **competency standards express the needs of the labour market, while curricula "translate" those needs into TVET programmes**. This difference is important since competency standards mostly focus on the interests of the world of work, whereas curricula focus on the interests of TVET. Competency standards focus on the level of competence required for a person to perform effectively in an occupation, which they may achieve in TVET and must subsequently be able to transfer into employment. Curricula, on the other hand, may include other elements, because of legislation and/or TVET practice and infrastructure, which are not part of the competency standard concerned.[15]

If competency standards accurately and clearly reflect the skills needed for the greening of products and services, and if curricula in turn accurately reflect the competency standards, then TVET programmes stand a good chance of being well attuned to the needs of the green transition. Whether this turns out to be the case will also depend on how national curricula are implemented "on the ground", in training provision in local schools and colleges (the next step in the "chain", covered in Section 5).

To make sure that curricula accurately reflect competency standards, and that these standards accurately reflect skill needs, attention must be paid to the processes involved in this chain. In Zimbabwe,[16] close attention was paid to the process to ensure consistency in participation across the different components, and also that the "right" people were involved at the "right" time. The process was structured so that a core group of people were involved from the stage of identifying occupational duties and tasks through to actual curriculum development. It was also structured so as to benefit from relevant expertise, with industry experts involved mostly at the start and curriculum development experts mostly at the end. Workshops were also organized throughout the process so that the outputs reflected a consensus across different interests. Another important factor in the success of the process was that it was undertaken over quite a short timeframe, ensuring that thinking on the subject remained fresh in the minds of the participants and topics did not have to be revisited.

15 Derived from Fretwell, D.H., Lewis, M.V. and Deij, A. 2001. A Framework for Defining and Assessing Occupational and Training Standards in Developing Countries. Information Series No. 386. World Bank, ERIC, and European Training Foundation. (Washington, Columbus, Turin) https://unevoc.unesco.org/e-forum/A_Framework_for_Defining_Training_Standards.pdf

16 Based on evidence gathered during piloting of the tool.

In deciding which stakeholders should be involved, the range of actors and processes described in Section 3.4.6 also applies here.

Within curricula, expected results are expressed as learning outcomes. So a key concern in curriculum design for the green transition centres around how competency standards are translated into learning outcomes, and how they are "packaged" within a curriculum. The various issues involved are discussed in the following sections.

4.2.1 How learning outcomes are written and presented

Learning outcomes (LOs) typically specify what someone is expected to know, understand and be able to do at the end of a TVET programme. Sometimes the LOs are the CS themselves (so no translation is necessary) but sometimes the CS need to be "unpacked" or broken down into the knowledge, skills and attitudes/behaviours (or a similar combination) that people are expected to achieve. This approach was adopted in the FOIL project in Central America. The FOIL "curriculum map" presented in the box below can be compared with the elements of competence set out in Section 3.4.3 to make clear the differences between CS and learning outcomes, as well as what additional information is provided in the curriculum map, for example the box 11 shows the number of hours involved and how they might be divided between theoretical and practical learning. National qualifications frameworks may be accompanied by guidance on how to write and group learning outcomes.

▶ Box 11: Example of a curriculum for a green occupation: the FOIL project

LEARNING OUTCOMES

DESCRIPTION OF LEARNING MODULE N ° 1/8

Module code: CIUO08

6113/2 Title: Development of organic crops.

Correspondence with unit of competence:

This training module corresponds to Unit 2 of the qualification: developing organic crops, applying agronomic techniques according to the selected species.

General objective of the module: At the end of the module, the participant will be able to develop organic crops, applying the agronomic techniques appropriate to the selected species.

Elements of competence:

- Produce organic inputs, mainly with resources obtained on the farm.
- Carry out agronomic practices, based on the requirements of the selected species.
- Handle the harvested product, according to the characteristics of the species and the requirements of the market.

Prerequisites: Approval of the module on 'Preparation of the farm for organic cultivation'

Proposed times: Theoretical hours: 54; Practical hours: 86; Duration: 140

ELEMENT 2.1

Unit objective

didactics:

At the end of the didactic unit, the participant will be able to produce organic inputs in accordance with established techniques.

Proposed times: Theoretical hours: 20; Practical hours: 50; Duration: 70

CONTENTS

Learning goals	Knowing	Knowing how to do	Knowing how to be	Evaluation criteria
13 Select the raw materials for organic input production, based on their characteristics and availability.	General information about raw materials: • Source • Characteristics • Proportions to be used • Function • Types of raw material	Select the raw materials appropriately.	Initiative Responsibility	Raw materials for the production of organic inputs selected on the basis of their characteristics and availability
13 Produce and store the organic inputs respecting the protocol of methods used and current regulations on occupational health.	Organic inputs: • Solid fertilizers • Liquid fertilizers • Compost	Produce the organic inputs Store organic products	Initiative Responsibility	Organic inputs produced and stored respecting the protocol of the method used and current regulations on occupational health

Generally, LOs should be described in a way that makes sense in a learning context, especially so that they can be assessed in that context (which may distinguish them from CS). LOs should also comprise carefully drafted statements that are clear and unambiguous, as in the example from Ireland presented in the box 12. This example highlights the attention that should be paid to the verbs used, with a wide range being introduced. It also illustrates the issue of "granularity", i.e. how detailed the learning outcomes are. This Award has a credit value of 10, which may require up to 100 hours of learning – i.e. seven to eight hours of learning per learning outcome. Granularity varies from country to country – and perhaps across sectors of occupations – and may be determined by regulations or by custom and practice and preferences as to how detailed LOs should be.

▶ Box 12: Learning outcomes included in the Specification for the Minor Award in Domestic Solar Hot Water Systems, Ireland

Purpose

The purpose of this award is to equip the learner with the knowledge, skill and competence to design, install and commission domestic solar hot water heating systems in a safe and competent manner and in accordance with appropriate legislation, regulations and standards.

Learning outcomes

Learners will be able to:

1. Explain the use of Solar Hot Water Technology and its uses as an energy solution
2. Outline the different Solar Hot Water systems to include Direct system, Indirect system, Pressurised system, Open Vented system and the Drain Back system
3. Appraise the use of safety controls in domestic solar hot water systems to include working thermostats, high limit thermostats, temperature relief valves, thermostats and mixing valves/anti-scald valves
4. Appraise the importance of storing water at 600C in domestic solar hot water systems to eliminate legionella
5. Assess the difference types of domestic solar hot water heating systems and list the key components of each system with reference to the relevant national and European standard
6. Provide advice to customers on the advantages and economic issues relating to domestic solar hot water technologies
7. Recommend an efficient domestic solar hot water system for a given size and type of domestic dwelling
8. Apply relevant scientific and mathematical concepts to the specification of an efficient domestic solar hot water installation
9. Design an efficient domestic solar hot water installation with regards to site orientation assessment, aesthetics, collector size, boiler size, solar pipe loop installation, control strategy and safety strategy and hygiene
10. Plan the installation of a domestic solar hot water system with due regard for safety and compliance with relevant standards and national building regulations
11. Manage a range of practical tasks related to commissioning domestic solar water heating systems and the hand-over of the completed system to the client
12. Manage overall responsibility for the co-ordination of all aspects of the domestic solar hot water installation
13. Work effectively with other trade specialists, site supervisors, architects and building services officers, demonstrating good listening, reporting (written, verbal) and team participation skills.

Source: Component Specification NFQ Level 6, Domestic Solar Hot Water Systems 6N5647, available on the Irish Register of Qualifications https://qsdocs.qqi.ie/sites/docs/AwardsLibraryPdf/6N5647_AwardSpecifications_English.pdf

4.2.2 How learning outcomes are grouped

The grouping of LOs into what are variously termed “modules” or “units” is an important consideration. LO groupings may differ from CS groupings because they need to take into account factors such as how learning is to be sequenced or whether the LOs concerned are to be achieved through practical experience in the workplace (or a workplace simulation) or theoretically in the classroom. An example of how this can work out in practice is provided below (see table 4).

▶Table 4: Example of how learning outcome and competency standards groupings may vary: Malaysia's Green Technology Compliances Course of Study[17]

COURSE MODULES			
National competency standard profile		**Green technology essentials**	**Green technology practices**
Group	*Abilities*		
Environmental requirements	Understand relevant green legislation		
	Comply with health and safety standards		
	Understand pollution control requirements		
	Understand sustainable use of resources		
Green culture	Understand impacts of climate change		
	Practice green lifestyle		
	Reduce waste		
Social and economic productivity	Participate in green community programmes		
	Maintain workplace environmental quality		
Energy efficiency and alternative energy	Understand energy performance		
	Use green products and processes		
	Understand alternative energy		

4.2.3 How to include and integrate wider green needs

Depending on the individual country, it is not unusual for curriculum design processes to introduce considerations that go **beyond the direct needs of individual occupations or the labour market as a whole**. National qualifications frameworks (NQFs) may require the inclusion of learning outcomes (perhaps as separate modules, perhaps integrated) relating to such issues as general health and safety (OSH measures). Or they may require curricula to indicate how they will be inclusive and reflect the requirements of a just transition (see box 13), for example in terms of access. Greening TVET introduces

17 Extracted from Skills Development Dept., Ministry of Human Resources, Malaysia. 2013. Course of Study Z-050 Green Technology Compliances, ILO Version, 2013, NOSS Matrix, p. xiii. Not complete, for illustrative purposes only.

wider considerations of this kind which are not directly related to the needs of particular industries but which are necessary for an economically efficient and socially just green transition. These considerations may reflect national environmental and social agendas.

▶ Box 13: ILO guidelines on the just transition

Guidance on the key aspects of a just transition are set out in the ILO's comprehensive guidelines. Regarding **skills development**, the guidelines state that:

Governments, in consultation with social partners, should:

- support the transitioning to more environmentally sustainable economies by reviewing skills development policies to ensure they support responsive training, capacity building and curricula;
- coordinate skills development policies and technical and vocational education and training systems with environmental policies and the greening of the economy; and consider concluding bipartite or tripartite agreements on skills development;
- match supply and demand for skills through skills needs assessments, labour market information and core skills development, in collaboration with industry and training institutions;
- give high policy priority and allocate resources to the identification and anticipation of evolving skills needs and the review and alignment of occupational skills profiles and training programmes;
- encourage the acquisition of both generic skills and skills in science, technology, engineering and mathematics, and their incorporation in curricula for basic training and lifelong learning.

Governments and social partners should:

- engage in social dialogue for responsive and collaborative labour market institutions and training systems, and coordinate stakeholder needs at all stages of education and skills policy development and implementation;
- promote equal access to opportunities for skills acquisition and recognition for all, in particular for young people, women, workers who need to be redeployed, including across borders, and for owners and workers of MSMEs, by offering specific training services, ensuring suitable timing and duration and promoting supportive policies to enable individuals to balance their work, family and lifelong-learning interests;
- promote work-related training and practical experience as part of the training process in order to increase the employability of jobseekers;
- formulate a holistic skills development policy to promote skills for green jobs that are coherent with environmental policies, including means for appropriate recognition through certification of skills;
- foster peer learning among enterprises and workers, as well as education and training in green entrepreneurship to spread sustainable practices and the use of green technologies;
- assist businesses, particularly MSMEs, including cooperatives, in their engagement with governments and training providers with regard to the management and skills upgrading of their current workforce, anticipation of future occupational profiles and skills needs, and workers' acquisition of portable and employable skills.

Source: International Labour Organization (ILO). 2015a. *Guidelines for a just transition towards environmentally sustainable economies and societies for all.* (Geneva). Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_432859.pdf

The following box gives an example of how a national curriculum document might provide guidance on taking steps to make training more equitable for women.

▶ Box 14: Providing guidance on gender equality in a national curriculum document in Zimbabwe

The Curriculum Document for the Level 4 Certificate for Biogas System Installers gives the following guidelines:

The Programme's Gender Equitable Approach

This curriculum recognizes that historically, women have not enjoyed the same access to opportunities, responsibilities and benefits as men. Women have been socially disadvantaged in many aspects of life, including in the workplace, and especially in technical industries. Therefore, achieving gender equity in technical industries and the workplace is a significant avenue through which women can enjoy equality in society ...

A gender-blind curriculum is likely to reinforce traditional gender stereotypes and norms in industry ... Curricula, then, if designed and implemented with gender equity in mind, can be channels through with the historical inequality between men and women is challenged and redressed.

A first step towards gender equity is being gender-sensitive. This means considering the practical needs of women and men, i.e. what women and men need to fulfil their 'assigned' roles in society, and the differing barriers to access that women and men experience ...

This curriculum endeavours to include gender-sensitive content within its modules. During its design, the curriculum designers used a gender-sensitivity checklist to ensure that key factors relating to gender sensitivity were addressed. However, it is acknowledged that a curriculum can only be gender equitable if it is delivered in a gender-equitable way. The following guidelines/strategies are offered to instructors using this curriculum when they deliver it in their training institutions.

Gender equitable strategies for curriculum delivery

- *Ensure balanced participation of women and men in your workshops, in particular asking questions of both women and men, and asking both women and men to take part in skill or process demonstrations.*
- *Be aware of the ways that gender norms influence women and men's experiences, e.g. be aware that female trainees may have had fewer opportunities to interact with machinery in the past due to gender norms, whereby this is mistakenly perceived as a 'male' activity.*
- *Directly address any discriminatory or offensive comments made in your workshop, e.g. swiftly reprimanding a trainee who makes a sexist comment so that all trainees can see that such behaviour is not welcome in the workshop.*
- *Affirm and support female trainees, ensuring that they feel welcome and that they are valued members of the class.*
- *Use a variety of teaching techniques, including working in small groups, as it can sometimes be easier for female trainees to speak opening in small groups, rather than in from of the whole class.*
- *Use gender responsive language, e.g. use both male and female examples when sharing examples or cases studies and avoid referring to machinists only as 'he', as this may make female trainees feel excluded.*

Source: Extracted from Section 3.2.1 of the Certificate in Biogas System Installation, Level 4. Final Draft Curriculum Document, published in October 2020 by the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (MHTEISTD), Government of the Republic of Zimbabwe.

Sometimes wider considerations are captured in **different types of competency or learning outcome**, as the example in the box below demonstrates.

▶ Box 15: Competency types, the example of Bangladesh

In Bangladesh, the national system recognizes four types of competency: generic (required for all qualification levels in all industry sectors and covering tangible/observable work activities common to all workers); sector-specific (required in a particular sector, but not limited to the performance of a particular task); occupation-specific (unique to a particular activity); and elective (additional skills which are useful but not absolutely necessary for enhancing a worker's mobility/employability). Curricula/qualifications bundle together different types of competency.

There are important questions as to how skills for green jobs should be reflected in such structures:

- **Should they be spread across different types of learning outcome as appropriate, for example covering both generic/transversal, as well as occupation or sector-specific?** An approach of this kind would have the advantage of ensuring comprehensive coverage, but it might be difficult to ensure that no gaps or overlaps arise. In addition, incorporating skills for green jobs into a generic module might not give them the desired priority.
- **Should green transversal types of LO be captured in free-standing modules or integrated into occupation/sector-specific LOs?** An important general issue here is that, based on European experience, transversal skills and knowledge related to attitudes, mindsets and ways of thinking tend not to be as well represented or expressed as technical skills within curricula or qualifications; and even within the same qualification system there can be variation from one curriculum to another in how they are treated.[18] The reasons for this problem are not clear but it may reflect difficulties in formulating such learning outcomes (perhaps because they can be harder to measure and assess) or the lack of priority ascribed to them. Separate modules on environmental awareness might be one solution but this is likely to both pros and cons, for example they may need to be taught separately.
- **Should free-standing modules be compulsory or elective?** This might be dictated by regulations governing national qualifications but, given the importance of the green agenda, it is legitimate to ask whether systems in which new skills for green jobs are placed in elective modules should be reformed to make them compulsory. The FOIL project developed a free-standing set of learning materials covering environmental responsibility and cleaner production with the intention that it be used ubiquitously.

An example of how transversal skills related to communication and teamwork can be integrated into a qualification specification is shown below (see box 16).

18 Unpublished Cedefop report

▶ Box 16: Integrating a generic/transversal skill into a qualification on domestic solar hot water systems in Ireland

This example shows how a transversal skill (highlighted in bold italics below) might be integrated as a learning outcome into a qualification module alongside other, more technical, learning outcomes.

Title:

Domestic Solar Hot Water Systems

Purpose:

The purpose of this award is to equip the learner with the knowledge, skill and competence to design, install and commission domestic solar hot water heating systems in a safe and competent manner and in accordance with appropriate legislation, regulations and standards.

Credit value:

10

Learning outcomes:

Learners will be able to:

1 Explain the use of Solar Hot Water Technology and its uses as an energy solution;

...

9 Design an efficient domestic solar hot water installation with regards to site orientation assessment, aesthetics, collector size, boiler size, solar pipe loop installation, control strategy and safety strategy and hygiene;

...

13 Work effectively with other trade specialists, site supervisors, architects and building services officers, demonstrating good listening, reporting (written, verbal) and team participation skills.

Source: Extracted from Minor Award 6N5647 in the Irish Register of Qualifications: https://irq.ie/qualifications/domestic-solar-hot-water-systems?id=cfc0124e-333d-4e46-be69-2a03c42c4b6c&ref=%257B%2522awardClass%2522:%2522Minor%2522,%2522nfqLevels%2522:%25226%2522,%2522search%2522:%2522domestic%2520solar%2520hot%2520water%2520systems%2520minor%2520award%2522,%2522sector%2522:%2522Further%2520Education%2522%257D (Accessed 30.11.21)

Which of the above questions might be asked depends in part on the **types of curricula** concerned, in particular whether we are dealing with initial TVET curricula or short programmes required for upskilling and reskilling (see box 17), the greening of existing curricula, or the creation of new curricula for new green occupations (as touched on in the previous section).

It might be beneficial to **reflect on the potential pros and cons of these different approaches in your national context and to what extent a system-wide approach is needed for the greening of curricula.**

▶ Box 17: Examples of skills for green jobs training offered in adult labour-market training in Denmark:

Environment and energy in manufacturing: At a basic level, the participants can map environmental impacts and perform simple energy assessments in their own workplace in an industrial company involved in energy and climate / environmental technology. (6 days)

Energy-saving driving techniques: The participants acquire knowledge of the environmentally harmful substances and particles emitted by engine exhausts. They learn about the factors that affect energy consumption in practical driving and how to achieve a reduction in fuel consumption. (1 day)

Environmental care for property caretakers: The participants learn to contribute to the implementation of both technical and behavioural preventative environmental measures in homes and institutions. They also learn to describe, plan, implement, evaluate and maintain environmentally friendly actions in collaboration with, among others, residents, users and colleagues in the workplace. (4 days)

Waste handling in parks and other public green areas: Participants learn to perform proper environmental management of waste in public green areas based on applicable waste management rules, including knowledge of essential elements of waste, as well as knowledge of the nature of the waste. (3 days)

The climate-friendly professional kitchen: The participants develop and cook climate-friendly food taking into account environmental and climatic conditions and seasonal issues. They learn to apply knowledge of local production, quality, ecology and sustainability to purchasing and cooking in order to develop a climate-friendly professional kitchen. They learn to apply knowledge of economic sustainability and potential customer groups in developing concepts for climate-friendly food. (2 days)

Source: Cedefop. 2018. *Skills for green jobs in Denmark: an update*. Restricted access report. (Thessaloniki) p. 15

The following template could be used to identify and discuss how skills should be included in curricula.

	SKILL A **UNDERSTANDING PRINCIPLES OF SUSTAINABILITY**	**SKILL B**	**ETC.** .....
Is the skill generic, sector-specific or occupation-specific?	*Generic*		
If the skill is transversal, should it be the subject of a free-standing module or integrated into technical modules? Why?	Decision: *To be included in a free-standing module on sustainability.* Rationale: *A free-standing module has clarity and will ensure the skill is given priority.*		
If a free-standing module is preferred, should this be compulsory or elective? Why?	Decision: *Module to be compulsory for everyone taking a TVET course.* Rationale: *It is vital that every citizen has an understanding of sustainability.*		

4.3 Greening the curriculum

While learning outcomes are the key link with CS, a curriculum typically contains a number of other important elements. How these elements are specified may depend on national requirements, such as those related to national qualification frameworks.

4.3.1 Greening the basics

Table 5 shows elements that are commonly found in curricula. The green transition challenges us to think what greening might mean for these elements, so the table also indicates the questions we should be asking to ensure that these common elements reflect the green agenda.

▶Table 5: Common curriculum elements and issues for greening

ELEMENT	TYPICAL CONTENTS	ISSUES FOR GREENING
Objectives and level	Indicates the relationship of the programme to occupations/the labour market, and specifies the national qualification framework level	Do the objectives need to reflect the need for greening in the labour market?
Learning outcomes	Knowledge, skills and attitudes and grouping into modules	Do the learning outcomes reflect all the greening aspects of the corresponding CS? Are the transversal skills needed for a green economy adequately reflected?
Entry requirements	Specifies qualifications learners will need to take the programme	Are the entry requirements inclusive, e.g. do they allow for use of methods of recognition of prior learning?
Programme structure	Duration, sequencing, location (school, workplace, distance/ online)	How sustainable are the choices to be made in terms of location?
Teaching, learning and assessment strategies	Suggests appropriate pedagogies and assessment criteria and methods	Do the suggested pedagogies and assessment methods adequately support the development of green mindsets and behaviours, as well as the technical skills needed?
Resources	Requirements for teaching and learning	How sustainable are the resources that will be used? Are there more sustainable alternatives?
Destinations after graduation	Indicates possible pathways into employment or further learning	Could an indication be given of the employment possibilities in the green economy?
Teacher and in-company trainer requirements	Indicates the competencies or qualifications required	What additional training might teachers and in-company trainers need to support a greener curriculum?

4.3.2 Towards a deep green curriculum

In addition to the standard elements shown above, the notion of developing a "deep green" curriculum challenges us to go further and to ask ourselves a number of more searching questions as to how curriculum specifications can be used to support the greening of TVET:

- Do the learning outcomes sufficiently challenge us to think about the new knowledge and skills people need to address environmental crises, which might go beyond the narrower needs of individual occupations and sectors?
- In respect of teaching and learning strategies, is sufficient consideration given to new pedagogies that promote the development of skills such as critical thinking, problem-solving, adaptability, collaboration and communication, for example learner-centred approaches, project-based learning, harnessing learners' experiences to co-create learning activities at local level? How could greening activities on the campus and participation on the part of local communities and parents support these developments?
- How can the curriculum be used to stimulate TVET providers to think about the sustainability of the resources they deploy for the programme, e.g. the mix of locations or use of digital technologies?
- How can the curriculum provide guidance on how to implement inclusive practices that enable and support the participation of disadvantaged groups in TVET programmes, e.g. ensuring that people with disabilities have access and are provided with the teaching and learning resources that need, or that women are able to take part in programmes for occupations traditionally dominated by men?
- Should the requirements for teachers specify the need for some form of green awareness?

4.4 Steps to a greener curriculum

Greening the curriculum involves a number of key elements, as discussed above. The following table summarizes these elements and provides some **hints and tips**.

KEY ELEMENTS	HINTS AND TIPS
Ensure learning outcomes are aligned with green competency standards	It is very important that the learning outcomes of curricula reflect new green competency standards effectively, so that TVET can be attuned to the needs of the green transition. For individual learning outcomes, make sure they are clearly written, paying attention to the verbs used and removing any ambiguities. Check they are grouped in a way that is suitable for teaching and can be assessed straightforwardly. Make sure that they integrate wider green requirements beyond the immediate needs of the particular occupation(s) to which they relate. Consider how best to incorporate the resulting learning outcomes into existing programme/qualification structures: integrated into existing modules or covered by free-standing modules; compulsory or elective?
Review all the elements of the curriculum for their "green-ness"	New competency standards provide an opportunity to review every element of the curriculum from a broad sustainability perspective. Check each element to make sure it reflects such issues as inclusion for a just transition and provides opportunities to acquire a green mindset, not just technical skills for greener jobs.
Entry requirements	For a just transition, greener jobs should be open to as wide a range of potential candidates as possible. To break down barriers (e.g. gender stereotypes) when specifying entry requirements, emphasize recognition of prior learning and link the stated requirements to recruitment/promotion methods.

KEY ELEMENTS	HINTS AND TIPS
Programme structure	Greening TVET is about doing things differently. Rather than simply accepting traditional programme structures, try thinking outside the box. Traditional locations and timings of provision may close off access to a programme for some groups of people; what alternatives are possible? And question the environmental sustainability of the choices open to you.
Teaching, learning and assessment strategies	Developing transversal, core skills is vital to the green transition. However, teaching, learning and assessment in TVET have traditionally been attuned primarily to technical skills instead. Think how methods in these areas could be adjusted to be more effective for transversal skills.
Resources	Whilst cost is often a key factor in the choice of resources, this has not been true of sustainability. We need to question whether existing resources could be used in more sustainable ways and whether new, more sustainable resources could be used in future (e.g. linked to greener campuses, see Section 7)
Destinations after graduation	As well as indicating the occupations and further learning opportunities that relate to the curriculum, consider whether there are ways in which you could highlight the wide range of opportunities available in the green economy and more advanced TVET, and where learners might obtain appropriate information and guidance.
Teacher and in-company trainer requirements	Take the opportunity to indicate the competencies needed by teachers and trainers for supporting a greener curriculum, which could be related to opportunities for professional development (see Section 8).

The following box provides a list of questions that can be posed for self-reflection when developing a greener curriculum.

Self-reflection template for greening the curriculum

MAIN ELEMENTS	KEY QUESTIONS	SELF-REFLECTION SPACE
Incorporating learning outcomes into existing programme/qualification structures	• Should the learning outcomes be integrated into existing components (modules or units) of programmes/qualifications? Or should they be consolidated into a new component (module or unit)? Consider the pros and cons of the different options. • If a new module/unit is created, should it be compulsory or optional (elective)? Consider what is feasible within the structure and rules of national qualifications/programme frameworks.	
Writing learning outcomes that are aligned with green competency standards	• Do the learning outcomes accurately reflect their corresponding competency standards? • Do they also reflect the wider core skills needed for the green transition beyond the immediate needs of the particular occupation(s) to which they relate? (e.g. critical thinking, problem-solving). • Are the learning outcomes written clearly and unambiguously? Have suitable verbs been chosen? • Are the learning outcomes grouped in a way that is suitable for teaching and training? • Will it be possible to assess the learning outcomes in a straightforward and non-complex way?	

MAIN ELEMENTS	KEY QUESTIONS	SELF-REFLECTION SPACE
Entry requirements	How can entry requirements be made as inclusive as possible, to support a just transition? Has full use been made of recognition of prior learning? What promotion methods should be used to break down barriers and support inclusive recruitment to the programme (e.g. do they counter gender stereotypes)?	
Programme structure	Does the course use traditional locations and timings of provision, or can alternatives be specified that are more environmentally sustainable and inclusive?	
Teaching, learning and assessment strategies	How well adjusted are the teaching, learning and assessment strategies, not just to greener technical skills but also to greener core skills like critical thinking?	
Resources	Are the resources that will be used the most sustainable? Could existing resources be used in more sustainable ways and/or could new, more sustainable resources be used in future?	
Destinations after graduation	Are opportunities available in the green economy and more advanced TVET sufficiently highlighted to staff and students? Is it clear where learners might obtain appropriate information and guidance on green jobs and courses?	
Teacher and in-company trainer requirements	What are the competencies needed for teachers and trainers to support a greener curriculum? What professional development opportunities will support the acquisition of these competencies?	

Links to useful resources:

Competency-Based Training (CBT): An Introductory Manual for Practitioners (2020)

Greening Technical and Vocational Education and Training: UNEVOC's practical guide for institutions

Report of conference on Greening TVET: Qualifications and implementation strategies (UNEVOC)

Going green in training

5

Key learning points

This section will help you to learn about:

- How greener curricula can be implemented through TVET provision and practice
- How greening training requires the application of a set of sustainability principles to all aspects of provision
- The importance of developing and using new and innovative teaching and learning methods that empower learners to think and act differently and collaboratively towards their environment
- How work-based learning can be tuned to support the green transition
- The important role of upskilling and reskilling in the workplace, especially for motivating senior technicians and supervisors to embrace the green transition
- How green principles can be applied across the entirety of TVET provision, including collaboration with the local community, partnering with employers, careers guidance, co-curriculum development and so on.

Stakeholders to be involved in greening training

- School leaders and senior managers
- Teachers and in-company trainers
- TVET school governing bodies
- Educational experts
- Environmental NGOs
- Community organizations
- Enterprises, employers' organizations and sector bodies
- Trade unions
- Students and apprentices

5.1. Introduction

In the previous sections, we looked at how competency standards and curricula could be greened. In this section we move on to look at how greener curricula can be implemented through training provision and practice. The greening of TVET at local level does not necessarily have to take place in sequence after the greening of competency standards and curricula. Indeed, there is often scope within national regulations for local activities to take place independently, although the degree of local autonomy varies between countries.

Greening training involves consideration not just of teaching and learning methods, materials and equipment, but also the full range of associated provision, activities and services required to ensure that TVET is fully attuned to the needs of the green transition. Consideration must therefore also be given to such activities as engagement with employers and the wider community, and the provision of careers guidance services. Attention should also be paid to the greening of TVET campuses and the systematic professional development of teachers and trainers; these issues are dealt with in Section 7 and Section 8.

While the previous sections examined processes that take place mainly at national level, this section focuses more on the local level, since TVET providers typically have a great deal of scope to take decisions about teaching and learning strategies, employer engagement for work-based learning and so on. At local level, TVET has the potential to become an immersively green experience for learners – and also for employers and the wider communities with which TVET can engage – by providing a holistic green environment for learning.

5.2. Applying sustainability principles to training provision

Going green in training involves the application of sustainability principles to all aspects of provision. There is a vast array of such principles but the box below sets out the sustainability principles that could be applied to TVET, drawing on the UN's Sustainable Development Goals (SDGs). **It is important that TVET providers identify and internalize a set of sustainability principles that are relevant in their own context; and then apply these principles to their policies and practice.** One way of doing this would be to review existing provision using a set of principles as a basis for formulating a strategic action plan.

▶ Box 18: Sustainability principles as reference points for the greening of training (based on the UN's Sustainable Development Goals)

- Designing and delivering quality education and lifelong learning for all
- Tackling interconnected global challenges at local level
- Adopting responsible consumption and production practices
- Working in partnership
- Ensuring a just transition: working for gender equality and supporting the marginalized and vulnerable
- Developing pathways into decent work opportunities

Source: Based on: https://www.un.org/sustainabledevelopment/sustainable-development-goals/

5.3 Greening training: changing what and how people learn

In the previous sections, we learnt about competency standards and curricula, which essentially set out **what** it is that people will learn during TVET programmes. An equally important concern from the green perspective is **how** people learn. Developing mindsets and behaviours that will support the green transition requires people to learn in new and innovative ways. Greening is not simply about making adjustments to technical skills, it is also about empowering people to think critically about what they do and how they do it, to solve problems in implementing the "Reuse, repurpose, recycle" approach, and to work with others so that green goals and solutions become a shared endeavour with wider impacts than if individuals worked alone. This requires greener pedagogies and training methods.

TVET has a wide range of teaching/learning methods to choose from, as well as several types of learning environment. This already places it in an advantageous position where greening is concerned since TVET relies heavily on experiential and embodied learning (see Glossary for definitions), providing learners not just with classroom-based theory but also with opportunities to learn from practical experiences of greening in the workplace or in school-based simulations. This creates an ideal environment in which to develop not just greener mindsets but also greener behaviours.

TVET providers should review the teaching and learning methods already in use in their institutions and see how well they are suited to developing skills for a greener future. They should also examine new and innovative methods, including those being introduced as a result of digitalization, which is vastly expanding the range of possibilities. To support the green transition, pedagogical approaches to TVET need to embrace systems thinking, inquiry, discovery, active learning, problem-solving and thinking about the future, with an emphasis on both local and global solutions.

The box below gives some examples of teaching and learning methods that are particularly well suited to supporting the greening of training:

▶Box 19: Pedagogies for greener training: some examples

- **Project-based learning**: environmental challenges typically involve complex sets of inter-connected factors and project-based learning is ideally suited to providing students with appropriate inter-disciplinary learning and problem-solving to replicate such situations. Project-based learning can also span classroom and workplace, e.g. helping employers to tackle real green challenges.
- **Game-based learning** has been shown to have benefits in terms of inclusion by engaging people who might struggle to take part in traditional learning scenarios. It therefore has potential to contribute to a just transition. There are many commercial examples of game-based learning related to environmental topics, for example involving learners in designing greener cities or green buildings.
- **Blending digital learning tools into teaching and learning** has, of course, been given an enormous stimulus by the COVID-19 pandemic, during which they provided a basis for remote learning. But they also have potential to support greening by expanding the range of experiential learning opportunities available, especially though simulations based on augmented and virtual reality. Digital learning does not have to be expensive to be effective and can help support inclusive green learning. It also has the potential to make training greener by opening up new realms of experience without the large carbon footprints associated with more traditional methods, for example those involving bulky, polluting equipment.

In Europe, the European Union is funding projects to develop new approaches to the development of skills for green jobs (see box 20).

▶ Box 20: Developing innovative approaches to developing skills for green jobs in Europe

In Europe, the Erasmus+ programme is supporting a range of projects concerned with skills for green jobs, including the following:

- The GREENOVET project (which involves 30 partners in four regions of Austria, Finland, Portugal and North Macedonia) is promoting the adoption of new teaching methods to foster employability and entrepreneurial skills for the green transition, at the same time adapting the technical and didactical skills of teachers.
- The European Platform for Urban Greening (which involves 15 partners in six countries - Czechia, Denmark, Finland, the Netherlands, Spain and Romania) aims to broaden the expertise of urban greening professionals in relation to innovative "vertical green landscaping": the creation of green walls or gardens on the sides of buildings. The project will identify the skills needed, and create relevant and innovative curricula and learning methods for students and employees.

Sources: https://www.greenovet.eu; https://platformurbangreening.eu

In Zimbabwe, qualification standards and national curricula have recently been developed for five new green occupations.[19] Action-oriented learning is central to the new programmes, and provides a good example of how this form of new learning can be specified (see box 21).

19 Five new occupations have so far been covered: biogas system installer; climate-smart market gardener; solar agricultural processor; solar photovoltaics installation and maintenance mechanic; solar sales and marketing agent.

▶ Box 21: Specifying and promoting action-oriented learning in Zimbabwe

National curriculum documents for new green occupations in Zimbabwe set out guidance on programme philosophy, which includes the specification of action-oriented learning:

The learning philosophy of the programme takes a gender-sensitive, learner-centred approach, and includes practical orientation, simulation of industry practices and the involvement of industry in the development and implementation of the training programme.

The implementation of this curriculum is based on the principles of action learning, learning by doing, experiential learning and discovery learning. Learners discover and learn new skills and knowledge by performing well-designed and challenging learning activities.

Action-oriented learning is based on problem-solving. The following are the basic phases of action-oriented learning:

- *Problem analysis*
- *Collection, selection and analysis of information*
- *Decision-making on different alternative solutions and selection of the best solution*
- *Planning of the different steps; required tools, equipment, materials and other resources; safety, hygiene and environmental considerations*
- *Implementation*
- *Evaluation of process and product*

Learners must learn to perform all these phases of action-oriented learning for all work tasks.

In accordance with the didactic principles of action-oriented learning on which this curriculum is based, learning and assessment must include both the production of a product or service, and the identification and correction of faults in the process and product/service.

Source: Extracted from section 2 of the 'Certificate in Biogas System Installation, Level 4. Final Draft Curriculum Document' published in October 2020 by the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (MHTEISTD), Government of the Republic of Zimbabwe.

5.4 Work-based learning (WBL) and the green transition

A unique and key aspect of TVET is, of course, work-based learning. Globally, efforts are being made to strengthen WBL because of the benefits it brings: better tuning of training to the skills needed in labour markets and practical learning experiences for students. There is now the opportunity to couple such efforts to the green agenda. The box below gives an example of how TVET providers, employers and employer associations can collaborate to develop TVET that better meets skills needs. Other actors with roles to play include trade unions and TVET learners and apprentices. Trade unions can play an important part, especially in ensuring the rights of apprentices (see also Section 9.3.6), while associations representing learners (such as the European Apprentices' Network)[20] can help to ensure the quality of WBL.

▶ Box 22: Improving WBL for green jobs in the construction sector in Estonia

In Estonia, new green requirements are emerging against the backdrop of a need to enhance the scale and quality of WBL internships in the construction sector. Estonia's skills anticipation system, OSKA (see box, Section 3), has highlighted overall shortages in the construction industry, especially in environmental engineering and indoor climate control, the fastest growing areas in the sector. At the same time, there is a lack of TVET provision in these green fields and learners cannot find internships in their areas of speciality.

To tackle these issues, a package of measures is to be implemented through a project funded by the EU to establish a new internship system for vocational training specialities in construction, focusing on energy-efficient construction and smart-house solutions.[21] The project partners are three TVET schools, the Estonian Employers' Confederation and the Estonian Association of Construction Entrepreneurs.

To improve internships and achieve a common standard, the teachers and partners of the three schools will meet to agree on a better way to organize internships. Construction practitioners will also be involved more deeply in teaching: ten top specialists from companies belonging to the Estonian Association of Construction Entrepreneurs will give lectures or supervise in-school practical training for at least four hours. The involvement of the two national employers' organizations is seen as an important benefit.

Source: Author's research

More specifically, WBL offers a range of opportunities with respect to the green transition:

- WBL can provide opportunities for **putting into practice the green "theory" learnt in TVET schools** – as illustrated in the box below. It will be important to ensure that there is as close a match as possible between green theory and green practice, and this opens up the possibility for learning in both directions, with learners, as well as teachers and trainers, playing a role in providing feedback between schools and workplaces.

20 https://apprenticesnetwork.eu

21 https://opleht.ee/2021/03/suur-samm-kutsehariduses-ettevotetega-parema-koostoo-poole/

▶ Box 23: Sustainable building design and construction curriculum in Canada

Fleming College in Canada offers intensive, hands-on experience whereby students from across Canada learn to construct a new sustainable building, showcasing green building technologies and new energy-saving techniques. Students interact with project consultants, inspectors and tradespeople, and are involved in all aspects of constructing a sustainable building. This programme had been described as an excellent combination of theory and practical skills, whereby students are first educated in class, then given the opportunity to apply their acquired knowledge on site. Students learn first-hand sustainable construction practices, are introduced to renewable energies, and are given the freedom not only to think for themselves, but to act as leaders in experiencing the entire process.

Source: Fleming College (2016) Homepage. https://flemingcollege.ca/

- **WBL offers opportunities to tap into the latest green developments.** Where employers are in the vanguard of greening, such as in renewable energy, WBL can provide students with the opportunity to learn and use the latest green technologies, which might otherwise be beyond the reach of a TVET provider.
- Conversely, where employers have not yet fully engaged with the green agenda, WBL can offer employers the opportunity to **build capacity for greening training.** All employers stand to benefit from greening but, for some employers, perceptions of the costs of greening may outweigh the benefits. TVET providers may then need to take the lead in greening by promoting and demonstrating its benefits through WBL (see Section 9).

5.5 Training to meet the need for upskilling and reskilling

Teaching and learning methods and curricula have to be suitable not only for young people (on initial TVET programmes) but also for adults, since upskilling and reskilling are key to ensuring the workforce is fully up-to-date in respect of skills for the green transition. To meet these needs, TVET providers can put together tailored short courses (should national regulations permit, as noted above).

▶ Box 24: Upskilling plumbers for the green transition

GreenPlumbers is an international upskilling/reskilling course designed to help plumbers and tradespeople adopt greener practices, originally established in 2000 by the Master Plumbers & Mechanical Services Association of Australia (MPMSAA). The GreenPlumbers' curriculum was developed in conjunction with RMIT University (Melbourne) and the Australian Greenhouse Gas Office. GreenPlumbers training is now available in several countries, including the USA, where the focus is on installing technologies and acquiring techniques that limit water and energy waste. It consists of a 32-hour programme covering five topics: Climate Care (8 hrs), Caring for our Water (8 hrs), Solar Hot Water (4 hrs), Water Efficient Technology (8 hrs), and Inspection Report Services (4 hrs). Some 15,000 individuals have taken the training in the USA. People who complete the course can become "Licensed GreenPlumbers" (for an annual fee of 400 USD) and are able to market their services using the associated brand, marketing materials, and consumer/commercial referral programmes, as well as having access to discounts on relevant water- and energy-efficient products. As well as the environmental benefits, the programme emphasizes the cost savings that can be passed on to consumers.

Source: Author's elaboration based on https://www.greenbuilding.org.au/Green-Tradies/GreenPlumbers.htm; and http://greenplumbersusa.com/

Digital technologies are considerably expanding opportunities for implementing such training packages efficiently and effectively, without having to temporarily remove workers from the workplace, and increasingly without compromising the quality of learning since they expand the range of learning experiences possible. The range of digital technologies is vast, growing and available for deployment in all manner of circumstances. While some, such as virtual and augmented reality tools, can be expensive, the range of Open Educational Resources (OER), which are free to use and can be adopted by employers and used by workers, continues to grow. Unfortunately, the digital infrastructure required can be a barrier to inclusiveness in many low-income countries. Good practice nevertheless points to the benefits of combining digital tools with traditional teaching methods, i.e. blended learning, and warns against completely replacing teachers and trainers. Further information on the digitalization of national TVET and skills systems is available in a recent ILO report.[22]

▶ Box 25: Providing upskilling for renewable energy entrepreneurs through an e-campus at Kafue Gorge Regional Training Centre

Over 18 days in July 2021, Kafue Gorge Regional Training Centre held an online technical training workshop for a cohort of entrepreneurs under the Southern African Development Community's (SADC) Renewable Energy Entrepreneurship Support Facility, which is being implemented in 16 countries. Designed to support development of the renewable energy (RE) market in the SADC region by building the capacities of small and medium-sized entrepreneurs, the training was jointly organized by the International Renewable Energy Agency and the SADC Centre for Renewable Energy and Energy Efficiency, and delivered by the KGRTC.

Entitled "Planning, Design and Development of Renewable Energy Projects (PDDREP)", the workshop provided training in:

- Concepts of renewable energy project planning
- Renewable energy project conceptualization, scoping, technical procedures and quality assurance requirements;
- Feasibility study process, design and optimization
- Installation, operation and maintenance of renewable energy projects
- Performance of solar photovoltaic (PV) energy storage systems
- Renewable energy contractual issues
- Train the trainer - Energy efficiency management
- SME business skills toolkit.

The online training workshop consisted of lectures, case studies and interactive sessions. The KGRTC E-Campus (portal) was used as a hub for accessing all learning materials, including assignments. Live classes were conducted using Microsoft Teams, which enabled participants to interact with industry experts (trainers) in real time.

Source: https://www.kgrtc.org.zm/singlepost-pddrep-training.php (accessed 14.09.21)

The increasing ability to use digital badges (an electronic form of micro-credential) to recognize learning outcomes is also expanding the possibilities for upskilling/reskilling courses to meet the needs of the green transition. While questions relating to trust in validation have been an issue with digital badges since their inception, the growth in the number of trusted platforms and badge providers, along with efforts by national authorities to accommodate micro-credentials within qualification frameworks, is helping to address this important issue. (Micro-credentials are discussed further in Section 6 on assessment.)

22 Digitalization of national TVET and skills systems: Harnessing technology to support LLL: An enquiry and action framework (ilo.org)

It is especially important to develop green upskilling packages for senior technicians and supervisors. Senior technicians and supervisors perform an important "gatekeeper" function in companies, insofar as they provide (or do not provide) opportunities for recent TVET graduates to apply what they have learnt. It is critical that they be knowledgeable about the green transition so that they will enable graduates of greened TVET courses to use their knowledge and skills, and promote the green agenda as change agents within companies.

▶ Box 26: Greening training for the chemical industry in Germany

Under a project entitled Sustainable Educational Careers in the Chemical Industry (NaBiKa), the Rhein Erft Academy initiated an "Around the clock – 24-hour real-time" activity which helped fifty trainees from different vocational fields to work on interdisciplinary projects in three shifts during the week. Chemical technician trainees and industrial mechanics, for example, were first trained in sustainability and engaged in teamwork. The main emphasis was on organizing their work across their individual trades and interacting and communicating with one other, thus exercising collective responsibility across the various areas of the chemical industry, as well as in safety and health. The trainees learn specialist skills and have opportunities to develop their personal capabilities, benefiting from a standard sustainability protocol drawn up for their guidance, and the different tasks performed involving team communication, coordination and work shifts. The trained technicians were certified as sustainability experts and later returned to their companies with the aim of stimulating sustainability in the workplace.

Source: Germany (2016). Sustainability in everyday working life: vocational training for sustainable development. Bonn, Germany, BMBF (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, German Federal Ministry of Education and Research). www.bmbf.de/pub/Sustainability_in_Everyday_Working_Life.pdf (Accessed 14 November 2016).

5.6 Greening other aspects of training provision

As noted at the start of this section, greening training also means greening the full range of activities that underpin effective teaching and learning. Here are some examples of what this might entail:

- **Collaborating with local employers to identify their skill needs in relation to green jobs and developing locally tailored provision.** In many TVET systems there are opportunities for designing and implementing optional modules/electives as part of nationally validated programmes; these can be an effective means of greening local provision. Approaches of this kind can involve TVET providers in forming sectoral partnerships with groups of employers in locally important sectors. These issues are discussed in more detail in Section 9.
- **Developing greener teaching materials and equipment.** Green training requires green classroom/workplace resources. In TVET, this also means considering the greenness of equipment used in workplace simulation settings, for example how up-to-date and energy-efficient it may be. Digital tools may provide more sustainable options (although it should not be taken for granted that this is the case). Consideration should also be given to how to reuse, recycle or repurpose old, outdated equipment.
- **Providing "immersive" green training environments.** TVET providers have opportunities to ensure that all curriculum areas/disciplines promote green values. This may involve, for example, making sure posters on classroom walls or in workplace settings highlight green issues relevant to every discipline. Such measures may be a good first step, perhaps where curricula have not yet been greened. For more on this topic, see Section 7 on greening the campus.

- **Introducing other green opportunities for learners.** Alongside or in the absence of WBL, visits to employers with strong green credentials (greener construction sites for instance) are a good way for learners in initial training to see how greener learning is relevant to the world of work. Another way of stimulating learners' engagement in the green agenda is to devise competitions relating to skills for green jobs.

- **Developing co-curricular activities**. TVET providers may be able to develop and implement co-curricular activities which take place outside the main curriculum but are linked to it, thus providing complementary learning experiences (particularly where competency standards and national curriculum frameworks have not yet been sufficiently greened). Such activities are increasingly popular in the university sector, often linked to campus-based or community-based greening activities and the development of core (soft) skills. The skills developed through co-curricular activities can be formally acknowledged by institutions issuing diploma transcripts.

- **Ensuring careers guidance is aligned with green goals.** Careers services can inspire students to seek employment in the green economy, as well as highlighting pathways into further green learning. They can also help to promote the concept of decent work in the job opportunities they choose to highlight. In 2021, Skills Development Scotland launched the Green Jobs Workforce Academy (GJWA).[23] A key outcome of the Climate Emergency Skills Action Plan (CESAP) published in 2020, the GJWA provides information on green job opportunities, the skills needed to move into them, and links to training and funding sources.

- **Ensuring the greening of training is embedded in quality frameworks**. TVET providers should make sure that their quality frameworks make provision for the green transition, perhaps as a cross-cutting topic. For example, they could consider whether sustainability principles should be taken into account in all aspects of TVET.

- **Reaching into the local community.** Empowering people to develop local solutions, avoiding top-down-only models, is essential to the green agenda. The local area can be a source of resources for active enquiry and discovery. More than this, local community stakeholders, NGOs and parents can be a resource for TVET in terms of sustainability practices (which might also be acknowledged and captured by recognizing prior learning), as well as being able to benefit from community-based training in dealing with local green challenges. Building cooperation opportunities and partnerships can not only enrich students' learning experiences but can have a positive impact in greening the community and local workplaces.

- **Becoming centres of excellence.** TVET providers are in a strong position to become centres of excellence for the green transition in their areas, given their role in equipping the next generation with relevant skills and in upskilling and reskilling the existing workforce. An example is given in the box below. By linking into regional strategies for innovation and economic development, and a wider stakeholder group that includes universities, centres of excellence have the potential to draw on the latest research relating to green technologies and skills for green jobs.

23 https://www.skillsdevelopmentscotland.co.uk/news-events/2021/august/green-jobs-workforce-academy-offers-a-new-route-to-a-sustainable-career/

▶ Box 27: Kafue Gorge Regional Training Centre, Zambia – A centre of excellence

Located near to the Kafue Gorge hydro-electric power station, Kafue Gorge Regional Training Centre provides specialized training solutions in hydropower and related fields to electricity utilities in the Southern African Development Community (SADC) and sub-Saharan regions. Controlled by a regional Board of Trustees (BOT) from Malawi, Eswatini, Tanzania, Uganda, Zambia and Zimbabwe, the Centre has been recognized by the Association of Power Utilities in Africa as a centre of excellence.

The Centre is also the key implementing partner in the Skills for Energy in Southern Africa (SESA) project (January 2021 – June 2024), launched by the ILO and the Swedish Government. As such, it will be implementing training programmes for the renewable energy sector with the objective of increasing the uptake of renewable-energy, energy-efficiency and regional-energy-integration interventions in Southern Africa, leading to a more sustainable and low-carbon economy. The intended outcomes of the project are:

- More power technicians, engineers and managers in the SADC region with enhanced technical capacity to apply, manage and promote the latest RE, EE and REI technologies.
- The Centre having built its brand and standing as the region's centre of excellence for competitive skills training in RE, EE and REI technologies.

Sources: https://www.kgrtc.org.zm/about; and https://www.ilo.org/africa/media-centre/pr/WCMS_779260/lang--en/index.htm

5.7 Ensuring inclusion as an element of green training

Inclusion is a key aspect of green training. As noted at the start of the section, support for marginalized and disadvantaged people and gender equality are included in the UN Sustainable Development Goals. However, while many countries aim to include disadvantaged and vulnerable groups in their skills development programmes for green jobs, these groups remain largely under-represented (ILO, 2019, p. 40). Curricula can be designed to improve inclusion, for example by being sensitive to the position of certain target groups and by including elements such as learning about one's rights. In addition, targeted interventions can be implemented to support disadvantaged groups and communities, including older workers, people with disabilities, persons with HIV/AIDS, indigenous and tribal people, women, LGBTQ+ people, migrant workers, refugees, unemployed people, informal workers, low-skilled workers and those living in rural areas (see the example related to women and green jobs in Bangladesh in Section 10.3.4).

Inclusion should therefore run as a "red line" through all training activities. Here are some examples:

In their **recruitment practices**, TVET providers should consider how to open up access to people from disadvantaged communities who might not meet minimum entrance requirements, for example by recognition of prior learning (RPL) and running access courses, and how to encourage the enrolment of women into programmes for occupations in which they are under-represented. As a tool for recognizing skills obtained anywhere, RPL can also be a way of engaging with and giving visibility to traditional sustainability practices based in local communities.

- Training should be made **flexible in terms of delivery times and locations**, so that it supports, for example, female participation and engages with people from disadvantaged backgrounds with challenging domestic commitments. This might mean locating activities in community centres or using online learning.
- **Courses and buildings** should be accessible to everyone, including people with learning disabilities, for example by installing access ramps or providing assistive learning devices (increasingly using digital technologies). This issue is also discussed in Section 7, which deals with greening the campus.

- Training activities can be **integrated with other policy measures**, for example Brazil's Bolsa Verde (Green Grant) social protection programme, involving a mix of measures, brought many people out of poverty while reducing deforestation. Local managers designed area-relevant training in topics such as alternative land use, sustainable production and enterprise development, and marketing of eco-friendly products, with income support conditional on training participation. The training helped normalize pro-environmental activities, supported the role of local people as forest guardians and created new job opportunities (McCoshan, K., 2020).

5.8 Steps to greener training

This section has identified a wide range of ways in which training can be greened. This variety makes it all the more important that approaches to delivering greener training be developed and implemented **systematically** so as to meet the challenges of the green transition effectively. TVET providers therefore need to identify how green their provision is, what the associated development needs are, and what actions should be prioritized in the short, medium and long terms.

The questions below provide a diagnostic framework that can be used to interrogate provision of the key elements involved in greening training.

KEY ELEMENTS	WHAT ARE OUR DEVELOPMENT NEEDS?	WHAT SHOULD WE AIM TO ACHIEVE IN 1-3 YEARS?	WHAT SHOULD WE AIM TO ACHIEVE IN 3-5 YEARS?
Are current **teaching and learning methods** the best way to develop competencies for the green transition, including greener mindsets and behaviours? Are there new pedagogies that could be used?			
How suited are **teaching and learning materials** to teaching greener curricula? Is effective and efficient use made of digital learning tools?			
How **sustainable are the resources and equipment** used for teaching and training, and could digital tools improve sustainability?			
Could **work-based learning** be developed to offer learners more and better green experiences in employment situations? Conversely, could our WBL offer employers an opportunity to address their green challenges?			
Can we develop **tailored local training packages** to support greener training, both for our initial TVET students and for workers in need of short courses for upskilling and reskilling in the green economy, especially senior technicians and supervisors?			
How can **engagement** with (a) employers and (b) the wider community be utilized to improve the greening of TVET?			
Do TVET **quality frameworks** adequately reflect the green transition?			

KEY ELEMENTS	WHAT ARE OUR DEVELOPMENT NEEDS?	WHAT SHOULD WE AIM TO ACHIEVE IN 1-3 YEARS?	WHAT SHOULD WE AIM TO ACHIEVE IN 3-5 YEARS?
How well equipped are **careers guidance services** to promote employment in green jobs and pathways into further green learning?			
Are **teachers and in-company trainers** provided with appropriate opportunities for their professional development to support greening of the curriculum?			
How can our **campus** be greener?			
Is **inclusion** taken into account in every aspect of provision. Are there any gaps?			

Links to useful resources:

Competency-Based Training (CBT): An Introductory Manual for Practitioners (2020)

Greening Technical and Vocational Education and Training: UNEVOC's practical guide for institutions

What works for sustainability in entrepreneurship training delivery? A guide for practitioners based on lessons from ILO's SIYB programme

Skills 21 – Empowering citizens for inclusive and sustainable growth (ilo.org) in Bangladesh

Digitalization of national TVET and skills systems: Harnessing technology to support LLL: An enquiry and action framework (ilo.org)

Policy Brief - Digitalisation of TVET and skills development: Leveraging technology to support lifelong learning (ilo.org)

Assessment packages to support greener learning

6

Key learning points

This section will help you to learn about:

- The role assessment packages play in supporting the green transition in TVET
- The factors to consider in developing assessment packages
- The relationship between competency standards (or learning outcomes) and assessment methods
- How to select assessment methods appropriate to the knowledge, skills and attitudes/behaviours needed in the green transition
- How to ensure assessment packages support a just transition
- How to select assessment and certification methods appropriate to upskilling and reskilling

Stakeholders to be involved in greening assessment packages

- Educational experts
- Teachers and in-company trainers
- School leaders and senior managers
- Licencing/certification and accreditation bodies
- Enterprises, employers' organizations and sector bodies
- Local community organizations
- Environmental NGOs

6.1 Introduction: assessment for the green economy

The success of greening TVET depends not only on the accuracy of competency standards in reflecting the skills required in green(er) occupations, and the ability of curricula and training to enable learners to acquire skills in line with those competency standards; it also depends very much on the packages of assessment methods put together to measure learners' achievements. Only at this point, of course, does it become clear what skills learners have acquired.

Assessment strategies and methods need to be appropriate to the types of competency being developed and the context in which learning takes place. Greened TVET curricula and training methods need suitable assessment packages, and the range of assessment methods that can be deployed are similar to those that would be deployed in other circumstances. But there are also particular features of greening TVET that need to be taken into account in any approach to assessment and certification: how to assess the development of transversal skills like green awareness and behaviours, how to ensure that assessment methods are tuned to inclusivity for a just transition and how to assess and recognize skills acquired through upskilling and reskilling programmes, which are so important for developing a greener economy.

6.2 General assessment methods and issues

Assessment packages generate the evidence that sets of skills have (or have not) been acquired. Broadly speaking there are two types of assessment: **formative and summative.** Formative assessments enable teachers to check the progress of their learners and the effectiveness of their teaching practice by providing feedback, and they may make use of both informal and formal methods. Summative assessments, on the other hand, tend to be focused on programme outcomes and assess learners against an (often external) reference point such as a competency standard, and for this reason tend to rely on formal methods.

Assessment packages typically comprise a number of different types of assessment method, a wide range of which are available, for example written tests of various types, including multiple choice, oral tests, practical skills demonstrations, productions of finished goods or products and portfolios. Putting together an assessment package means taking decisions about which methods to use, in particular:

- Making sure that the methods are capable of **capturing evidence that accurately assesses a learner's achievements against competency standards**. As explored further below, certain categories of skill (core) are generally more challenging to assess than others.
- **Balancing theoretical tests and practical examinations.** This is an important issue for TVET given that it entails the acquisition of both theoretical knowledge and practical skills. Practical demonstrations of skills, either through direct observation and/or production of a final product, are an important component of high quality and effective TVET. An associated issue is the extent to which in-company trainers should be involved in assessment, or whether assessment should be exclusively performed by teachers.
- **Assessing learners individually or in groups.** While it is self-evident that individual assessment is key to providing evidence of achievement, group assessment is highly appropriate for assessing some skills, the most obvious being teamwork.
- **Whether to use oral or written assessments**. Oral assessments, when students explain why they have done something in a practical test or under direct observation, have a long history. Moreover, while minimum levels of literacy and numeracy are required in the workplace, oral examinations

(individually or in groups) can be helpful in cases where written tests might be a challenge for some TVET students (e.g. in the informal sector).

- **Whether to use online assessments.** Decisions as to when it is appropriate to use online assessment tools were already becoming more common before 2020, but the question has become especially prominent with the upsurge in remote learning due to the pandemic. During the pandemic, many emergency measures were taken and it is important that, as the pandemic wanes, proper evaluations of online assessment are made, to check their effectiveness and also their fairness (whether they advantage some learners over others).
- **Using portfolios and e-portfolios.** Portfolios enable learners to evidence their achievements in a variety of ways and at the same time help to develop their skills. They are a learner-centred assessment method, involving learners in making choices (under the guidance of teachers and trainers) about the best ways to evidence their achievements.
- **Using digital assessment tools**. Digitalization in TVET is raising the possibility of using digital tools to help with assessment. This is not a question of either/or but of using digital tools alongside traditional methods (blending), often as a way of making assessment faster and more effective. Digital learning tools are commonly used to provide feedback to learners, often more quickly and sometimes in greater detail than with traditional methods. They can also enable learners, teachers and trainers to stay permanently connected and so support apprentices' formative assessment.[24]
- Deciding on the nature of the **assessment criteria** to be used, for example whether achievement should be graded (A, B, C, etc.) or simply determined in terms of pass or fail. This may have a bearing on the involvement of in-company trainers in assessment, since deciding on a pass or fail for a product or service delivered by a trainee may be easier than determining a grade.

6.3 Designing assessment packages for greener TVET

Decisions about assessment are made at two broad levels: national and local. At national level, guidance is often provided alongside competency standards and curriculum specifications to help TVET providers, teachers and trainers at local level to decide on the content of assessment packages. The scope of such guidelines will depend on how much autonomy is permitted in a TVET system for actors at local level to make decisions about teaching, learning and assessment. The box below provides two examples of the type of guidance provided in national specifications.

24 See the TRIALOG app developed in Europe: https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2016-1-RO01-KA202-024528

▶ Box 28: Example of national guidance on assessment, Cambodia, food processing sector

Assessment guide

The following skills and knowledge must be assessed as part of this unit:

Understanding the basic principles of climate change and global warming

Demonstrated ability to understand and follow green procedures

Demonstrated ability to analyse and propose solutions

Critical aspects of assessment

Evidence of the following is essential:

Demonstrated ability to inspect the work area and identify common environmental hazards/risks

Demonstrated ability to maintain green attitude and conduct to minimize environmental impact, use of plastic, water and energy consumption

Knowledge of greening strategies

Context of assessment

This unit may be assessed on or off the job.

Assessment should include practical demonstration, either in the workplace or through a simulation activity, supported by a range of methods to assess underpinning knowledge.

Assessment must relate to the individual's work area or area of responsibility.

Resource implications

Training and assessment to include access to a real or simulated workplace and workplace documents, and access to workplace standards, procedures, policies, guidelines, tools and equipment.

Assessment methods

The following methods may be used to assess competency for this unit:

Case studies

Observation of practical candidate performance

Oral and written questions

Portfolio evidence

Problem-solving

Role plays

Third party reports completed by a supervisor

Project and assignment work.

Key competencies in this unit

Level 1 = competence to undertake tasks effectively

Level 2 = competence to manage tasks

Level 3 = competence to use concepts for evaluating and reshaping tasks

Source: Cambodia, Competency Standard: Green competency for food production professional - 1

Assessment methods in Malaysia's Green Technology Compliances Course of Study

This training programme "represents the fundamentals of Green Technology, which complement any vocational skills training programme related to green technologies. It covers a wide scope of knowledge and performance objectives on green technologies in terms of fundamentals, practices, procurement, research and innovation which is contained in this Course of Study (CoS)."

"The purpose of Performance Assessment is to evaluate the actual process of doing and complying with green technology in Malaysia. These Performance Assessments examine trainees' actual application of knowledge and abilities/skills in solving assigned problems. In some cases, the solution of the problem may imply (a) the application of a specific procedure learned in class; (b) a combination of procedures; and/or (c) it may require a thoughtful adaptation of trainees' knowledge and abilities/skills. The assessment of trainee's knowledge will eventually focuses on the performance and the result during assessment sessions.

Assessment Method 1: Checklists for highly structured tasks

In green technologies, some tasks require systematic procedures that do not yield multiple entry points or exit points. In this case, a check list system can be appropriately used by an assessor or a highly-structured trainee-answer sheet in which each aspect of the procedure and result is described in detail. It is often found the highly-structured format useful when working with large-enrolment classes. Highly-structured assessment tasks provide students with step-by-step instructions to follow. In contrast, less structured assessment tasks give students more opportunity to make judgments in determining the procedures needed to solve the problem.

Assessment Method 2: Collaborative groups

Performance assessment can be administered individually, in pairs, or in collaborative groups. If it is administered in pairs or groups, trainees should write in their own answer/response sheets. It is important to keep in mind that when trainees solve the problem in pairs or groups, the goal and the composition of the group will affect the student's individual performance. In this context, it should be clear what the criteria of the assessment are, for example how well trainees are able to interact and collaborate with others, creativity, originality, etc.

Assessment Method 3: Written examination

Performance assessment must include a final written examination that is set in relation to the National Competence Standards (NCS). The examination paper must be structured with either multiple-choice, open or close-ended question, or an assignment essay."

Source: Skills Development Dept., Ministry of Human Resources, Malaysia (2013) Course of Study Z-050 Green Technology Compliances, ILO Version, 2013, pp. vii - ix

As can be seen from the Cambodian example especially, actors within TVET institutions often have considerable scope to decide what combination of assessment methods to use. So what factors should be taken into account? Some pertinent ideas have already been given in the preceding section, but it should be made clear that no assessment method is inherently "better" than any other. Rather, a range of factors needs to be taken into account in determining what types of assessment methods are most appropriate in any given circumstance, as shown in the box.

▶ Box 29: Factors to consider in the choice of assessment methods

Validity. The ability of the assessment method or tool to measure what it was originally designed to measure.

Sufficiency. The quantity of evidence available is sufficient to make an accurate assessment of the competency of the trainee.

Reliability. A measure of how consistently an assessment method or tool yields the same results for the same performance over time.

Objectivity. The degree to which the same results are obtained by different assessors.

Authenticity. The degree to which an assessment is applied to work produced or conducted soley by the trainee.

Accessibility. The circumstances of the assessment are equally accessible for all trainees, and reasonable adjustments are made for vulnerable or disadvantaged groups (e.g. people with disabilities), without affecting the reliability of the assessment.

Effectiveness. Avoiding redundancy and unnecessarily long assessment periods.

Cost efficiency. Adopting assessment procedures that are cost-effective relative to the quality of evidence obtained.

Currency. The degree to which the knowledge, skills and attitudes assessed are relevant and have value in the current labour market.

Source: Adapted from ILO, 2020b, p. 59

As far as assessment for greener TVET is concerned, it is important to highlight a number of further factors, which are addressed in the following sections.

6.3.1. Ensuring assessment is suited to competency standards for the green transition

First, as noted above, the nature of competency standards (or learning outcomes) is a key driver of the types of assessment methods selected. In a sense, the factors set out in the box above mediate between the competency standards and the assessment methods used (Figure 7) – and there might need to be some iteration of competency standards and assessment methods, whereby the former are reviewed in the light of the latter (see section on mainstreaming).

Figure 7: Competency standards and assessment

As we have seen, competency standards comprise a mix of technical (or "hard") and core (or "soft") knowledge, skills and attitudes/behaviours. In greening TVET, it is important that attention be paid not only to technical knowledge and skills but also to developing green awareness, behaviours and broader generic skills, for example critical thinking and problem-solving, oriented towards tackling environmental crises. As we have seen in preceding sections, the development of these new skills may involve new learner-centred pedagogies and learning environments, as well as the development of less formal co-curricular learning opportunities around the greening of the campus (see also Chapter 7) and tapping into sustainability expertise in local communities. The new skills may also involve new forms of assessment to ensure that they can be evidenced and validated effectively. However, core (transversal) skills like teamwork and having a positive work ethic are known to be more challenging to assess effectively and efficiently than technical skills such as incorporating insulation into building works, where these is a tangible end product. This is a serious important challenge when it comes to devising greening assessment packages, in which so many of the core skills are related to attitudes and behaviours. In addition, where greening TVET is concerned, these skills might be acquired within local communities (as we saw in Section 5) – and not just within the two traditional TVET settings of school and workplace. This opens up another environment where assessment might also take place. There is likely to be a need for professional development in these areas (see Section 8).

It is important that the new ways of assessing these skills are acceptable not only within the world of TVET but also among external stakeholders, especially employers. While educators may be the experts in assessment methodologies, the assessment methods chosen need to have credibility and must be trusted by employers and the wider community if their programmes are to be valued in the labour market and in society. A wider range of stakeholders should therefore be involved in determining assessment methods. The social partners are likely to have a key role to play for occupational programmes, whereas for more generic green awareness courses it will be important to involve the wider community.

To choose a set of methods suited to competency standards for the green transition, the matrix in Figure 8 can be used to evaluate the issues involved. Key questions to be addressed for each of the boxes in the matrix are:

- What factors do you need to take into account in selecting an appropriate assessment method?
- What obstacles might you find in collecting accurate evidence of the knowledge, skills and attitudes/behaviours acquired?
- Who should be involved in choosing the assessment methods and how?
- Which assessment method(s) would you choose and why?

Figure 8: Matrix for evaluating assessment methods

	TECHNICAL SKILLS	CORE (SOFT) SKILLS
Knowledge	Factors to consider: Obstacles Who to involve Assessment method(s) chosen	Factors to consider: Obstacles Who to involve Assessment method(s) chosen
Skills	Factors to consider: Obstacles Who to involve Assessment method(s) chosen	Factors to consider: Obstacles Who to involve Assessment method(s) chosen
Attitudes and behaviours	Factors to consider: Obstacles Who to involve Assessment method(s) chosen	Factors to consider: Obstacles Who to involve Assessment method(s) chosen

6.3.2. Assessment for a just transition

As well as considering the nature of competency standards, assessment methods need to take into account the need for a just transition (see box in Section 4.2.3) and therefore should be reviewed in terms of their inclusivity. Some assessment methods might give an advantage to some students over others, so it is important that a range of methods be adopted to suit all abilities and learning styles. TVET students often take TVET programmes because they are practically focused and they may be better at oral than written communication. Such factors should be reflected in the choice of assessment methods. The methods adopted should also support female participation, for example by having female assessors for female candidates. In general, assessment methods that place the learner at the centre are likely to be beneficial from the perspective of inclusion. Portfolios, for example, can be empowering by involving learners in assessment rather than being simply the object of (nationally determined)

assessment processes. This is especially true of e-portfolios, which expand the range of possibilities for evidencing achievement beyond the written format into videos, oral diaries and so on.

It is important to review assessment methods in terms of their inclusivity. Questions to address include the following:

- Which groups of people should be taken into account when considering assessment from the inclusion perspective?
- Do assessment methods need to be adjusted to meet the needs of these groups? If so, how? What obstacles might be encountered in implementing the adjustments?
- Do the existing plans and policies of TVET institutions and national authorities encompass inclusive assessment practices?

6.3.3. Assessment and certification to support upskilling and reskilling for the green economy

The important role of upskilling and reskilling in the green transition raises key questions not only about assessment but also about how to recognize and validate acquired skills that are not part of existing qualifications. To have maximum value in the labour market, skills acquired through upskilling and reskilling need to be recognized, validated and certificated. Certification practices vary. In advanced economies, it is common for independent third-party accreditation bodies to train assessors, accredit providers, oversee certification and so on. But such practices involve costs and administration that, outside advanced economies, TVET providers may struggle to cover. This causes a dilemma for authorities in deciding how much independent oversight of assessment and certification to require (ILO, 2020b). Micro-credentials, including digital badges, might help to address this issue, although they are not yet recognized in many national qualification systems.

Micro-credentials are not new. For example, someone may take a short course in management leading to a micro-credential recognized by an institute of management or similar body. But micro-credentials are becoming more commonplace as a result of increasing demands for upskilling and reskilling, as well as digitalization on the supply side of education and training. Furthermore, the green transition affects the entire workforce in one way or another, and there are certain common needs, such as the need for green awareness of recycling methods, which could be addressed by the development of common micro-credentials for use across different industries. Alternatively, micro-credentials could be developed by TVET providers.

As discussed in Section 5, digital learning tools have great potential to meet the demand for upskilling and reskilling where workers need to add a green component to their existing skills. For instance, they facilitate learning in the workplace, especially in small “add-on” or “top-up” programmes. Some of the obstacles to engaging with online learning, for example lack of understanding and trust that such methods could work, have been reduced as a result of experience during the pandemic, even though the challenges of suddenly switching to online learning were also thrown into sharp relief. Digital learning also enables digital assessment and certification, and the growth in online learning has seen a parallel growth in micro-credentials, digital badges and their accompanying digital platforms, while new methods for the secure online validation and storage of digital credentials have been created through technologies like blockchain.

▶ Box 30: Digital badges for skills on Near Zero Energy Buildings (NZEB) in Ireland

All domestic and non-domestic buildings in Ireland are required to meet national NZEB standards and all construction professionals need to undergo upskilling to meet the requirements of the standard. In response, Waterford and Wexford Education and Training Board (WWETB, a TVET provider) has developed a set of 10 NZEB short courses covering all the main building trades (bricklaying, carpentry, plumbing, etc) plus topics like Site Supervision. To develop the courses, WWETB gathered inputs from industry partners, government departments, local authorities and third-level (post-secondary) institutions. The programmes are delivered at two of the WWETB's training centres, and are the first trade-specific courses in Europe. The courses are of short duration, from one day for the course in NZEB Fundamental Awareness to four days for the Site Supervisor course, and the trade courses are a mix of online provision plus a one-day practical workshop.

All these programmes are approved by the Construction Industry Federation and "assured" by the City & Guilds international awards organization under its programme recognition service, which benchmarks programmes against their quality standards. Learners who successfully complete City & Guilds Assured Training Programmes receive a digital badge, which "allows learners to recognize and communicate learning achievements and certifications online in a secure way". City & Guilds provides its digital badges through the Credly digital credentials platform.

Sources: https://www.independent.ie/regionals/wexford/news/housing-minister-darragh-obrien-visits-nzeb-centre-in-enniscorthy-40847294.html; http://nzeb.wwetbtraining.ie/; Waterford and Wexford Education and Training Board. 2021. NZEB Course – Information Booklet. http://nzeb.wwetbtraining.ie/page/nzeb-course-information-booklet; situation described is pre-pandemic; https://www.credly.com/org/city-guilds/badge/nearly-zero-energy-building-nzeb-fundamental-awareness-programme; http://waterfordwexford.etb.ie/latest-news/nzeb-digital-badge-now-showcased-by-city-guilds/; https://info.credly.com/about-us

Nonetheless, important issues surround the value and credibility of micro-credentials/digital badges linked to how they are accredited and who accredits them. While some badges have the status of "industry standards", for example the suite of credentials offered by the IT networking firm CISCO, this is not true of all micro-credentials. Micro-credentials, and the courses that lead to them, have to be of high quality and to come from trusted suppliers.

Issues to explore in relation to using micro-credential/digital badges in the greening of TVET include:

- What might be the benefits of using micro-credentials/digital badges in relation to the greening of TVET?
- What might be the challenges? How could they be addressed?
- Are there any skill areas for the green economy where micro-credentials/digital badges could be beneficial at national or local levels, or for particular sectors?
- How well would digital learning and badges accredit the acquisition of green attitudes and values, as opposed to technical skills that can be more easily assessed through online assessment?
- Would it be possible to include digital badges in national qualification systems? What developments would be required to make this possible?

6.4 Steps to greener assessment packages

Making sure that assessment is fit for greener learning involves a number of key elements, as discussed above. The following table summarizes these elements and provides some **hints and tips**.

KEY ELEMENTS	HINTS AND TIPS
Selecting appropriate assessment methods	A wide range of assessment methods is available. The methods selected should be suitable for the type of skill involved and the learning context. Assessment packages allow a range of methods to be used, which provides space for creativity in thinking about new approaches.
Type of skill being assessed	Greening existing TVET provides an opportunity to review assessment methods, not just in terms of such general factors as reliability and accessibility but also in terms of how well they are suited to the development of green mindsets and behaviours. Core (soft) skills of this kind are critical, but they can be challenging to assess. If you intend to tap into local communities as a resource for learning, there may also be ways of taking community impacts into account as part of assessment.
Learning settings	Greening TVET involves using the campus for learning (both formal and informal) and local community resources and expertise around sustainability, as well as the traditional settings of TVET schools and workplaces. Consider how assessment methods might need to be adjusted to these new approaches, e.g. peer assessment for campus-based co-curriculum opportunities, and obtaining feedback from local community representatives.
Involving relevant stakeholders	While educationalists are experts in assessment, the methods selected need to have credibility and be trusted in society. Consider how employers, trade unions and local communities might be consulted.
Assessment for a just transition	Make sure that assessment methods do not disadvantage some learners as against others. Learner-centred methods are worth exploring, e.g. portfolios, which involve the learner in assessment far more than traditional methods.
Assessment and certification	Where TVET students engage in new – and less formal – co-curricular learning opportunities, consideration needs to be given to whether some form of recognition can be provided in addition for formal certification. Regarding upskilling and reskilling, which are key aspects of the green transition in TVET, short courses taken by adults are typically not recognized or validated. However, digital technologies are already opening up new possibilities for in-work assessment and certification and these are worth exploring.

To support self-reflection when greening assessment methods, the box below provides a checklist of relevant questions.

Self-reflection template for greening the curriculum

MAIN ELEMENTS	KEY QUESTIONS	SELF-REFLECTION SPACE
Type of skill being assessed	• Will the methods adopted enable the assessment of core skills related to the development of green mindsets and behaviours, as well as technical skills? Do you need to use any new assessment methods for core skills like critical thinking?	
Learning settings	• Where local communities provide a setting for learning skills for green jobs (as well as traditional school and workplace settings), how should assessment be tailored to this new context? • If (less formal) co-curricular learning has been developed around the campus or local community, how can this be assessed, e.g. using peer review or feedback from community representatives?	
Involving relevant stakeholders	• To ensure the credibility and trust of society, how can the views of employers, trade unions and local communities be taken into account effectively with regard to assessment?	
Assessment for a just transition	• Do the assessment methods treat all learners equally? Could learner-centred options such as portfolios be included, which involve the learner in assessment far more than traditional methods.	
Assessment and certification	• Where (less formal) co-curricular learning opportunities have been introduced, can some form of recognition be provided alongside formal certification? • If short courses are being provided for upskilling or reskilling adults, can they be included within formal recognition procedures and count towards full qualifications? If not, what alternative forms of recognition can be granted, e.g. as micro-credentials that have currency with employers?	

Links to useful resources:

Competency-Based Training (CBT): An Introductory Manual for Practitioners (2020)

OECD Assessment and certification in vocational education and training

UNESCO Assessment for improved learning outcomes

Towards a greener campus

7

Key learning points

This section will help you to learn about:

- The role the campus can play in enabling TVET to become a beacon of green excellence by being a living example of how to apply sustainability practices systematically
- How greening the campus involves a holistic approach including waste reduction, improved energy efficiency, green procurement and improvements to make the campus more inclusive
- How a greener campus can go beyond campus management to embrace a review of institutional values and energize learners to engage with environmental improvements
- The value of campus-wide sustainability plans and tools, such as food-waste guidelines, and continuing professional development to develop greener mindsets for all staff.

Stakeholders to be involved in greening the campus

- School leaders and senior managers
- Teachers and in-company trainers
- Students
- All TVET school staff
- Local community organizations
- Environmental NGOs

7.1 Introduction

Greening the campus is a critical step in greening TVET and is closely linked to other elements of greening, such as the curriculum, delivering greener training and mainstreaming. The campus provides the overall environment for learning and therefore a critical framework for the process of greening TVET. Greening the campus also enables TVET institutions to become beacons of green excellence and thus have an impact on the employers with whom it engages in work-based learning and wider stakeholders in the community.

"Greening the campus" is a broad term and largely refers to managing the physical campus to ensure that the learning environment functions and operates more sustainably in terms of energy efficiency, reduced carbon footprint, etc. However, greening the campus also means making the campus a better place to live and work, and creating a space that is a living and inclusive laboratory of ideas, skills and innovations for sustainable development (UNESCO/UNEVOC, 2017).

7.2 Why greener campuses are needed

A greener campus is characterized by sustainable, healthy and safe conditions, and gives students – of all social groups, religious beliefs and genders – the best possible opportunities to obtain the knowledge, skills and attitudes that will lead to formal qualifications, and help them to achieve sustainable work and a sustainable lifestyle (UNESCO/UNEVOC, 2017).

Ultimately, green campuses are **better learning environments**. For instance, improved air quality and green spaces can improve health, concentration and wellbeing. Green spaces are safer places for the community (especially women) and are more accessible for students with disabilities. From an operational perspective, green campuses also improve the efficiency of resource use and financial returns.

Greening the campus is also about "**practicing what you preach**": it is important for TVET providers to show how green attitudes can translate into green behaviours. Research on sustainable behaviour has shown that enabling more eco-friendly choices, and providing the infrastructure to make this possible, encourages people to engage with each other on green issues, making "living green" an accepted and executed concept (Goel, S. 2013). In a campus context, exposure to green values, spaces and sustainable infrastructure can help translate daily actions into a practical eco-consciousness (Monstadt, J. 2009; Newton, P. 2013; Wheeler, S. 2004). For instance, the greater the exposure of trainees to sustainable concepts, practices and examples, the more likely it is that green culture change will also occur in workplaces in the future (CPSC and CTEVT, 2021).

As noted in Section 2, greening is a continual process, a journey rather than a destination. Greener campuses should become a **permanent part of the institutional ethos**, which covers all aspects of an institution's activities. This also supports a "whole of institution approach" to greening TVET, creating an institution that is a model of sustainable living (UNESCO/UNEVOC, 2017). This wider greening will help the campus become an inclusive laboratory of ideas and skills for sustainable development because, in being a model of greener practices and infrastructure, the campus becomes a live case study for what is learnt in the classroom, with the potential to enhance students' learning, engagement and understanding.

7.3 Key features of a greener campus

Greening the campus applies to all aspects of the campus environment, from buildings and energy to services and resources. This section looks at the two dominant features of greening: campus management (referring to physical infrastructure and maintenance) and beyond-campus management (referring to services, behaviours and practices on campus).

Key elements of a greener approach to **campus management** include:

- Reducing **waste** (general and food waste) and improving recycling - using any savings on running costs to fund an institution's overall greening plan.
- Reducing **water use and improving efficiency** (water irrigation, reuse tanks, water quality monitoring, water filtration systems and stickers/signposts to encourage reduced water use).
- Making more efficient use of **energy** (control of electric motors/drives, eco-rated air conditioning, monitoring electric lighting, office machines and equipment, efficient power engineering in office space), which is essential to reduce an institution's carbon footprint and energy costs. Efficient energy management reduces pollution and thewaste of resources, and lowers operation and maintenance costs to improve productivity overall.
- Applying green principles to **procurement** so that the goods and supplies purchased come from environmentally friendly sources and have reduced negative environmental impacts or help to enhance and protect the environment. For instance, goods that have a low-carbon or ecological footprint and traceable supply chains.[25] Sustainable procurement also involves planning ahead to manage demand, dealing with supply chain risks and thinking from a circular economy perspective (DEFRA, 2014).
- Improving campus **cleanliness, security and accessibility** so that female students feel safe and students with disabilities are able to access all facilities. Improving cleanliness should also feature materials and services for maintaining green spaces and keep them clean (garbage bins, garbage sorters, changes in garbage collection and disposal).
- Creating and maintaining **green spaces** to combine the purposes of education, research, leisure and aesthetics (community gardens, beehives and allotments). Locally produced food could be used in catering services and existing spaces enhanced by habitat restoration and protection (rooftop gardens).
- Making **transportation** more environmentally friendly (better cycling facilities, such as bike storage, showers and bike routes, electric vehicle charging points, car share schemes) and discouraging less sustainable modes of transport.
- Making use of **more sustainable products** (plant-based foods, and organic and carbon-neutral materials for studying, hygiene and cleaning).
- Investing **in short training and retraining measures for campus staff** on value chains (drivers, suppliers), green campus management and efficient ways of ensuring joint performance.
- Creating environments that **stimulate and support staff to come forward with innovative greener methods and services** on campus (green advocacy and knowledge, peer-learning events).

As greening the campus is a **whole of institution approach** and is linked to other areas of greening, additional green features that go beyond beyond campus management need to be taken into account.

25 Green Purchasing. 10 principles for green purchasing. Available at: https://www.gronneinnkjop.no/en/. Accessed 14.09.21.

These elements go further than - but can be driven by - changes to the physical environment and are concerned with greater sustainability in institutional values, practices and behaviours.

Activities that can be undertaken in these **beyond-campus-management** areas include:

- **Reviewing and adjusting institutional values and practices** by, for example, setting up a Green Committee, whose membership should include learners, to run initiatives at the institution and provide ongoing support; producing communication materials to publicize sustainability issues on campus; and running workshops on inclusivity, sustainable lifestyles and consumption for staff and students.
- **Energizing and supporting learners** in wider cross-curricula activities related to the campus (see "Cross-curricular activities" in Section 5.6 and the box on the activities of the UK's National Union of Students in Section 9.3.3). This could include setting up sustainability groups and advocacy projects to facilitate an institutional green movement, for example a green club (with social media presence to connect with the local community and any other interested parties); or reviewing and implementing funding schemes to support appropriate practices developed by students that apply sustainability concepts and practices and engage the community.

It is important that the elements and examples of campus greening described above be coherent and that **institutions adopt systematic approaches**, rather than undertaking activities in an ad hoc way, otherwise the full benefits may not be realized. This is a case where the whole may achieve more than the sum of the individual parts. The box below provides an example of how a coherent approach can be adopted.

▶ Box 31: Greening all the key elements: the example of the Business Incubation Centre, University of Liberal Arts, Bangladesh

The University of Liberal Arts, Bangladesh, an implementation partner of the ILO, worked on ensuring the inclusion of green aspects and/or products in its proposed business incubation centre. The business centre aims to provide four types of services: infrastructure, business services, financing and people connectivity. Each of these services needs green elements to ensure the environmental sustainability of the centre.

1. Infrastructure services
    a. office space, meeting rooms, electricity, phone system, internet lab facilities
    b. energy efficiency, waste management and correct handling of hazardous materials
    c. improving electricity efficiency by using LED lights and minimizing printing
    d. encouraging reduced waste, plastic-free and upcycling initiatives
2. Business services
    a. help with registration, licenses, accounting, strategy advice, market research, export facilitation, requiring green strategies to ensure a green economy
    b. entrepreneurs willing to produce eco-friendly products may be given preferential treatment by the proposed business centre authorities
3. Financing services
    a. brokering and/or financial services, such as equity, credit and guarantees, may be granted to entrepreneurs willing to create/start a green business
4. People connectivity services
    a. mentoring, coaching and interaction with fellow entrepreneurs (micro-clusters), market linkages, may include green elements for establishing green growth
    b. mentors are drivers of the incubation centre and at least one will be knowledgeable on green business and economy; they can help with communication campaigns

Source: University of Liberal Arts Bangladesh (2020) *Recommendations to Incorporate Green Elements into the Business Incubation Center and Business Model.*

7.4. Plans and tools for a greener campus

To achieve the type of coherence described above requires the development of clear plans and the use of a variety of tools.

A **campus-wide sustainability plan** should establish clear goals and objectives, as well as a monitoring and assessment scheme to measure and analyse improvements. Campus sustainability plans can be used to create sustainability guidelines (for both institutional structures and services). The individual departments of an institution should report annually on sustainable practices and involve students and other stakeholders in consultations. Importantly, this will make greening a flexible and more inclusive process.

The box below shows the typical components of a sustainability plan, the types of goals set and how the plan can be used as a tool for greening over time.

▶ Box 32: A Green plan framework: the 3Es of college sustainability at George Brown College, Canada

George Brown College in Toronto is a higher-education institution that offers technical degrees and vocational skills programmes. In 2008 it set out a green plan proposal that identified three key outputs (below) to reduce its institutional impact on the environment.

1. A green plan framework – this was organized into five areas representing a whole-of-institution approach where greening needs to be considered: institutional mechanisms and support, academic initiatives, corporate initiatives, student and community projects, and facilities management.
2. Goals and objectives with measurable outcomes – with an overarching goal to reduce the College's overall footprint and with a sub-goal of energy management. This sub-goal included the following objectives:
    a. Target: reduce GHG emissions and overall energy consumption
    b. Baseline: 537 tonnes/year EkWh/GSF: 29.19
    c. Benchmark OCFMA Average EkWh: 26.84
    d. Opportunities and Constraints: Energy retrofit, demand management, payback analysis and THES partnership
    e. End goal: reduce GHG by 15% over 3 years
3. A College Green Plan "report card".

The Green Plan Framework provided the foundation for subsequent plans, such as **Strategy 2020**. Strategy 2020 commits to creating a college experience that enhances student satisfaction by ensuring resources are used as responsibly, ethically and efficiently as possible. The goal is to direct financial and physical resources so that the college can grow responsibly, and enhance the college environment for the benefit of the entire community.

More recently, this has become the College's **Sustainability Plan 2022,** built around the **3Es of college sustainability**:

1. **Eco-footprint**

    Goal: Reduce the College's environmental impacts by setting goals and strategies to reduce the eco-footprint of the College's operations, facilities and purchasing practices.

2. **Education**

    Goal: Enhance sustainability in teaching and learning by integrating sustainability into the curriculum and vocational learning outcomes.

3. **Engagement**

    Goal: Educate and empower the College's staff and external communities to promote changes in awareness and behaviour on the part of the College community to support the sustainability goals.

Source: George Brown College, 2021 and UNESCO/UNEVOC, 2017.

Regarding the available **tools for greening the campus**, these cover a broad range and include methods for monitoring progress, as well as guidelines for the use of staff. There are two main types of tools, covering (i) physical aspects (largely relating to campus management and infrastructure) and (ii)

non-physical aspects, reflecting the campus-management and beyond-campus-management features referred to in Section 7.3.

Tools for the **physical site** include:

- **Calculation and whole-cost accounting tools** for measuring energy and water efficiency, carbon footprint, energy and cost-savings. This could entail identifying specific spaces or activities that contribute to the institution's carbon footprint.
- **Guidelines on food waste and waste management** that support institutions in implementing tools to measure food loss and waste, developing campus-specific policies and continual monitoring - for instance implementing the international Food Loss and Waste Standard.[26]
- **Transportation and procurement guidelines** and **building codes** in line with international codes and agreements, such as 2015 Paris Agreement and UN Habitat.

Tools for **non-physical aspects** include:

- Continuing **professional development** to develop greener mindsets among all staff, whether teaching or non-teaching. Teaching staff are considered in Section 8, but greening TVET also means considering the skill needs of every staff member. For example, greening the TVET campus involves operational staff who will need to be equipped with the requisite skills, while greening procurement involves supporting the upskilling and reskilling needs of administrative staff.
- Guidelines for **gender integration** and gender sensitivity, inclusion guidelines.
- **Audit tools** that can be used to assess existing procurement procedures in line with updated sustainability principles, and can also assess impacts and improve efficiencies.

26 *Food Loss and Waste Protocol*. 2013. Available at: https://www.flwprotocol.org. Accessed 14.09.21.

7.4. Hints and tips for a greener campus

The table below provides hints and tips for achieving a greener campus.

KEY ELEMENTS	HINTS AND TIPS
Plan well	Greening the campus is an aspect of the holistic approach to greening TVET and consequently needs careful planning to make sure all the elements fit together coherently. It goes beyond teaching to encompass areas like procurement policies.
Involve all the stakeholders	Greening the campus should involve everyone involved in the life of a TVET institution, not just the school leaders and teaching staff. This means all staff, from cleaners and caretakers (janitors) to the school governing board and partners in the business community. Everyone needs to feel they have a real stake in the green agenda. This means involving them in both developing the overall plan by coming up with specific ideas on how to improve sustainability practices and recognizing and rewarding positive contributions.
Start with small wins and celebrate success	Greening a TVET institution in its entirety is an ambitious goal and can seem overwhelming. Starting small can be important as it helps to show what can be achieved and builds ownership and momentum. Greening involves large-scale shifts in institutional values and practices but also comprises lots of small-scale changes. Success in small matters should be celebrated, for example giving an award for the best green idea should be an opportunity for recognition and celebration.
It takes a local community to tackle climate change	The proverb "it takes a village to raise a child" is highly relevant in the context of greening TVET. Local action is a vital part of greening, and TVET schools should consider how closely they are engaged with their local communities. Local communities can not only provide resources and expertise for TVET schools, but TVET school students can be a resource for local communities in addressing their environmental challenges. Greening is an opportunity to expand and deepen local community connections.

Links to useful resources:

Greening TVET: A practical guide for institutions (UNESCO/UNEVOC)

Greening guidelines for TVET institutes (ILO Bangladesh)

Greening the professional development of teachers and in-company trainers

8

Key learning points

This section will help you to learn about:

- The importance of equipping teachers and in-company trainers with the skills to design, implement and assess TVET for the green transition and to contribute to the holistic approaches to green TVET required of providers (discussed in Section 7)
- How to green initial training for teachers and trainers through enhancements to national programmes so that this training provides the solid basis of understanding of green issues they need
- How to green continuing professional development (CPD) through short national courses, as well as supporting TVET schools in implementing appropriate training for the "green upskilling" of existing teaching staff
- Broader ways to green CPD, for instance by developing networks of good practice and supporting teachers and trainers in becoming multipliers and mediators for the green transition
- How to develop a systematic approach to greening professional development through the development of effective action plans involving all relevant actors, including steps to recognize and validate the skills for the green transition acquired by teachers and trainers.

Stakeholders to be involved in greening teachers' and trainers' professional development

- Policymakers
- Teacher training institutions
- School leaders and senior managers
- Teachers and in-company trainers
- Licensing/certification institutions

8.1 Introduction

Greening professional development (PD) for teachers and in-company trainers[27] is vital for the overall success of greening TVET. Teachers and trainers need to be equipped with the skills to design, implement and assess training for the green transition as described in previous sections. They also need to be supported in developing their own environmental awareness, which might be applied in school and workplace environments more widely, thus contributing to the growth of greener cultures in TVET institutions and among employers.

8.2 Context: State of play in teachers' and trainers' professional development

8.2.1 Roles, challenges and opportunities

To undertake the greening of PD for teachers and in-company trainers, we need to have some understanding of the context within which it is likely to take place.

- First, **teachers and in-company trainers** perform different roles. While roles vary from one country to another, often according to how they are defined in the relevant laws and regulations, there are some common differences between them, which are highlighted in the box below. While teachers are integral to TVET, the prevalence of in-company trainers and the roles they undertake varies considerably across the globe. As well as teachers and trainers, other persons may also support learners in TVET, working alongside teachers and trainers as mentors, role models, guides, tutors, coaches or confidantes.

The different, complementary roles of teachers and trainers[28]

Teachers:

- Typically based in TVET schools or related institutions
- Work in classrooms, school workshops or simulated learning environments
- Teach either general subjects or vocational theoretical subjects
- Have roles that are increasingly moving towards guiding and enabling learning in cooperation with other teachers and working-life representatives.

In-company trainers:

- Are based in and employed by companies/enterprises
- Are usually workers with relevant work experience in the company and pedagogical skills
- Have responsibility for training and accompanying learners within the company.

Teachers' and trainers' roles are complementary: teachers are pedagogical experts; trainers have up-to-date practical skills and knowledge of learners' needs.

27 The term "in-company trainer" is used throughout the tool since it is widely used. It includes trainers in all forms of employment, whether in the private or public sectors, or civil society.

28 The terms "teacher" and "in-company trainer" have been used for the sake of simplicity, but different terms may be used in different countries, e.g. teaching professionals in VET institutions can also be described as trainers, instructors or tutors.

- Secondly, there are a number of **challenges** facing teachers and trainers that can be observed across the globe. There is a growing demand to embrace **new ways of teaching and learning** in order to equip learners with the modern skills they need. In particular, teachers are being asked to take on the role of learning facilitator, fostering critical and individual thinking skills based on students' individual needs, styles and levels of ability (which is in line with some of the key needs of the green transition). Increasingly, teachers are becoming trusted brokers of educational information sources and are embracing new pedagogies and learning environments, especially those linked to new digital learning tools (given momentum by the coronavirus pandemic), thus becoming enablers of discovery-based learning. Teachers are also increasingly required to take on **new roles**, for example in relation to careers guidance, guiding students in their choices of employment or further education, and providing greater pastoral support for inclusion policies. Where trainers are concerned, the policy push to expand the number and quality of work-based learning opportunities and apprenticeships (including formalizing "informal apprenticeships") is increasing the demand for them to improve their pedagogical skills and strengthen and improve coordination of their work with teachers.
- Finally, in many countries there is a pressing need to improve **the education and professionalization** of teaching and training. For teachers, initial training is a given but pathways and opportunities for progression are not always clear and teachers suffer from the poor status of TVET, which results in relatively poor social status, wages and working conditions. Trainers are typically in an even less favourable position, being less likely to be governed by regulatory frameworks, receive initial education, be part of a training community of practice or have their pedagogical skills recognized.

These factors provide a challenging environment in which to undertake greening. However, greening also provides an enormous opportunity to improve the quality of teaching and training since many of the trends noted above are in line with the requirements of the green transition, as we shall explore in what follows. First, however, we need to look at how professional development is typically structured.

8.2.2 Structure of professional development

Teachers' professional development can be seen as running on a continuum related to the different stages of a teacher's career, in which three distinct elements can be distinguished (sometimes referred to as the three "Is" of teacher education):

- **Initial training** is undertaken before entering teaching. This is typically a three-year degree-level course or a shorter course or qualification taken following a subject-based course of study unrelated to teaching. In the case of trainers, a qualification is often acquired after several years' work experience in a chosen profession (although it is rare that trainers are required by law to have a pedagogical certificate). Initial training is often undertaken by higher education or national TVET institutions, and will take into account any national regulatory requirements.
- **Induction**, for those who have recently entered the teaching profession, is intended to help them settle into their roles. It is often provided by more experienced teachers on an informal basis. Trainers hardly ever benefit from induction of this kind.
- **In-service continuing professional development (CPD)** encompasses the wide variety of learning opportunities that may be afforded to teachers during their careers, so that they can update their pedagogical skills and vocational/professional subject knowledge. Induction and CPD are largely the responsibility of TVET institutions, although national CPD courses may also be offered.

The extent to which teachers and trainers will have access to – or be required to engage in – these different components varies substantially in practice; they tend not to be dealt with systematically in policies and practices related to teacher/trainer education.

In this context, how should the greening of teacher education proceed? In the following sections, we consider how to green the two main elements: initial training and CPD.

8.3 Greening initial training

Initial training should provide the solid basis of understanding of green issues that teachers and trainers need. Depending on national circumstances, this may mean following similar approaches to those outlined in Section 3 and Section 4, i.e. developing appropriate **competency standards** for the green transition and determining how they should be taken into account in **curricula**, either as separate modules or integrated into existing parts of courses. Competency standards should be coherent with national policies for the green transition. Where teacher training is covered by university programmes, national competency standards may not exist and it will therefore be the responsibility of individual higher-education institutions to decide how to green their courses. There may be an important role for teacher's unions in promoting the need for greening in both these scenarios.

▶ Box 33: Greening teacher education in Nigeria

The Department of Vocational Teacher Education of the Centre for Technical and Vocational Education, Training and Research (CETVETAR) has reviewed and revised its teacher education curricula. It now includes two mandatory face-to-face courses in its postgraduate programme: Green Technology and Skills Development, and Emerging Issues and Innovations in Technology Education, which are infused with green economy issues. These form part of the academic programme interventions. CETVETAR outreach activities for TVET teachers include a series of greening TVET workshops aimed at advocating and sharing experiences on best approaches to infuse emerging greening concepts and ideas into the curricula of TVET institutions and departments. Another intervention aims to enhance the capacity of TVET teachers in responding to emerging training needs for skills for green jobs, which will be based on a research-based exercise on the skills needs of teachers.

Source: Centre for Technical and Vocational Education, Training and Research, Nigeria (2015) *Global survey for green economy learning: exploring opportunities for knowledge-sharing and collaboration*. Geneva, UN Institute for Training and Research (UNITAR).

As noted, trainers are far less likely to undergo initial training as extensive as that of teachers; they are more likely to take short courses to introduce them to pedagogical techniques. Nonetheless, the principles of how to incorporate green components is the same as for teachers.

It will be up to individual countries to determine the skills teachers require, but it is important to note that teachers need two sets of interrelated skills if they are to be fully equipped for the green transition:

- **Knowledge, competence and experience in developing and delivering green curricula and learning programmes in tune with the greener competency standards related to the needs of industry**. In short they need to be able to play their part in the "flow" of developments from national level into TVET classrooms and employment situations where training is provided.
- **More general skills for the green transition to infuse everything they do and every subject they teach with green concepts and activities**. In this way, they can play their part in the holistic approach to greening TVET mentioned in Section 5, empowered to take a lead in greening at local level without having to wait for new curricula in their vocational field to cascade down from national competency

standards and revised programmes and qualifications. These skills include critical thinking, innovation, entrepreneurship, adaptability, collaboration, communication and teamwork, and problem-solving.

To be effective and successful in their work, those involved in the design and delivery of training for TVET teachers and trainers should ensure that they provide them with the general skills they require, as this establishes a starting point for looking at how greening might take place. The box below gives a broad idea of the general types of skills TVET teachers and trainers may need,[29] together with suggestions as to the green elements that might be incorporated.

▶ Box 34: Greening the skills of teachers and trainers

General skill requirements	Skill needs related to the green transition
Technical knowledge of the particular vocational/ professional domain in which the teacher/trainer specializes	Knowledge of changes in relevant industries and how these are affecting the skills needed for green jobs, e.g. how recycling is affecting waste management
Transversal knowledge, skills, mindsets and behaviours for being effective in the workplace, including communication, teamwork, time management, health and safety	Examples include critical thinking, innovation, entrepreneurship, adaptability, collaboration, communication and teamwork, and problem-solving
Pedagogical knowledge and skills, i.e. the knowledge and skills required to deliver different methods of teaching and learning	Pedagogies suited to greening (see Section 5) – e.g. experiential, enquiring (discovery-based), embodied, game-based, project-based; as well as the potential of new digital technologies for teaching greener TVET
Pastoral, communication and relational (inside and outside the TVET institution) – The ability to support and motivate learners, and to communicate with learners, staff and employers/ in-company trainers	The ability to build and communicate the green culture and ethos of the institution to all relevant stakeholders, including trainers and employers
Reflective practice and assessment – The ability to assess the quality and suitability of educational resources and tools, and to monitor and assess learners	The ability to assess resources and tools for their suitability in supporting the greening of training, as well as their inherent sustainability (e.g. the carbon footprint of digital resources as compared to traditional resources) The ability to assess the green attitudes and behaviours acquired by learners, as well as technical skills for greener jobs (see Section 6.3.1).
Organizational and group management skills – The ability to manage learners and contribute to the overall management of the TVET institution	The ability to reflect on how learning programmes contribute to the overall green goal of a TVET institution
Professional (self-)development – The ability to reflect critically on one's own needs, and to be proactive in sourcing PD opportunities	The ability to reflect on the need for CPD in greening TVET

29 This typology draws in part on requirements set out in laws and regulations in Europe - see Table 2.2, European Commission, Directorate-General for Employment, Social Affairs and Inclusion, Broek, S., Pagliarello, C., Vroonhof, P., et al., 2017. *Teachers and trainers in work-based learning/ apprenticeships : final report*. (Luxembourg) **https://data.europa.eu/doi/10.2767/34652**

8.4 Greening continuing professional development (CPD)

At national level, it is unusual for there to be a systematic approach to CPD for teachers and trainers. As a result, the incidence of CPD tends to be fragmented, with provision depending a lot on individual TVET institutions' initiative in identifying the needs of teaching staff and sourcing appropriate provision, perhaps on an ad hoc basis.

In this context, several types of action may be beneficial:

(i) Developing short national CPD training courses in the "fundamentals" of the green transition, to be made available to both teachers and trainers. Such courses could be linked to national green agendas and, if rolled out to all relevant individuals, could bring everyone to the same level of ability in integrating green elements into the curriculum in any subject area. They could also bring teachers and trainers together, along with others, for example green technology specialists, to develop a shared understanding of greening, as the box below illustrates. This would be an ideal way of addressing the fact that trainers frequently do not have much opportunity to undertake CPD. Such opportunities could also be integrated into collaborative projects of the type discussed in Section 5. They could also be validated, taking advantage of developments in micro-credentials and digital badging.

▶ Box 35: Trainer training in Malaysia to support green technologies

In 2015 a trainer training programme was conducted to support the introduction of a new course in "Green Technology Compliance". The course had been developed by the Department of Skills Development of the Ministry of Human Resources to support skills development related to the fundamentals of green technology, and could complement any vocational skills training programme related to green technologies.

With the aim of creating a pool of master trainers, the programme was run twice and, on each occasion, took place over five days (40 hours of training), involving 20 trainees and three trainers. Participants were drawn from a range of backgrounds and included not only TVET trainers/instructors but also green technology practitioners and relevant NGO managers and executives. This approach fostered the sharing of experience between green technology specialists and trainers.

(ii) Embedding teacher and trainer training in programmes to green TVET

In some countries, the greening of TVET is undertaken as a project or programme, for instance when a group of new occupations is taken through a process of greening. As emphasized in Chapter 1 and Chapter 2, it is important that greening be seen as a holistic process and, when this concept is applied to such programmes or projects, it is important to include the professional development of teachers and trainers. Indeed, without professional development, the effective implementation of greener curricula will be hampered. The following box provides an example of how teacher and trainer training can be integrated into greening programmes.

▶ Box 36: Integrating the training of teachers and trainers into Zimbabwe's Green enterPRIZE programme

Zimbabwe's Green enterPRIZE programme adopted a holistic approach (see box in Section 2.3) and included Training-of-Trainers (ToT) workshops as an integral component, with the aim of developing a cadre of staff able to teach the new courses. The ToT workshops brought together part-time tutors in industry and lecturers in relevant subjects, for example electrical engineering in the case of biogas digesters, who were able to exchange expertise and perspectives as part of the learning process. The aim of each two-week training programme was to build the capabilities of participants to write training manuals and deliver work-based learning. As part of the workshops, the teachers and trainers developed action plans for their institutions to guide the introduction of the new green programmes – a critical step in helping to ensure effective outcomes in terms of the green agenda.

Source: Evidence gathered during piloting of the guidance tool

(iii) At institutional level, supporting and encouraging TVET schools to implement CPD in the green transition. In this regard, CPD should not be seen in isolation. While greening CPD can be undertaken in an ad hoc manner, for example by sending teachers on short courses on the green fundamentals, this is unlikely to support the development of greener cultures within TVET institutions, which are critical for the overall greening of TVET:

> *Perhaps one of the more important pillars [of greening TVET institutions] is culture. It is this pillar that could be adapted as a guiding mechanism for the greening process. A strong basis of green values and ethics, combined with knowledge, skills and competencies, is an important foundation for social transformations that will affect all other sectors, such as the economy and the environment. This greening culture must permeate the entire personnel of the institution, from the most senior administrator to new recruits. The culture must be understood, consistent and prominent in both policy and practice. (UNESCO, 2017, Greening TVET, p. 41)*

CPD – indeed all aspects of human resources (HR) management – has a central role to play in this process of green culture development. For this reason, to be most effective the greening of CPD needs to take place in the context of an overall institutional strategy that has also been greened, so that CPD and other HR practices are aligned with green institutional objectives. Part of this process might include an assessment/gap analysis of teachers' skills needs, including consultation with staff through focus groups and surveys. Trainers involved in WBL could also be included in this process. The outcome of these processes would be an action plan to ensure that CPD provides staff with the new skills they need. Suggested questions to be asked when developing this plan are shown below.

Developing a CPD action plan: Questions to be addressed

- How should our overall institutional goals in relation to the green transition shape our HR and CPD practices?
- Do our recruitment, performance-appraisal and career-progression structures adequately reflect our goals for the green transition so as to reward staff with strong "green credentials"?
- Do our induction activities for staff help to reinforce and consolidate the green elements of their initial training?
- What green professional development needs do our staff have?
- How should we address these needs?
- Will it be possible to secure some form of recognition/validation for the green training that staff undertake, for example by giving awards for green activities or, more broadly, by using micro-credentials?
- Do teachers need any tools to help them evaluate their teaching practice in terms of its "green-ness"?
- How can we include trainers in the WBL part of our provision in these professional development processes? What support might their employers need to enable this to happen?

8.5 Ideas for further CPD activities

Along with the core actions to support the greening of CPD described above, there are a range of other activities that can be undertaken to support the acquisition and updating of skills, such as:

- Developing **networks to share good practices**. Teachers are often involved in subject-based networks which could embrace the green agenda, while trainers often belong to professional networks and would benefit from being able to participate in networks concerned with the green transition together with teachers.
- Providing opportunities for **teachers and trainers to swap roles**. In this way, trainers could learn more about pedagogies and how schools function, and check that the green theory taught in TVET schools fits well with the green practices learnt in the workplace. By the same token, teachers could update their knowledge of the world of work from a green perspective. Employers may be encouraged to participate in such schemes if they are compensated for the time their employees spend supporting teachers or updating their knowledge and skills in schools.
- Supporting teachers, as well as trainers, in becoming **multipliers and mediators for the green transition**. Teachers and trainers may find themselves in the vanguard at local level in knowing how to respond to environmental crises. They can be encouraged to become multipliers and mediators by, for example, setting up "green ambassador" schemes like those adopted by business sectors in some countries (see Section 9).

▶ Box 37: Meeting needs for greening in Estonia's construction sector

As already noted in Section 5, a project has been launched in Estonia to improve WBL for green jobs in the construction sector. This project includes a significant element of teacher and trainer training.[30] A challenge for the construction industry is that, as well as a lack of internships, there are not enough qualified vocational teachers in the fields of structural, indoor-climate and environmental engineering, while company internship supervisors have highlighted that they do not know exactly what is expected of them. To address these issues, the project envisages the training of 100 construction-practice supervisors from both schools and companies, as well as organizing network cooperation meetings and study visits to construction sites. Fifteen teachers will be offered internships in construction companies.

8.6 Steps to greener professional development for teachers and trainers

Owing to the state of play in the professional development of teachers and trainers (its fragmented nature, the lack of systematic approaches to both initial and continuing CDP), there is a risk that greening in this area will become ad hoc and fragmented. Current environmental crises are too great for this risk to be allowed to become a reality. It is therefore critical that national stakeholders work together to devise action plans for professional development that are coherent and systematic, and embrace both teachers and trainers. They must not be simply "bolted on" to national green agendas (as noted at the start of this guidance document, the linkages between TVET and the environmental and business policy domains are all too often weak or non-existent). A wide range of actors might be involved in this process, including TVET teachers' unions and business representatives, as well as initial teacher education providers such as universities.

Building effective action plans requires a number of key steps, which are set out in the table below, along with hints and tips.

▶ Table 6: Key steps for greening teachers' and trainers' professional development

KEY STEPS	HINTS AND TIPS
Take stock of current provision for green teacher and trainer training	It will be important to obtain a picture of existing provision at both national and local (TVET institution) levels. SWOT analysis could be used to assess the current position and identify gaps in provision. This should cover both initial and continuing professional development. Consider also how new green provision might fit within existing professional development programmes.
Consider how to develop national green training	Consider whether new training packages should be developed and/or how university teacher education courses might be adapted. Whichever option is chosen, new courses should reflect national green priorities, ensuring a strong connection between overall policies for the green transition and teacher and trainer training.
Address the entirety of teacher and trainer training in a coherent way	It will be important to have a plan for all phases of professional development, so that CPD builds systematically on initial education to support career progression that takes into account the green transition.

30 https://opleht.ee/2021/03/suur-samm-kutsehariduses-ettevotetega-parema-koostoo-poole/

KEY STEPS	HINTS AND TIPS
Consider how to offer recognition and validation for green CPD packages.	A comparatively simple way of doing this is by organizing green awards and presentation events, which recognize success while raising the profile of greening for teachers and trainers. Ways of formally validating learning outcomes, for example by awarding micro-credentials or incorporating green modules into career development schemes, should also be explored.
Monitor and evaluate the effects of new provision	It will be important to have mechanisms to track progress. Training teachers and trainers does not guarantee that new ways of teaching and learning will trickle through into the classroom or the work-based learning setting. Make sure that effects are monitored and evaluated, and that the findings are used to make improvements to teacher and trainer training.

The following box provides a checklist of questions that can be used for self-reflection when greening the professional development of teachers and trainers.

Self-reflection template for greening the professional development of teachers and trainers

MAIN ELEMENTS	KEY QUESTIONS	SELF-REFLECTION SPACE
Current position		
Scope and quality of current provision for greening initial teacher and trainer training at national level (courses for becoming qualified teachers and trainers)	• What are the Strengths, Weaknesses, Opportunities and Threats of current provision? • What actions are required to maximize the Strengths and Opportunities and minimize or tackle the Weaknesses and Threats?	
Scope and quality of current provision for greening CPD for teachers and trainers at national and local (TVET institution) levels	• What are the Strengths, Weaknesses, Opportunities and Threats of current provision? • What actions are required to maximize the Strengths and Opportunities and minimize or tackle the Weaknesses and Threats?	
Solutions		
Define core skills for the green transition for teachers and trainers	• What core skills will teachers and trainers need? • Which stakeholders should be involved in defining them? Why not involve TVET students with a strong interest in sustainability, as well as current teachers and trainers? • What differences between teachers and trainers might need to be recognized in the core skills?	

MAIN ELEMENTS	KEY QUESTIONS	SELF-REFLECTION SPACE
Integrate skills for the green transition into initial teacher training	• Who should be involved? • What (extra) support will current providers of teacher education require? • How will new green requirements fit into existing initial teacher education programmes. Are new modules/units needed or can they be integrated into existing courses? • What measures are needed to ensure that learning during initial training is consolidated on entry into the profession, e.g. TVET school induction programmes?	
Develop training packages to upskill existing teachers and trainers	• What will be the optimal delivery options: face-to-face, digital, blended? • Will any special measures be needed to enable the roll-out of training packages, e.g. where CPD is currently underdeveloped? • How can TVET school leaders be best supported in planning for and integrating green training into existing CPD approaches? • How can skills acquired through greener CPD learning be recognized and validated? What combination of formal and less formal methods can be used (e.g. micro-credentials linked to national programmes for career progression, and/or green awards and presentation events)? • Consider the differences between teachers and trainers.	
Monitor and evaluate the effects of new, greener provision	• What measures can be put in place to monitor and evaluate the effects of greening teachers' and trainers' professional development in classroom and workplace learning settings? • What mechanisms will be used to bring about improvements, given the findings?	

Sensitizing enterprises[31]

9

Key learning points

This section will help you to learn about:

- The importance of sensitizing all enterprises to the needs of the green transition, not just those in industries most directly affected, such as energy, but across all sectors
- How diversified approaches that take into account enterprises' positions in the green transition and their general participation in TVET are needed to stimulate enterprise engagement
- The ways in which enterprises can be sensitized, for example by developing the institutional set-up, including social dialogue, collaborative activities (particularly for SMEs), sectoral approaches, promotional measures like "green champions" and financial incentives, and supporting green entrepreneurship
- The important role that can be played by trade unions, especially in ensuring an inclusive and fair transition, for example by appointing environmental workplace representatives and providing training for union representatives on green issues
- How TVET providers can also play a key role in "selling the benefits of the green transition" to enterprises, acting as sources of expertise and working with employers to implement energy-saving measures to reduce costs, as well as running short courses for managers and senior technicians
- How to prioritize interventions, and how to partner with other stakeholders to maximize available resources, in light of the competing priorities involved in sensitizing enterprises.

Stakeholders to be involved in sensitizing enterprises

- Policymakers
- School leaders and senior managers
- Teachers and in-company trainers
- Students
- Environmental NGOs
- Employers' organizations and sector bodies
- Trade unions

31 The term "enterprise" is used here to include employers in both the public and private sectors.

9.1 Introduction: Why we need to sensitize enterprises

Enterprises have a key role to play if greening TVET is to be successful. They play an important role as the venue for work-based learning and in providing the spaces within which TVET students can practise the skills for the green transition they have been learning in TVET classrooms. In sectors directly impacted by environmental changes, such as renewable energy, enterprises and sector bodies can play leading roles in greening TVET. However, this is not true of all sectors or businesses. For example, a survey of soft skills in the food-processing sector in Cambodia, conducted in 2016, found that only 13 per cent of employers identified a need to enhance skills for green jobs such as recycling, while 77 per cent identified a need to enhance teamwork skills.[32] Some businesses still need to be convinced that the short-term costs of, for example, integrating recycling into their waste management processes are outweighed by the benefits that will accrue only over the medium to long term. In these cases, it is TVET institutions, teachers and learners, as well as national policies to stimulate and incentivize employers, that could be the key to sensitizing enterprises as to the value of engaging with the green agenda. Company managers and technician supervisors need to be made aware and convinced of the green approach if graduate "green students" are to implement their knowledge at the company level. In addition, workers' organizations can play a key role in sensitizing enterprises to the green transition, for example by seeking to ensure that workers are adequately reskilled or upskilled for new employment opportunities and that policies and practices are attuned to the need for a just transition, as well as being part of broader strategy development processes.

9.2 The need for a diversified approach

Given the diversity in enterprises' attitudes and responses to the green transition, a diversified approach towards sensitization is also required. Sectors and enterprises can be seen as being at different positions along a spectrum in terms of how far they are likely to engage with green training. These positions are the result of a number of factors, such as:

- **Position with respect to the green transition**. Sectors and enterprises are affected by the green transition in different ways. Environmental policies and regulations, the evolution of green markets, and the growth in green technology and innovation impose obligations on enterprises in different ways and to different degrees. Consequently, for some sectors and enterprises will be strongly motivated to develop skills for green jobs, while in others the impulse will be weak.
- **Position with regard to engagement with TVET in general.** Enterprises and sectors exhibit huge variations in the extent to which they engage with formal TVET. This is due to a range of factors, including training traditions, capacity constraints (time, resources, lack of human resource plans and expertise – which especially affect SMEs), and the general state of development of TVET in their country.[33]

If we "cross" these factors, we can see that, on the one hand, we have enterprises or sectors with a strong reason to engage actively with green training on account of their regulatory, market or technology environment, which are already strongly engaged with formal TVET. On the other hand, we have enterprises where the effects of environmental crises are comparatively weak, where the effect in terms

32 ILO Skills for Trade and Economic Diversification (STED) Report: Food Processing Sector, Cambodia (2017)

33 Countries with dual apprenticeship systems (e.g. Germany, Denmark) have strong employer involvement in training and are also comparatively well set up to absorb and integrate the new requirements of the green transition, just as they would other external demands, e.g. digitalization. In contrast, many countries lack robust TVET systems with strong employer engagement (e.g. the Republic of Korea), which hinders their response to the green transition. See Section 7.2.3 ILO, 2019.

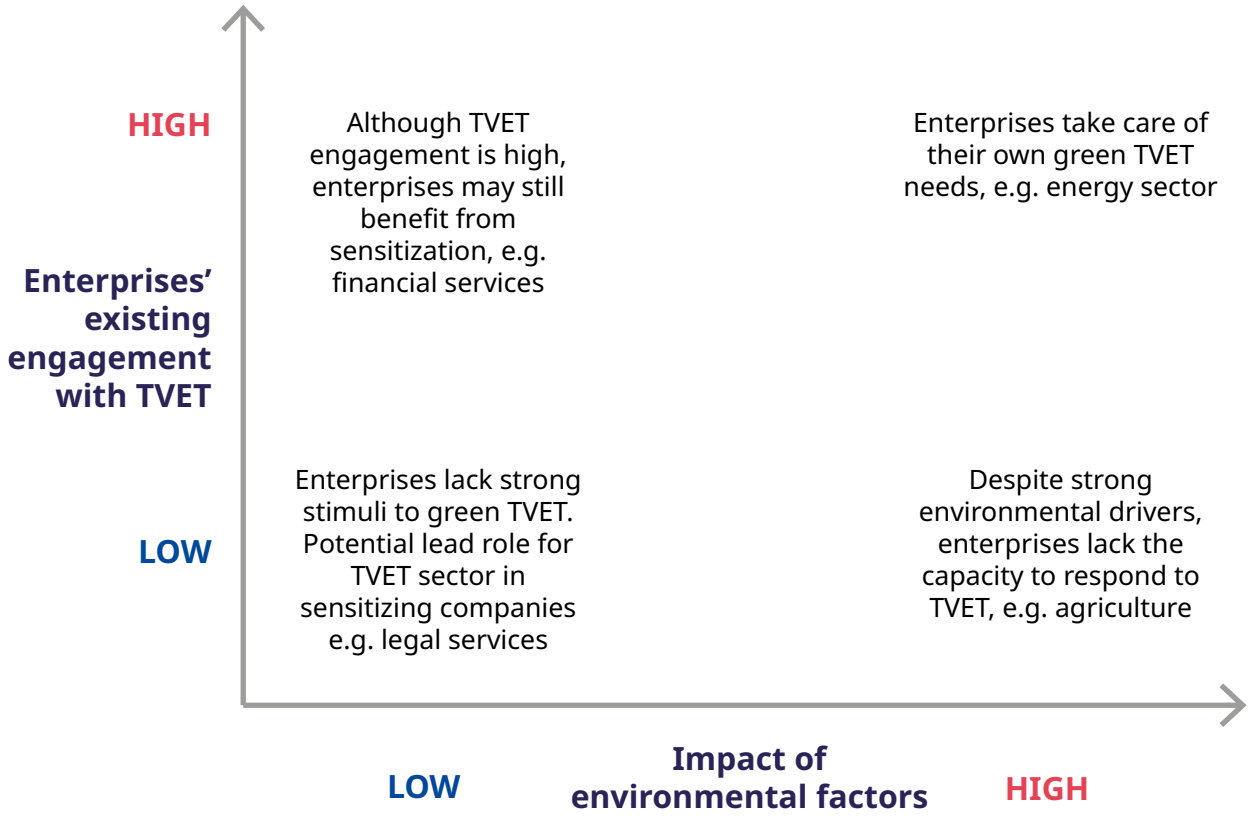
of greening skills is also small, and where engagement with formal TVET is limited or does not exist as such. It is these latter enterprises that present the greatest challenge in terms of sensitization.

In general, different measures will be needed for the sectors and enterprises falling into the broad categories that result from crossing these two sets of factors. The analytical matrix shown in Figure 9 can provide a starting point for prioritizing interventions, as well as determining the different types of interventions that might be required to sensitize enterprises. To populate the matrix, the following questions can be asked:

- Which sectors or types of enterprise would be placed in the different boxes and why?
- What types of interventions would be most appropriate for the different types of enterprise/sector?

Broadly speaking, enterprises and sectors where the impact of environmental regulations, markets and/or technology is strong, but where engagement with formal TVET is normally weak, would constitute a priority for intervention. Globally, evidence suggests that the agricultural sector might fall into this category. SMEs also find it difficult to engage with TVET because of capacity constraints and may therefore find it hard to engage with the greening of skills, even if the demand is high or increasing.

Figure 9: Analytical matrix for determining needs of enterprises/sectors for sensitization



9.3 Ways to sensitize enterprises

A range of types of intervention can be undertaken to sensitize enterprises at both national and local levels, involving the development of both structural mechanisms and processes, as well as responding to enterprises' individual needs.

9.3.1 Developing the institutional set-up for engaging enterprises

At national level, the institutional set-up, including social dialogue, can be used to help sensitize enterprises, together with a range of policy approaches and instruments. In a situation like the green economy, enterprises are almost inevitably split between those which are stimulated to lead developments on their own initiative, and those which will merely follow developments and need varying degrees of support and encouragement.

In many countries, enterprises have taken the lead in responding to the green transition by developing appropriate structures, processes and activities. These sorts of developments often involve sectors in the front line of tackling environmental challenges in countries that lack well-developed TVET systems and/or where there are mandatory green regulations but no corresponding mandatory incentive to green TVET (often in LICs and MICs). There is a role for the public sector in stimulating and encouraging such developments in sectors and among types of employers (e.g. SMEs) where there is not such a spontaneous positive response to the green transition. One way is by forming partnerships, which may involve social dialogue mechanisms (see box 38). Trade unions can also play an important role in stimulating enterprises to engage with the green agenda, as discussed in Section 9.3.6.

▶ Box 38: What are public–private partnerships?

Public–private partnerships (PPPs) are collaborative arrangements involving government, private enterprises and educational institutions for the provision of a public service or the promotion of research and development. Such partnerships may include trade unions and business representatives, NGOs, and environmental and community organizations and leaders.

Source: ILO, 2019, p. 203

One way of doing so is by establishing a **national council**, for instance India's Skill Council for Green Jobs (described in Section 3), or a **designated national authority** to promote the need for engagement with environmental topics in a general way, as exemplified in the case of Thailand (see box 39).

▶ Box 39: Thailand Greenhouse Gas Management Organization

An example of a designated national authority that serves as a supporting (public) organization is the Thailand Greenhouse Gas Management Organization (TGO). This was established in 2007 under the Ministry of Natural Resources and Environment to ensure that Thailand reaches its 2020 and 2030 goals for greenhouse gas (GHG) emissions. It serves as a centre of collaboration between the Government, the private sector and international organizations, and strives to enhance both public and private capacity-building in respect of GHG management. The TGO has established a Climate Change International Technical and Training Centre (CITC) to build capacity and develop skills in relation to GHGs and climate change adaptation in the South-East Asia region. The CITC's main activities are developing and providing training courses (including e-learning), establishing networking platforms for the member states of the Association of South-East Asian Nations, disseminating knowledge and acting as a learning resource centre. In the process of curriculum development, all stakeholders were involved in assessing training needs. The CITC has provided courses (for over 1,000 participants by 2014) in five knowledge clusters: GHG inventory management, climate change management, climate change adaptation, mitigation mechanisms, and the financing and economics of climate change. All courses are provided without charge, funded by the Thai Government.

Source: ILO, 2019, p. 182

Collaboration between enterprises is another way in which enterprises can be sensitized and actively involved. It can be especially helpful for SMEs that face obstacles in engaging with greening TVET, as already noted.

▶ Box 40: Inter-company vocational training centres in Germany

Germany has a network of inter-company vocational training centres (überbetriebliche Bildungszentren), some of which focus on environmental issues and play an important role in the promotion of skills for green jobs (and related technologies), especially in the absence of other support measures that might offer SMEs training in skills for green jobs. New advanced content for skills programmes related to skills for green jobs is very often developed in such centres and so made accessible to a large number of firms, especially SMEs.

Source: ILO, 2019, p. 174

9.3.2 Adopting sectoral approaches

Another approach is to work in partnership with employers to stimulate their engagement at sectoral level. For example, the TVET sector may be able to energize employers under pressure from environmental legislation (but which may not have a tradition of strong engagement with formal training) by using their expertise at national level to provide solutions to the green challenges faced by key business sectors. Trade unions are also well in tune with sectoral needs and can provide valuable inputs to sectoral approaches (see Section 9.3.6).

▶ Box 41: Integrating waste management in training for car mechanics in Costa Rica

In conformity with Costa Rica's goal to become carbon-neutral by 2021, the Instituto Nacional de Aprendizaje (INA) has created capacity-development opportunities to increase the level of environmental awareness, thus influencing the management of automotive waste. The INA conducted an in-depth investigation to assist the local transportation sector in finding solutions to the serious problem of soil contamination observed during the repair of motor vehicles. This initiative was supported by collecting information on how automotive waste is managed throughout the country. These findings highlighted the environmental damage caused by incorrect waste disposal.

A good part of the strategy undertaken by the INA was to design a series of projects. The first of these was piloted in the automotive shops of education centres involved in teaching mechanics. The aim was to raise the awareness of those working in technical and civil fields. The INA then developed modules with the aim of developing comprehensive waste management plans among teachers and students. These plans were developed in the context of short-term courses and a manual was developed to guide teachers and students in implementing their integrated plans. This work was complemented by training the owners of automotive centres in the integrated management of waste. The project resulted in the successful implementation of waste management plans in five out of six educational training centres for car mechanics. The initiative was extended to train forty-five company owners, using the course modules developed.

Source: UNESCO-UNEVOC 2014. Promising practice: greening TVET. Bonn, Germany, UNESCO-UNEVOC

9.3.3 Promoting the green agenda

Enterprises can be sensitized by measures that promote the benefits of their engaging with both the green transition in general and with TVET. For example, the "green ambassador" or "green champion" concept is well established in schools (the WWF runs such a programme),[34] while the idea developed by some universities of giving their students the skills to act as green agents of change is growing in popularity (see box 42). Such schemes are also relevant to TVET, with learners and apprentices potentially acting as change agents in enterprises.

▶ Box 42: The UK's National Union of Students' (NUS) Green Impact programme

The NUS is a key partner of UNESCO's Global Action Programme on Education for Sustainable Development, having established its Green Impact programme in 2006. Green Impact trains and supports students to act as change agents across organizations, while also boosting their experience and confidence. Green Impact is available to any organization, whether public or private, with universities particularly benefiting. The employers involved range from SMEs to large companies, which can benefit from the creation of tailored Green Impact toolkits to identify areas where business processes can be greened, and employees are supported in taking tangible actions towards sustainability. Around 1,000 students each year receive Green Impact training provided by the NUS, with universities and colleges providing the funding. Data shows that for every £1 an institution invests in the programme, they get £3 back in savings and efficiencies.

Sources: https://greenimpact.nus.org.uk/ and

UNESCO link https://en.unesco.org/prize-esd/2016laureates/nus

34 https://www.wwf.org.uk/get-involved/schools/green-ambassadors

9.3.4 Introducing financial incentives

Many countries stimulate enterprise engagement with the green agenda by offering financial incentives and TVET often features in these arrangements. A problem in this case is that enterprises often struggle to maintain activities once funding has run out.

▶ Box 43: Financial incentives for employers in Guyana

In Guyana, at least two commercial financial institutions and IPED, a microfinance organization, offer green financing, either as parties to a public–private arrangement and/or independently. Guyana's Micro and Small Enterprise Development Programme, which provides competitive financing for green business, offers skills training coupons that beneficiaries trade in for a variety of business development and management training programmes delivered by pre-approved training organizations and/or experts.

Source: ILO, 2019, p. 175

9.3.5 Supporting green entrepreneurship

Another way to sensitize enterprises is to support the growth of green entrepreneurship. Entrepreneurs need to be made aware of the potential business opportunities arising from the developing green economy, and equipped with the tools to take advantage of them. Opportunities of this kind are particularly relevant for LICs and MICs, which frequently face major challenges from climate change and environmental degradation.

▶ Box 44: Developing green businesses: the ILO's Start and Improve Your Business (SIYB) programme

The ILO has produced a **Green Business Booklet** to support the creation of green businesses, as well as the greening of existing businesses. The manual is designed to be used in conjunction with the ILO's flagship Start and Improve Your Business (SIYB) programme, which helps entrepreneurs to start and improve micro and small businesses as a strategy for creating more and better employment for women and men. It helps potential entrepreneurs to come up with a viable green business idea and to develop a business plan from a green perspective; it also guides existing entrepreneurs on ways to green their businesses.

Drawing on the SIYB programme, the **Zambia Green Jobs Programme** created a Start and Improve Your Green Construction Business (SIYGCB) training programme, which targets emerging and established entrepreneurs in developing environmentally sustainable construction businesses. Although Zambia is one of the most entrepreneurial countries in the world, many potential young entrepreneurs face difficulties in setting up and establishing green businesses. The obstacles include limited access to and availability of sector-specific green-business and technical skills, lack of access to finance and limited support in the form of mentoring. Some of these barriers are common to most entrepreneurs but become more pronounced when new types of entrepreneurial activity, such as green entrepreneurship, are involved. The SIYGCB has been created to offset some of these problems by developing and implementing a range of measures. They include a training package based on the SIYB programme and stimulus for the uptake of green entrepreneurship through activities such as a Green Business Plan Competition, which provides a platform for start-up entrepreneurs to develop and receive support for potentially successful business plans. The Zambia Green Jobs Programme is also developing skills for green jobs more broadly.

Sources:

https://www.ilo.org/empent/areas/start-and-improve-your-business/WCMS_555274/lang--en/index.htm

https://www.ilo.org/global/topics/green-jobs/projects/africa/WCMS_209922/lang--en/index.htm

9.3.6 Recognizing and supporting the role of trade unions[35]

Workers' organizations can play a vital role in developing and implementing policies on skills for green jobs, particularly where ensuring an inclusive and fair transition is concerned. Although evidence indicates that there is scope for trade unions to play a more active role,[36] their involvement in climate policy planning has been on the increase for a number of years.

Trade unions do indeed have the potential to play an active role in the design and implementation of national strategies for decarbonization, as well as in the development of just transition frameworks. Ways of strengthening the role of workers' organizations in greening TVET include:

- Involving them in the mechanisms relating to **skills anticipation for green jobs and competency development and the redesign of TVET programmes**. In Estonia, for example, the trade unions are represented in the OSKA skills anticipation system (see Section 3.3). Another example is outlined in the box below.

▶ Box 45: Trade union involvement in TVET re-design through tripartite mechanisms in Portugal

In Portugal, the National Agency for Qualifications and Professional Education (ANQEP) has created new "competence standards" linked to green jobs, as well as new short training modules to adapt workers' skills. Subsequently, the Institute for Employment and Vocational Training (IEFP) has undertaken the task of adapting the contents of vocational education and lifelong learning programmes. Through their involvement in the governance of the Portuguese qualification system, which is tripartite, trade unions like the CGTP-IN19, which is active on green employment issues, have been able to input their advice and opinions.

Source: European Trade Union Confederation. Undated. A Guide for Trade Unions. Involving trade unions in climate action to build a just transition. https://www.etuc.org/sites/default/files/publication/file/2018-09/Final%20FUPA%20Guide_EN.pdf

- Shaping interventions at **sectoral and regional/local levels**. Trade unions operate at "ground level", have an in-depth knowledge of their sectors and can provide concrete and effective solutions, for example by playing an active role in regions with significant fossil fuel industries in helping workers transition into new employment opportunities. They can assist by defining solutions aimed at minimizing social impacts, and exploiting opportunities where existing skill sets closely match new opportunities, as shown in the box below.

▶ Box 46: Trade unions support training in the latest green technologies in Denmark

To offset the closure of the shipyards at the Port of Odense in Denmark in 2012, the Lindø Industrial Park (*Lindø Industripark*) was set up to support the growth of companies involved in the production, storage and discharge of components for offshore and heavy industries. As part of the redevelopment, a retraining and reskilling programme was established with the support of trade unions. This programme led to the creation of the Lindø Offshore Renewables Centre (LORC) and an R&D and training centre in which the technologies associated with offshore wind energy can be tested and produced. Trade unions are closely associated with the management of the centre, as the LORC council includes representatives of Danish trade unions.

Sources: European Trade Union Confederation. Undated. A Guide for Trade Unions. Involving trade unions in climate action to build a just transition. https://www.etuc.org/sites/default/files/publication/file/2018-09/Final%20FUPA%20Guide_EN.pdf; https://www.lorc.dk

35 This section draws in particular on European Trade Union Confederation. Undated. A Guide for Trade Unions. Involving trade unions in climate action to build a just transition. https://www.etuc.org/sites/default/files/publication/file/2018-09/Final%20FUPA%20Guide_EN.pdf

36 ILO, 2019, p. 196,

- Being active players **within enterprises**, for example in highlighting the emergent skills needs of workers in respect of green jobs, an example of which is provided in the box below, and ensuring that employers' plans for upskilling and reskilling for the green transition are reflected in corporate social responsibility reporting mechanisms.

▶ Box 47: The UK's unionlearn develops environmental workplace representatives

In the UK, the national umbrella body, the Trades Union Congress (TUC), plays an active role in supporting learning in the workplace. Through its Learning and Skills Organisation, unionlearn, it manages the Union Learning Fund (which is supported by government) to help union learning representatives work with employers on TVET issues. The TUC also supports its member unions in appointing green or environmental workplace representatives, recognizing that encouraging employers to focus on green issues can lead to the creation of new green jobs and skills. Through discussion with employers, union representatives are reaching agreements to extend the scope of union activities to cover such environmental issues as energy use, recycling and green travel plans, as well as working with employers to train staff.

For example, the Bakers Food and Allied Workers' Union has worked with a major retail baker, first to extend the role of workplace safety and health representatives into green issues (becoming safety, health and environmental representatives), then to train staff and raise environmental awareness. Another example is the UNITE union, which is rolling out an education programme to equip its representatives with the skills to negotiate with their employers on all aspects of the climate emergency. A new five-day environmental representatives course aims to provide an up-to-date understanding of climate change and the just transition (through the work of the Just Transition Centre, which was set up by the International Trade Union Confederation (ITUC) in 2016).

Source: unionlearn, 2020, Cutting Carbon, Growing Skills – green skills for a just transition

https://www.unionlearn.org.uk/publications/cutting-carbon-growing-skills-green-skills-just-transition

9.3.7 Interventions by TVET providers

As well as the measures described above, TVET providers can also take the initiative in helping to sensitize enterprises. To return to the analytical matrix introduced at the start of this section, within a given TVET locality we are likely to find a range of enterprises posing different challenges where sensitization is concerned. In all scenarios, however, the key to this process is to **focus on the benefits enterprises can obtain from the green transition**. This may offer an opportunity for TVET providers to build new relationships with some enterprises – an alternative, if you will, to the traditional approach of "selling the benefits" of TVET. Instead, they can sell the benefits of TVET for the green transition!

TVET offers the opportunity to **support enterprises in tackling green challenges.** TVET institutions can be a source of expertise and are well placed to promote practices that contribute to reducing the environmental impact of business and help enterprises to reduce their costs. They can advise, for example, on improving energy efficiency and cutting down on waste, especially if they have had the experience of greening their own campuses (see Section 7). TVET providers might work with employers in a particular sector locally to **design and deliver short courses for managers and senior technicians**, thus raising their green awareness and showing how TVET graduates could contribute to the ability

of enterprises to meet new regulatory requirements for greening. TVET providers can also work with enterprises to find solutions to specific green challenges, as illustrated in the box below.

▶ Box 48: Greening the woodcraft technology curriculum in Fiji

A vocational school in a rural area of Fiji partnered with a local timber mill to improve the relevance of and inject sustainable development principles into its Woodcraft Technology programme. The programme teaches students how to add value to "waste" wood from the sawmill. Students construct lamp stands, ornaments, statues and the like from waste timber, which are then sold. In addition to teaching practical and applied skills in a learner-centred manner, the programme includes an entrepreneurial component which raises funds for the school, improving its sustainability.

Source: UNESCO, 2017

9.4 Steps to sensitizing enterprises to greener TVET

In most countries, where formal structures for engaging with enterprises are limited, and where the agenda for greening TVET is still in need of development, the scale of the challenge of sensitizing enterprises to the green agenda might seem quite overwhelming. This being the case, and given that there are always limitations in how resources can be used, two important over-arching questions arise:

- How should we prioritize our interventions?
- How can we make the most of our resources by partnering with other stakeholders?

These are questions that are relevant at both national level (where they will be helpful to policymakers and social partners) and local level (where they will help TVET providers and their local stakeholders). The following box provides a framework of key steps for self-reflection in determining a way forward.

KEY STEPS	HINTS AND TIPS	SELF-REFLECTION SPACE
Diagnosis		
What obstacles do enterprises face in engaging with the green agenda and with TVET from a skills perspective?	Consider identifying obstacles by conducting surveys or by consulting with enterprises, e.g. through sector bodies. This is also an opportunity to find out what types of support they would value.	
Which sectors or types of enterprise are most in need of sensitization?	The analytical matrix at the start of this section might provide a helpful way of targeting particular types of enterprise.	
What would motivate enterprises to engage with TVET for the green transition?	Enterprises will assess the costs and benefits of engaging with the green agenda. They may need convincing that the medium-term benefits outweigh the short-term costs. The key to motivation is answering the question "What's in it for them?"	

KEY STEPS	HINTS AND TIPS	SELF-REFLECTION SPACE
Solutions		
Do we need to improve the institutional set-up for engaging enterprises?	The national set-up, including social dialogue, can be used to sensitize enterprises. Putting in place new structures and processes can be time- consuming, so often they are better seen as complements to other, more direct, measures. Sectoral partnerships and collaborations are worth considering.	
How do we sell the benefits of TVET for the green transition?	TVET providers have a key role to play here, for example in supporting enterprises to find solutions to the green challenges they face.	
Can we engage other stake-holders, including trade unions and grass-roots civil society organizations, in sensitizing enterprises?	The green transition should be an inclusive process, so think creatively and beyond enterprises to where other resources and expertise may be found.	
Which range of interventions would best suit the enterprises selected for sensitization?	There is a wide range of measures that can be used, from promotion to financial support. Tailoring measures according to sectoral needs may be more cost-effective than general interventions.	

Links to useful resources:

The Role of Employers in Skills Development Systems

Guidance Paper on employment, just transition and climate governance

A Guide for Trade Unions: Involving trade unions in climate action to build a just transition

Financing and incentives for skills development: making lifelong learning a reality?

Skills Development and Lifelong Learning: Resource Guide for Workers' Organizations

Green Business Booklet

How to support the greening of skills for the informal economy

10

Key learning points

This section will help you to learn about:

- How skills are acquired in the informal economy, notably through "informal apprenticeships", and the challenges this poses for the green transition
- The opportunities for improving training offered by the green transition, which can enhance social outcomes and facilitate the shift to less environmentally damaging economic activities, as well as turning the negative cycles of informal employment into positive feedback loops
- How greening TVET can help businesses transition to formality, as in the renewable energy sector, by recognizing prior learning and establishing training standards
- The important bottom-up contribution that local knowledge and expertise in low-tech sustainable activities can make through community initiatives, alongside top-down policy measures
- The role that greening TVET can play in breaking down gender and other stereotypes in the labour market, for example by opening up new job opportunities in industries from which women are normally excluded.

Stakeholders to be involved in supporting the greening of skills for the informal economy

- Policymakers
- Individual enterprises, employers' organizations and sector bodies, including small business and industry associations
- Master craftspersons and professional associations
- Cooperatives
- Workers' organizations
- Environmental NGOs / civil society
- Community groups
- TVET institutions
- School leaders and senior managers

37 The term "enterprise" is used here to include employers in both the public and private sectors.

10.1 Introduction: Informal employment, skills, and the green economy

> *Informal apprenticeship … has evolved from traditional learning based on the immediate and extended family and has the potential to develop. Informal apprenticeship systems are an integral part of a society's institutions, whether formal or informal. As advanced countries have shown, a successful transition to modern learning systems is possible; a gradual improvement of an indigenous training system is possible. This requires raising the level of competences, improving the capacity of master craftspersons to innovate and diversify, and encouraging enterprises to learn the latest knowledge and adopt new technologies. A better system will improve the employability of apprentices coming out of the informal apprenticeship system; they could have a decent job with a decent income'*[38]

Employment in the informal economy is a significant phenomenon. Indeed, over 60 per cent of the global workforce is economically and socially dependent on the informal economy,[39] which continues to expand (Benson et al., 2014, p.3). Informal employment is a particular feature of low-income countries, which are also often most affected by environmental problems. Indeed, informality and environmental degradation are often co-related since informal work is, by definition, unregulated and "typically characterized by a high incidence of poverty and severe decent work deficits".[40] As a result, the impact of informal work is often the polar opposite of the goals of the green transition, with people forced through poverty into unregulated activities that have negative impacts on the environment. In a sense, therefore, the informal economy has a much greater distance to travel if it is to embrace the green transition.

▶ Box 49: What do we mean by informal employment?

Informal employment includes both employment in informal sector enterprises and informal employment in formal sector enterprises. It is "all remunerative work (i.e. both self-employment and wage employment) that is not registered, regulated or protected by existing legal or regulatory frameworks, as well as non-remunerative work undertaken in an income-producing enterprise. Informal workers do not have secure employment contracts, workers' benefits, social protection or workers' representation."

Source: https://www.ilo.org/global/topics/wages/minimum-wages/beneficiaries/WCMS_436492/lang--en/index.htm

For a more detailed analysis of the meaning of informal employment see Box 2 in ILO (2018) Women and Men in the Informal Economy. A Statistical Picture. https://www.ilo.org/global/publications/books/WCMS_626831/lang--en/index.htm

The challenges for greening TVET are also substantial. Within the informal economy, there is often a lack of contractual relationships, protected rights and organized systems of training and production. Skills are acquired informally through forms of "apprenticeship" in which young people work and learn alongside experienced practitioners, but without acquiring formal qualifications. Most attempts to improve training in this context are focused on upgrading apprenticeships by introducing forms of formality and improving the links to the formal TVET/apprenticeship system.[41] Greening TVET in this context therefore involves **weaving a "green thread"** into the processes for developing these less formal forms of training through upgrading measures.

38 Alexis Hoyaux, Luxembourg Development Cooperation Agency, in the Prologue to Werquin, P., 2021

39 https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_627189/lang--en/index.htm

40 https://www.ilo.org/global/topics/employment-promotion/informal-economy/lang--en/index.htm

41 See, for example, ILO Working paper 49: How to strengthen informal apprenticeship systems for a better future of work?: Lessons learned from comparative analysis of country cases

We should remember that the size and shape of the informal economy varies from one country to another, influenced by factors such as the mix of economic sectors and demographics, as well as socio-cultural norms which affect informality by virtue of its intrinsic connections to family groups and local social networks. This results in significant variations in the informal economy's organization, training, employment contracts and environmental impacts. Supporting the greening of skills in the informal economy, and providing appropriate education and training, is therefore often more challenging, relying on context-specific insights into how existing and complex informal systems work.

10.2 Training in the informal economy

Skills in the informal economy are acquired in many ways, but it is common for people to **learn on the job** through less coordinated and structured training than in regulated formal economies (ILO, 2015c, p. 6). However, one can make a distinction between less structured on-the-job learning in informal sector enterprises and informal apprenticeship, which can be seen as a training system embedded in local norms and traditions. Both types of training vary widely between industries and cultures. A World Bank study in selected African countries found that on average one in five young people aged 24-35 had been trained through informal apprenticeship, with a variation of between 6 and 35 per cent (Filmer et al. 2014).

▶ Box 50: What is an informal apprenticeship?

"Informal apprenticeship refers to the system whereby a young apprentice acquires the skills for a trade or craft in a micro or small enterprise, learning and working side by side with an experienced practitioner. Apprentice and master craftsperson conclude a training agreement that is embedded in the local norms and traditions of a society. Apprentices learn technical skills and are inducted into a business culture and network which makes it easier for them to find jobs or start businesses when finishing their apprenticeship."

Source: https://www.ilo.org/skills/projects/WCMS_158771/lang--en/index.htm

Informal apprenticeships have both advantages and disadvantages. They can be seen as both effective and efficient. They are **effective** "*simply because there are no credible alternatives. For many young people in many countries, it is informal apprenticeship or idleness. Solutions in the formal TVET system are not accessible to them, quite often for reasons of distance, or resources … The informal apprenticeship system is effective … because it achieves objectives - particularly quantitative ones - in terms of creating competences among young people". (Werquin, P., 2021, p. 73).* Informal apprenticeships may also offer a stepping stone into formal employment.

Informal apprenticeships are also **efficient**: they enable people to learn without the need for TVET providers to buy machines and equipment and so enable people to acquire skills with no cost to the state (Werquin, P., 2021, p. 74). In the context of underdeveloped TVET systems and insecure public finances in many countries, informal apprenticeships may indeed be the most cost-effective option.[42]

However, informal apprenticeships also have a number of **disadvantages**. Their informality diminishes the credibility of the skills acquired through them outside the local area where the master craftsperson (MC) is known, and inhibits their wider recognition. The full range of skills that apprentices have acquired, and how far this prepares them for further employment, may be unclear for those who do not know the MC; potential employers in the local labour market may understand that they have acquired skills directly relevant to the work tasks set before them, but it may be less clear what other skills they have

42 As demonstrated in Burkina Faso, see Savadogo Boubakar and Richard Walther (2010). Les coûts de formation et d'insertion professionnelles. Les conclusions d'une enquête terrain au Burkina Faso. DT de l'Agence française de développement, no. 98, August, 2010.

acquired that are relevant to other jobs. Qualifications are a form of currency in labour markets, making skills more visible, and increasing their availability improves the efficient and effective functioning of labour markets and enhances access to formal job opportunities. However, these downsides also provide **opportunities**, for example for recognizing prior learning and strengthening institutional frameworks, developing new funding models and prioritizing people at a disadvantage in the labour market, in particular women. The following table summarizes the challenges, as well as the strengths and opportunities related to upgrading informal apprenticeships.

▶ **Table 7: Challenges, strengths and opportunities related to upgrading informal apprenticeships**

CHALLENGES		STRENGTHS AND OPPORTUNITIES	
What?	**Why?**	**What?**	**Why?**
Recognition of skills	Specific and often unrecognized skills are less transferrable and may discourage hiring by other employers.	Easier transitions from informality to formality	Informal apprenticeships provide a stepping stone between informal and formal, helping to smooth the transition and reducing potential exclusion.
Skills signalling	Without knowledge of employee or employer quality, labour is unlikely to be demanded and supplied to the right jobs at the right time – in particular beyond local labour markets.	Recognition of prior learning	Through informal apprenticeships, it may be easier to offer proof of skills, thereby boosting confidence, expanding labour market mobility, and improving workers' rights.
Lack of access to skills upgrading and new technologies	People in the informal economy face barriers to opportunities for skills upgrading (lack of information and funding, high opportunity costs) and therefore are unaware of new environmentally friendly methods and practices.	Reducing gender inequality	Formalizing and expanding existing informal apprenticeships in industries that are more popular and viable for women
Lack of data	There is a lack of data and knowledge of informal labour markets and informal employment conditions.	Strengthening institutional frameworks	Greater motivation to strengthen the organization and legitimacy of existing informal apprenticeships, in particular through small industry or trade associations.
Labour market exclusion from formal employment	Many informal employees and apprentices lack formal documentation and could therefore be excluded from formal employment, although such transitions do take place.	Financing apprenticeships	If informal apprenticeship schemes become more common, institutions may find it worthwhile to provide financial support for training, thus reducing exclusion and smoothing the transition.
Lack of resources/ funding	Lack of funds to purchase more environmentally friendly equipment.	Cost savings	Recycling, saving energy and managing waste more sustainably offer opportunities for cost savings.

Source: *Derived from ILO (2012); ILO (2015c); ILO (2015d);*

Various **measures** can be implemented **to upgrade apprenticeships**, (see box 51).

▶ Box 51: Options for upgrading informal apprenticeships

Strengthening the institutional framework for higher-quality training

- Share knowledge through business associations
- Enhance access to new skills, e.g. through short courses
- Monitor and assure quality of training, formally recognize businesses as training providers

Financing informal apprenticeship

- Make existing financing mechanisms more effective: contracts and social enforcement
- Improve access to additional, secure sources of funding

Practices in informal apprenticeship: modifying or replacing "bad" rules

- Strengthen gender equality in informal apprenticeship
- Improve decent work in informal apprenticeship

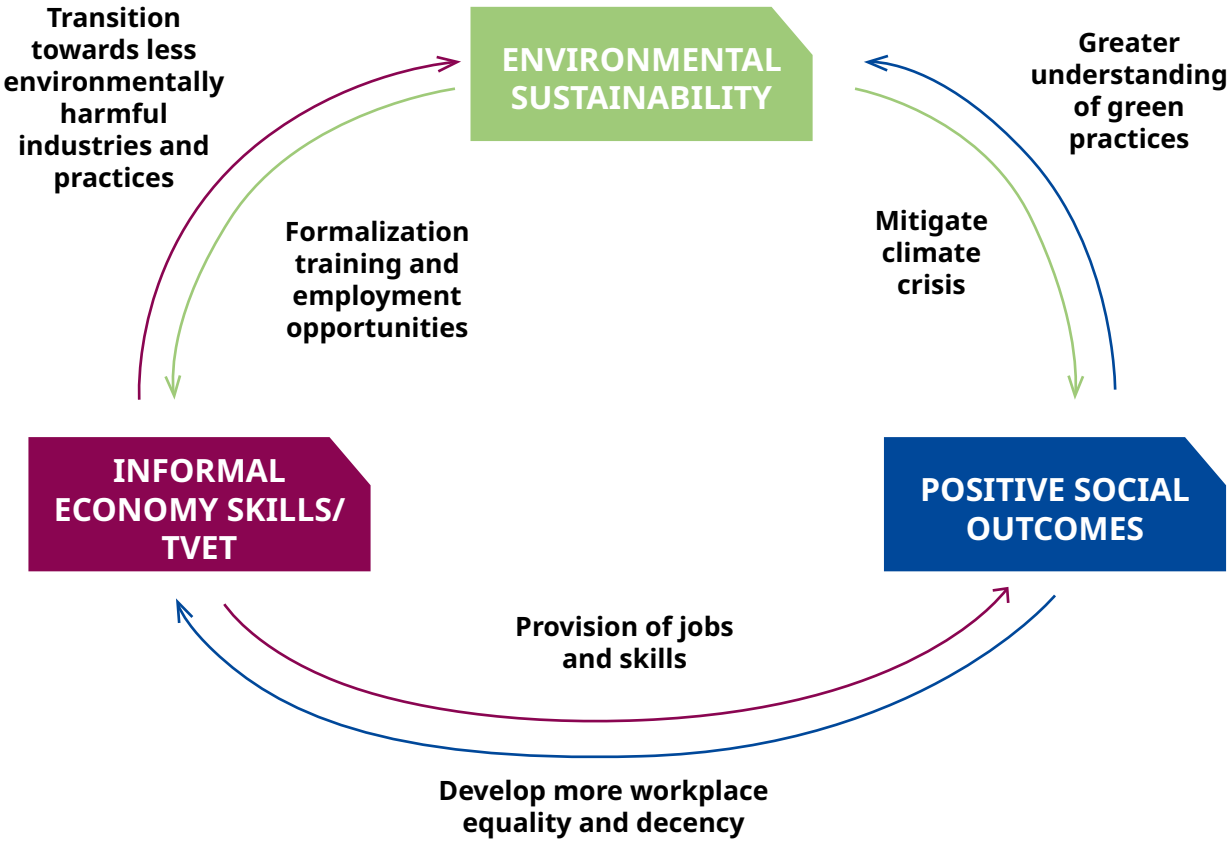
Improving linkages between informal apprenticeship and formal systems

- Promote linkages between formal education and informal apprenticeship
- Promote inclusion of informal apprenticeship in national training systems
- Institutionalize recognition of skills acquired in informal apprenticeship (recognition of prior learning)
- Develop micro- and small businesses and support formalization

Source: ILO, 2012.

10.3 Developing skills for green jobs in the informal economy

The preceding sections have shown that greening takes place in a complex, fluid and challenging context where training in the informal economy is concerned. However, greening can inject new opportunities for advancement into this situation. As the following figure illustrates, greening of the informal economy, especially when tied to greater formalization of skills development (but not excluding informal apprenticeships), offers the possibility of both enhanced social outcomes (more decent jobs) and less environmentally deleterious economic activities. In turn, greener training and jobs improves understanding of green practices, creating a positive feedback loop in terms of mitigating environmental damage. As the figure also shows, the benefits of greening, particularly when linked to greater formalization of elements of training are, crucially, inter-related, with the potential to turn the negative cycles of informal employment into positive feedback loops. Greening informal TVET has the potential to provide more training and employment in environmentally sustainable and socially inclusive ways - a powerful hybrid solution that lies at the intersection of environmental, economic and social issues.



To illustrate how some of these relationships can work in practice, the box below shows how upgrading apprenticeships can have positive effects in terms of the green transition.

▶ Box 52: Upgrading apprenticeships in Ghana can help reduce waste

In Ghana's construction sector, block layers and tilers are traditionally trained informally by working as apprentices with Master Craft Persons (MCPs) for a variable number of years, with no formal occupational standards and, therefore, no assurance for future employers of the actual proficiency of the employee. Employers usually have to employ workers who introduce themselves as block layers on a trial basis in order to discover whether that are appropriately skilled, which usually results in a waste of construction materials. The Ghana Skills Development Initiative (GSDI)*, in collaboration with the private sector, has developed national occupational standards for entry-level workers in block-laying and tiling linked to the National TVET Qualification Framework. The curriculum is being implemented by training providers in collaboration with accredited MCPs to ensure a good balance between school-based and workplace-based training. With over 60 per cent of workers on building sites involved in block-laying and tiling, there is potential for a significant impact on waste reduction.

Source: http://ghanaskills.org/node/135

*** GSDI is a project commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) with funding support from the European Union (EU) and the Swiss State Secretariat for Economic Affairs (SECO). It is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in cooperation with the Commission for Technical and Vocational Education and Training (CTVET) and other public and private sector stakeholders.**

Greening training in the informal sector offers opportunities in a number of areas, which are examined in the following sections.

10.3.1 Supporting the transition to formality in business activity

In general, there is a need to transition from informal to more formal business activity as this will help promote decent working practices and reduce local and global inequalities, such as gender imbalances, racial discrimination and geographical bias. However, achieving a smooth transition away from the informal economy is complex and highly context-dependent. Common challenges include finding active and well-coordinated social partners; enhancing the transparency and legal legitimacy of employee-employer relations; providing cost-reducing measures, such as funding, and distributing them fairly; ensuring that measures support transition and do not cause unemployment and business closures. These challenges are particularly stark in less developed economies where institutional coordination is often limited and dependency on the informal economy is high.

The green transition offers the opportunity to develop new products, services and entire industries, and to shift to more formalized activities, as in the case of the renewable energy sector, an example of which is outlined in the box below. In the long term, greening is likely to create economies with more formal and recognized employment and training structures, higher working standards and environmentally sustainable economic and social development. Informal apprenticeships can be upgraded, introducing greener practices through recognition of prior learning and the improvement of training standards.

▶ Box 53: Introducing training linked to greener energy: a renewable energy company and ILO working in partnership in Bangladesh

Grameen Shakti, one of the largest rural-based renewable energy companies in the world, has worked with the ILO to develop training linked to solar panel installation. Renewable energy is seen as a tool for sustainable development in Bangladesh and, when the project started in 2011, more than 70 per cent of rural people lacked access to the energy grid. As a result, they are obliged to depend on kerosene, firewood, cow dung and other polluting energy sources. There is also a need to create jobs in a context of high unemployment. The project therefore adopted an integrated approach, combining the production of generic training materials on green jobs with a knowledge-sharing platform and a guide to creating green jobs and enterprises. The project trained 36 trainers, 16 of whom in turn trained 90 solar technicians, while the other 20 trained 250 young women in entrepreneurship for solar accessories businesses.

Source: Presentation to National Conference on Climate Change and Green Jobs, Nepal, 28 April 2011

10.3.2 Harnessing local knowledge

As we have seen in previous sections, greening is not just about hi-tech solutions like solar panels and wind turbines; low-tech solutions also have a role to play. Greener training should recognize and tap into local knowledge of sustainable practices, both as a setting for learning and as an opportunity to recognize skills obtained in informal economies. Threading environmental policies into the informal economy should therefore be done in a way that enables informal employees and employers to take part in decision-making, so that policies are understood, respected and effective.

There are many cases in which green solutions have been adopted as practised by workers in the informal economy, rather than as a result of governmental and private bodies trying to enforce top-down

policies (Tandon, N., 2012). A good example is waste-picking initiatives, which have been found to be more efficient in the informal economy than when run by the state or private enterprises (Benson, E. et al., 2014). This is possibly because actors in the informal economy are likely to experience the adverse impacts of the climate crisis directly, in particular rising sea levels and food insecurity. Consequently, their motivation to clear waste effectively may be greater, and their knowledge of the area and of waste generation is likely to be more nuanced, enabling them to organize effective local waste-picking initiatives. Community initiatives of this kind can have a skills-development angle and generate positive feedback for local people, as the box below illustrates.

▶ Box 54: Community-led skills recognition in Colombia

In the Chocó bioregion of Colombia, Oro Verde (Green Gold) led a community initiative involving voluntary certification for artisanal and small-scale gold miners. Over 1,000 miners participated, receiving formal certification of their skills, and higher earnings as a result. These extra earnings have helped to pay for community projects and have enabled other industries to evolve, reducing dependency on mining. As a result, workers now have the knowledge to adopt safer and less environmentally harmful small-scale mining practices.

Source: World Intellectual Property Organization, 2013

10.3.3 Making training more inclusive and accessible to support just transitions to formality

Including the informal economy in greening processes is important not just because of its size (it will be very challenging to achieve environmental sustainability targets without transforming the informal economy). It is also important to ensure that training and job creation does not occur predominantly in the formal economy, which would exacerbate existing inequalities in skills, job opportunities and environmental awareness. This is an aspect of ensuring that a just transition is achieved. The challenge is to maximize the social and economic opportunities of climate action, while minimizing and carefully managing any negative impacts on all groups, and respecting fundamental labour principles and rights.[43]

Developing and providing opportunities for professional development and upskilling for people working in informal sectors is crucial if they are to benefit from the green transition. Greening TVET provides opportunities to reach people in informal employment in new ways. For example, a photovoltaic installation project in Zimbabwe run by the Informal Sector Training and Resources Network (ISTARN) exceeded its target of a minimum of 30 per cent female participation, largely due to the avoidance of gender stereotyping, which often lead to exclusion (ILO, 2012, p.70). Greening TVET can also open up sectors that are traditionally more accessible to women, for example by promoting small-scale manufacturing and secretarial roles in from new greener businesses, both of which provide greater job opportunities for women (Werquin, P. 2021).

Since initial (formal) TVET often fails to reach people in informal employment, it is important to put together packages that meet their needs, are accessible and are effectively promoted. An effective approach is to offer different types of support, including training provision, in a single support package, as illustrated in the following example from Bangladesh and the Bolsa Verde programme from Brazil, described in Section 5.7.

43 https://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang--en/index.htm

▶ Box 55: Opportunities for more formalized and gender-balanced jobs in green industries.

Bangladesh

In the earlier example featuring renewable energy in Bangladesh, women were the primary target since they are the main victims of fuel poverty. As well as training local technicians, Grameen Technology Centres focus on developing the entrepreneurial skills of women, adopting a market-based approach that couples skills development with a package of other measures (micro-credit facilities to help with business start-ups, and community participation and awareness development). As well as the installation of solar panels, the Centres provide training for women entrepreneurs in the local production, repair and maintenance of accessories to ensure the sustainability of the green jobs created.

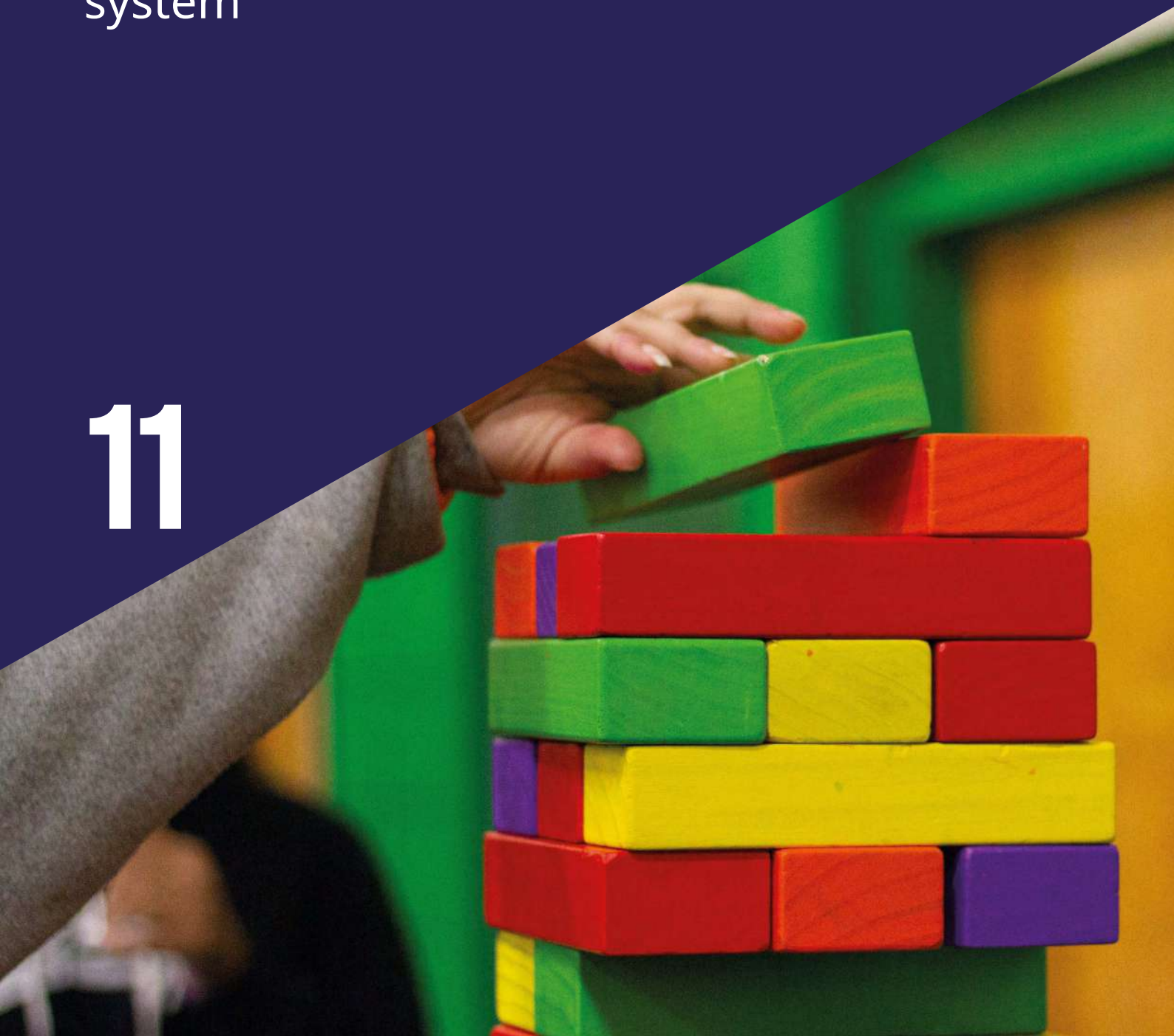
Source: Presentation to National Conference on Climate Change and Green Jobs, Nepal, 28 April 2011

Links to useful resources:

ILO Working paper 49: How to strengthen informal apprenticeship systems for a better future of work?: Lessons learned from comparative analysis of country cases

Mainstreaming: from piloting to the whole system

11



11.1 Introduction

> *"This has not been an easy exercise … [it] takes time, is painstaking, but the results are very sweet. We are ready to take off in terms of green economy education."*
>
> Dr Sosten Ziuku, Director, Ministry of Energy and Power Development, Zimbabwe, at the launch of the Green EnterPRIZE Innovation and Development Project[44]

The preceding sections of this guidance tool have shown how greening can be implemented across key elements of TVET. As noted in Sections 1 and 2, however, it is important that greening of TVET is approached in a **holistic and systematic way**. From a national perspective, systematic approaches are currently the exception rather than the rule: in most countries, the overall picture is a fragmented one, with greening activities being undertaken by a mix of organizations, including individual TVET providers, industry-led sector organizations and, in low-income countries especially, NGOs/development aid bodies (ILO, 2019). While individual activities of this kind make important contributions to greening TVET in particular localities and sectors, the urgency of the climate crisis and the degrading of the biosphere make it vital that greening TVET enter the mainstream.

National institutional contexts for mainstreaming differ considerably. As noted in Sections 2.4 and 9.2 especially, some countries' TVET systems are better developed than others, and not all countries face the same environmental challenges. In general, less developed countries have to contend with the greatest environmental challenges and, at the same time, have weak institutions for tackling them. In this section, we examine the steps needed to address these institutional challenges and enable comprehensive approaches to mainstreaming.

The next section looks at the systemic factors needed for effective mainstreaming, with a particular focus on issues related to governance, funding and the involvement of social partners.

11.2 Systemic factors for successful mainstreaming

Mainstreaming means **embedding the green agenda in TVET policy and practice** and adopting an **integrated approach** in which all the elements examined in Sections 3 to 10 function effectively together. This requires action on a number of fronts.

Key factor 1: Improving policy coordination at national level

In many countries, there is likely to be a need to **improve national policy coordination** between TVET and other policy domains. A major weakness in the TVET policy environment in most countries is a lack of strong connectivity between policies related to skills and other policy domains and their associated policy communities, in particular environmental, sectoral, business/industrial and employment policy (ILO, 2019). Furthermore, in contrast with other domains, policies to green TVET tend to be poorly developed, despite the large body of environmental laws and regulations now in existence. Together, these factors mean that, even where there may be requirements on employers to take action to protect the environment or reduce their carbon emissions, there is not a corresponding imperative to take action over skills and training. Mainstreaming greener TVET requires that these deficiencies be fixed, for example by ensuring that development plans and strategies for green jobs are adopted at national level and implemented, and take fully into account the developments that are required in training. This will require stakeholder engagement, the next critical factor.

44 Green EnterPRIZE launch video: https://greenenterprize.org/skills/

▶ Box 56: Improving policy coordination on skills for green jobs in the Philippines

In the Philippines, planned TVET reforms include developing skills for green jobs. The Technical Education and Skills Development Authority (TESDA), which manages TVET, has taken a number of steps to support this development. Skills anticipation is one of its key tasks and in 2018 it published a labour market intelligence report on skills for green jobs. In the same year, it also oversaw the introduction of the Philippines Green Jobs Act, which provides a legal framework for human capital development and the creation of decent jobs that contribute to environmental sustainability. Under the Act, the Department of Labour and Employment, in coordination with other government agencies, formulated a National Green Jobs Human Resource Development (HRD) Plan which integrates the international Just Transition framework and includes measures on education and skills development, labour market interventions, social protection, enterprise development, social dialogue, policy coherence and financing.

Source: ILO (2019) State of Skills: Philippines. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/genericdocument/wcms_742206.pdf

Key factor 2: Having effective systems in place to anticipate skills needs for the green transition

To be successful, the greening of TVET needs to be underpinned by systems that can effectively anticipate the demand for skills for green jobs in the labour market. Many countries have developed general systems for skills anticipation in the last few years, and such systems can be further developed so that skills for green jobs are regularly and systematically identified in order to inform policies, careers guidance and individual career and training choices. Systems of this kind involve a wide range of stakeholders and combine quantitative labour market data gathered by national statistics agencies and through surveys of employers and employees with qualitative insights brought by stakeholders with first-hand experience of production and service delivery.

Key factor 3: Developing structured methodologies and integrated packages for greening TVET

Another systemic component of successful mainstreaming involves the **development of effective integration between all relevant elements and a clear, structured methodology** to greening, including those wider system elements that are not typically part of TVET. As noted at several points in the preceding chapters, building a successful platform for greening TVET means making sure that all relevant elements are covered in the chain that extends from national competency standards development through curriculum development to ensuring that training and assessment are appropriately attuned to the green transition. However, elements in the wider employment system are also relevant. For example, careers guidance services and public employment services can be involved in the promotion of green jobs and pathways into green employment or further education and training. Such elements have a major supportive role to play in providing positive feedback into the green economy and the demand for skills for green jobs. Other elements, such as social protection systems, can play a key role in apprenticeship arrangements and, by implication, in greening such arrangements.

▶ Box 57: Example of an holistic approach to greening: Germany's BuildUp Skills project

Between 2011 and 2016, the EU-funded BuildUp Skills initiative was active in Germany in supporting greening in Germany's building sector.

The project comprised two phases:

Phase 1 Skills forecasting and roadmap development:

- analysis and forecast of supply of and demand for skilled workers
- development of a National Skill Development Roadmap, integrating all important sectoral players.

Phase 2 Implementation of roadmap priorities:

- establishment of a TVET 'early warning system', linking existing activities in different sectors and institutions
- development of a six-month cross-trade CVET curriculum (including teaching materials) to address the lack of overall understanding of greening the sector which was resulting in problems between trades on building projects
- one-day workshop to train in-company trainers, including supporting materials and an e-learning module, to teaching staff awareness of possible the interface problems between different crafts working on building projects
- provision of support for human resource development in SMEs, such as guidelines for owners in finding and retaining staff and implementing career development measures
- establishment of a database of CVET provision for the building sector to increase transparency in the CVET market.

The project partners included all relevant stakeholders: the German Confederation of Skilled Crafts (Zentralverband des Deutschen Handwerks; ZDH), the Federal Institute for Vocational Education and Training (Bundesinstitut für Berufsbildung; BIBB), the German Energy Agency (Deutsche Energieagentur; dena), the German Building Association (Zentralverband des Deutschen Baugewerbes; ZDB), and three institutes specialized on the crafts sector (Forschungsinstitut für Berufsbildung im Handwerk, FBH; Heinz-Piest-Institut für Handwerkstechnik, HPI; Zentralstelle für Weiterbildung im Handwerk, ZWH).

Source: Cedefop (2018) Skills for Green Jobs: An Update. Germany, pp 14-15.

Key factor 4: Strengthening engagement on the part of workers, employers and other stakeholders

Building spaces for **stakeholder engagement** where relevant actors (employers, workers, NGOs and others) can discuss the greening of skills development and training, and design and implement appropriate responses, is a crucial for effectively greening TVET. As noted in Section 3.3, a common approach is for countries to set up bodies dedicated to the green economy to address this issue. This may be the case even in countries with well-developed TVET systems, where environmental sustainability issues are often taken into account within existing mechanisms. A separate body ensures that the issue of skills and TVET for green jobs receives the attention it deserves.

Key factor 5: Developing and enhancing social dialogue

Social partners have a key role to play. It has been shown that greater levels of involvement in skills policies on greening on the part of employers and workers are associated with greater coherence between environmental and skills policies (ILO, 2019, p. 37ff). In many contexts, however, there is a need for **institutional development** of the structures and processes for social dialogue concerning the greening of TVET. In lower-income countries, social-partner organizations and mechanisms are generally underdeveloped. This is due, among other things, to their large informal economies, weak enforcement of freedom of association in the informal sector, and an absence of legislative provisions to allow the informal sector to organize. More generally across the globe, **trade union** involvement in greening policies tends to lag behind that of employers. This is a serious deficiency, given the role that unions can play in ensuring a just transition and making sure that training clauses are included in collective agreements.

Key factor 6: Stimulating private sector involvement

Given the important role in TVET played by employers, **stimulating private-sector involvement** is another key factor to include in the approach to mainstreaming. As discussed in Section 9, a range of measures can be adopted to sensitize employers on the subject of greening TVET, for instance packages of financial and non-financial measure have found to be successful in this regard. Nonetheless, private-sector greening initiatives subsidized by national authorities tend to be hard to sustain in the longer term, once support ceases. Although there are successful examples of sectoral or company initiatives, it appears that, without incentives, the private sector struggles to act on its own (ILO, 2019, p. 175).

Key factor 7: Enhancing systematic feedback mechanisms between TVET and the labour market

The final systemic factor in mainstreaming involves the development of **feedback mechanisms** in skills development and TVET systems.[45] The core elements that run from skills needs analysis through the development of competency standards and curricula to training to assessment can be seen as representing the links in a chain. To ensure that skill needs for the greening of the economy are fully met, it is important that each link accurately meshes with the links on either side. Only in this way will skill needs be accurately "translated" into competency standards and, in turn, into curricula, training and so on. As noted in Section 6, success in greening TVET depends on the accuracy of competency standards in reflecting the skills required in green(er) occupations, the suitability of curricula and training to enable learners to acquire skills in line with such standards, and the packages of assessment methods put together to measure learners' achievements. Not until the point of assessment does it become clear what skills learners have acquired. But this is not the end point. Assessment leads to certification and labour market entry or, for adults who are upskilling or reskilling, a return to or continuation in work. Only in the workplace does it become clear whether the processes involved in greening TVET are delivering the skills employers and employees need for a successful green transition. It is therefore important that the chain running from skills needs analysis to certification becomes a loop, with the addition of systematic review processes – or feedback loops – into the processes involved in greening TVET. Social partners are able to play a key role in such processes.

45 See, for example, Cedefop (2013). Renewing VET provision. Understanding feedback mechanisms between initial VET and the labour market.

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Annex

1. Summary of main constraints and challenges related to the greening TVET agenda

This annex provides a brief overview of the main constraints and challenges related to the greening TVET agenda.

Greening TVET helps to address many challenges associated with the climate crisis and environmental degradation, the COVID-19 crisis, youth unemployment, volatile job markets, changing skill requirements and digitalization. However, the greening process itself faces challenges and constraints. Although these will vary from institution to institution, sector to sector, country to country, as well as between service providers, and according to the type of TVET and different geographies, it is important to be aware of the possible hurdles to greening TVET.

Challenges and main constraints can be identified in a number of broad areas: deficiencies in policy and regulation; weak and fragmented coordination; weaknesses in skill anticipation systems; narrowness of approaches to skills development; inadequate consideration of inclusion issues; and supply-side challenges. As will be seen, many of these areas are interrelated and therefore mutually reinforcing.

DEFICIENCIES IN POLICY AND REGULATION

Despite the increasing number of international talks and agreements on tackling the climate crisis and environmental degradation in recent years, there has been a significant delay in linking public policy with action, nationally and sub-nationally. Importantly, the success of the green transition, and therefore the greening of TVET, depends on implementation of the Paris Agreement, Nationally Determined Contributions (NDCs – countries' actions that will enable them to deliver on the Paris Agreement) and future agreements. Of the 183 UN Member States that have submitted their NDCs, less than 40 per cent include plans for skills training to support their implementation (ILO, 2019). National commitments therefore tend to underestimate the role of skill development measures in enabling the green transition, presenting a high-level constraint for greening TVET.

The same is true of wider government policies: due to weak policies and poor enforcement of regulations, comprehensive and coordinated approaches to skills for green jobs are still lacking in most countries (ILO, 2019). This is partly due to weak overall TVET systems in countries where TVET has a low status and to a lack of involvement on the part of social partners, which means weak responsiveness to skill needs in the labour market.

For instance, it has been found that only a small group of European high-income countries (HICs) - France, Denmark, Germany and Spain - demonstrate both strong environmental performance and strong, comprehensive and coordinated skills policies, while a large group of mostly low-income countries (LICs) are still in the early phases of addressing both environmental and skills policy issues (ILO, 2019). This raises an important challenge in relation to government capacity to drive forward the greening of TVET.

In addition, many existing regulations and standards date from an era before the need for sustainability was fully appreciated and have not yet been fully updated to meet the requirements of a transition to a green economy (UNEVOC et al, 2017). In some countries, therefore, a key constraint may well be outdated policies that do not tie up with the sustainability agenda or changes within the labour market.

WEAK COORDINATION

Another challenge linked to policy challenges is weak coordination across the many different layers of policy design and implementation, and across different stakeholders.

At national level, responsibility for the areas of policy relevant to skills for green jobs tends to be distributed across more than one ministry. Processes to facilitate systematic policy coordination are rare (ILO, 2019). In addition, ministries dealing with education and training, and with employment, tend to be only weakly represented in policymaking on climate change and the environment (ILO, 2019), which constrains the ability of these different policymakers and the policy communities associated with them to work together on shared goals.

Coordination also requires the involvement of stakeholders outside government, including social partners, whose inputs are known to be significant: the higher the level of involvement on the part of employers and workers in the coordination mechanism, the greater the coherence between environmental and skills policies (ILO, 2019). In many countries, unfortunately, there is a need for institutional development to boost the contribution of social partners to policymaking in general and green policies in particular. Significantly, inputs from trade unions tend to lag behind those of employers. This presents a challenge for greening TVET, especially given trade unions' roles in ensuring inclusivity and the provision of training programmes.

LICs in general tend to suffer from coordination issues. In these countries, the informal sector accounts for a large part of overall employment (ILO, 2019). Mobilizing actors to take part in TVET greening dialogues in the absence of strong formalized mechanisms is therefore difficult.

WEAKNESSES IN SKILLS NEEDS ANTICIPATION SYSTEMS

Having good quality information on skills needs is a foundational for an effective skills development and TVET system. However, many countries suffer from weaknesses in this area, with deficiencies in quantitative data collection and interpretation and/or qualitative data sources. Most low-income countries have no system at all for monitoring skills needs (for green jobs or generally). In such cases, needs are usually identified on an ad hoc basis. Poorly developed skills needs anticipation systems limit countries' ability to identify skills gaps, and to analyse future training needs and shortages systematically and comprehensively. This in turn makes it difficult to develop specific skills policies, shape TVET appropriately, and adapt skills training and active labour market policies (ALMPs) to current and future demand.

NARROWNESS OF APPROACHES TO GREENING IN SKILLS DEVELOPMENT

Although developing skills for green jobs tends to take place as part of overall government policy, the greening of TVET is carried out by a range of actors: not only TVET providers, but also employers, civil society groups, regional and local government authorities and social partners (ILO, 2019). These stakeholders often work to fill gaps and needs from the bottom upwards and, although this is beneficial, it presents a challenge to the creation of a systematic and coordinated process of greening, especially since close dialogue between all actors is necessary (UNESCO-UNEVOC, 2014).

Instead, skills development responses to the green agenda tend to be fragmented and focused on the needs of those sectors and businesses most directly affected by environmental regulation, for example the energy sector. This narrow focus does not address the need for all workers and businesses to be trained, upskilled or reskilled in general green issues, such as recycling, which are applicable to all workplaces. This can mean that TVET graduates, when employed, experience difficulties in applying the

skills for green jobs that they acquire during their TVET programmes. However, engaging all employers in the green agenda can be difficult given the constraints many enterprises (especially SMEs) already face in terms of the time and resources they can commit to training. Employers need to be sensitized to the benefits of engaging with the green agenda, in particular the cost savings arising from improved waste management.

It also needs to be understood that greening is not a one-off fix related to technical skills, but a continual process (UNEVOC et al, 2017). Failure to understand this will be a considerable constraint when it comes to greening TVET. If greening is not seen as a flexible and continually reflexive activity, it may become a tick-box exercise and undermine the greening process's long-term and inclusive purpose.

INADEQUATE CONSIDERATION OF INCLUSION ISSUES

Another consequence of fragmentation and narrow focus in skills development for green jobs is the risk that issues of inclusion will not be given sufficient attention. Sector-led responses tend to focus on upskilling and reskilling existing workers and modifying initial TVET labour-market entry procedures. There is no guarantee that this approach will tackle such issues as the under-representation of women in certain occupations or the problems faced by disadvantaged communities in accessing decent employment.

Vulnerable groups in the labour market (young people, women, persons with disabilities, migrant workers, refugees, indigenous and tribal people, rural communities and other vulnerable groups) require targeted support in developing their knowledge and skills for green jobs (UNEVOC et al, 2017). Therefore, lack of provision for these groups will be a significant constraint, especially as they continue to be under-represented in policy and programmes (ILO, 2019).

Gender disparities may persist despite the greening of skills. In future scenarios, most job creation and reallocation is focused on mid-skill employment, with the greatest impact on male-dominated occupations, which will have the greatest need for reskilling and upskilling. This suggests that current occupational gender stereotypes are likely to persist unless there is a determined counter-effort: women will get only a fraction of the jobs created, unless measures are taken to train women in relevant skills, so that they, too, can benefit from green job creation (ILO, 2019). A lack of awareness of gender disparities and sensitivities is therefore another barrier to making the greening of TVET truly inclusive and sustainable.

SUPPLY-SIDE CHALLENGES

The greening of TVET is likely to be hindered by a variety of constraints and challenges on the supply side. Where TVET provision is underdeveloped, capacity development will be needed if the green agenda is to be embraced fully and effectively. Indeed, UNEVOC lists five types of greening,[46] which are challenging for even the most well-established, efficient and effective TVET providers to undertake simultaneously. Weak TVET infrastructure is likely to be a particular issue in countries with large informal economies where much training takes place the workplace in informal apprenticeships, and where the implementation of environmental regulations is challenging. Whatever the situation in a given country, greening TVET will require the development of teaching and learning materials appropriate for the green transition.

46 These are Greening the Campus; Greening the Curriculum and Training; Greening Research; Greening the Community and Workplace; Greening Institutional Culture

Another main supply-side challenge relates to the professional development of TVET teachers and trainers. To be fully effective, greening TVET requires not only technical adjustments to curricula but also changes in mindset, in approaches to teaching and learning and in associated assessment methodologies. Consequently, both initial teacher training and continuing professional development (CPD) need to be updated to make them fit for the green transition, which will be a challenge for many countries. In particular, CPD for TVET teachers is typically underdeveloped, as is pedagogical training for in-company trainers.

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2. Greening TVET: a self-assessment tool for institutions

The purpose of this tool is to enable TVET institutions to make a self-assessment of their current position with respect to the greening of TVET and to select their immediate priorities. It involves two steps:

- **Step One: involves assessing your current position across six main areas:** overall leadership and strategy; training, including teaching and learning methods and resources; methods of student assessment; teachers' and trainers' professional development; employers, trades unions and the community; and the campus. Here you will be thinking about your current position and where you'd like to be in one to three years' time.
- **Step Two: involves selecting a number of priority areas to examine in more depth.** Here you will be thinking more deeply about each priority and addressing the following questions: why you want to prioritize it; the strengths you already possess in the area and how to capitalize on those strengths; any possible obstacles that might stand in the way of achieving your goals and how you might tackle them; and any external support you think would be beneficial.

STEP ONE: ASSESSMENT – WHERE ARE WE NOW AND WHERE DO WE WANT TO BE?

KEY ELEMENTS	WHAT IS OUR CURRENT POSITION?	WHAT DO WE WANT TO BE IN 1-3 YEARS' TIME?
A. Overall strategy and leadership		
A.1 How far do our **plans and strategies** already reflect the need to green TVET?		
A.2 Do we have a **whole-institution approach** (covering all activities and all members of staff, teaching and non-teaching)?		
A.3 How far do our **senior managers** understand the green agenda?		
A.4 How far are **all our departments/faculties** implementing changes to make TVET greener?		
A.5 Do TVET **quality frameworks** adequately reflect the green transition?		

KEY ELEMENTS	WHAT IS OUR CURRENT POSITION?	WHAT DO WE WANT TO BE IN 1-3 YEARS' TIME?
A.6 Is **inclusion** taken into account in every aspect of provision? Where are the gaps?		
B. Training methods		
B.1 Are current **teaching and learning methods** the best way to develop competencies for the green transition, including greener mindsets and behaviours? Are there new pedagogies that could be used (e.g. learner-centred methods, project-based learning)?		
B.2 Can we do more to develop the **co-curriculum** (extra-curricular activities) with students in developing greener mindsets and behaviours? How can these support the mainstream curriculum?		
B.3 How suited are our **teaching and learning materials** to teaching greener curricula? Is effective and efficient use being made of digital learning tools?		
B.4 How **sustainable are the resources and equipment** used for teaching and training, and could digital tools improve sustainability?		
B.5 Could **work-based learning** be developed to offer learners more and better green experiences with employers? Conversely, could our WBL offer employers an opportunity to address their green challenges?		

KEY ELEMENTS	WHAT IS OUR CURRENT POSITION?	WHAT DO WE WANT TO BE IN 1-3 YEARS' TIME?
B.6 Can we develop **training packages tailored to local needs** to support greener training, both for our initial TVET students and for workers in need of short courses for up-skilling and reskilling in the green economy, especially senior technicians and supervisors?		
B.7 Can we better support our **students' transitions into further green programmes or employment** once they leave our school/college, for example by giving improved careers advice and guidance, working with higher education providers?		
C. Assessment methods		
C.1 Are current assessment methods appropriate for assessing **all skill needs** for greening, both technical and transversal? How do they need to be adapted?		
C.2 Could our assessment methods be made more **inclusive,** not gender-biased or exclusive of disadvantaged social groups?		
C.3 In our provision for adults, do assessment and certification practices support **upskilling and reskilling** effectively? Could we benefit from developments in micro-credentials or digital badges?		

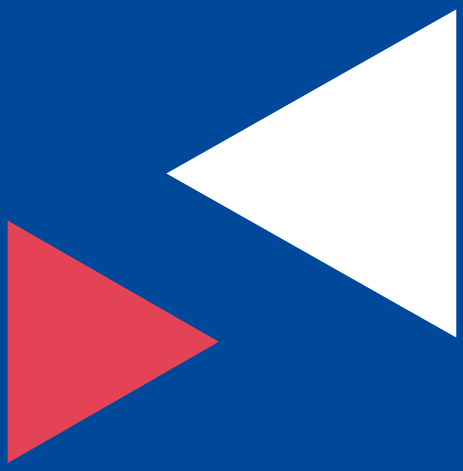
KEY ELEMENTS	WHAT IS OUR CURRENT POSITION?	WHAT DO WE WANT TO BE IN 1-3 YEARS' TIME?
D. Teachers and trainers		
D.1 How well equipped are teachers and in-company trainers with the **knowledge, skills and mindsets** to deliver greener curricula, training and assessment?		
D.2 In what ways do **professional development opportunities** (formal and informal) need to be developed to better support teachers and trainers in greening TVET?		
D.3 How can we **recognize and validate** teachers' and trainers' green learning and activities, for example by giving awards or organizing competitions?		
E. Employers, trade unions and the community		
E.1 To what extent are we engaging with **local employers** on the green agenda – not just those most immediately affected, for example in the energy sector, but all employers?		
E.2 Do we need to take measures to **boost engagement** with employers? What type of measures?		
E.3 Can we engage better with **trade unions** locally to get their support in greening TVET?		

KEY ELEMENTS	WHAT IS OUR CURRENT POSITION?	WHAT DO WE WANT TO BE IN 1-3 YEARS' TIME?
E.4 How can engagement with the **wider community** (community groups, mayors, local administration, civil society organizations, NGOs) and develop partnerships in the greening of TVET?		
F. Campus		
F.1 How far does our campus provide an **environment** that supports the development of greener mindsets and behaviours?		
F.2 Are we taking all necessary steps to **manage our campus** in greener ways**,** for example through greener procurement decisions, monitoring our ecological/carbon footprint, improved waste management and energy efficiency, water management, circular methods in ensuring inclusive and welcoming environments for all learners?		
F.3 How far are we **engaging and empowering our students** in greening our campus, for example by organizing green improvement projects, competitions and awards?		

STEP TWO: PRIORITIZATION – WHAT ARE OUR KEY GOALS FOR THE NEXT YEAR AND HOW ARE WE GOING TO ACHIEVE THEM?

Once you have completed the self-assessment, select one priority for each of the main topics A-F you have considered above. Then complete the boxes:

	A. OVERALL STRATEGY AND LEADERSHIP	B. TRAINING METHODS	C. ASSESSMENT METHODS	D. TEACHERS AND TRAINERS	E. EMPLOYERS, TRADE UNIONS AND THE COMMUNITY	F. CAMPUS
Our priorities and rationale						
Our priority for the next year is …						
We have selected this as a priority because …						
Our strengths						
What are our strengths in this area?						
How can we use and build on them to achieve our goals?						
Obstacles						
What obstacles do we face?						
How can we tackle them internally?						
Support						
Is there any external support (financial or technical) that would help us to achieve our goals?						



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