VET Toolbox

Skills for the Green Transformation
Toolkit

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Abbreviations

4IR	Fourth Industrial Revolution
ADA	Austrian Development Agency
AEE INTEC	Austrian Institute for Sustainable Technologies
AFD	Agence francaise de Development
AfDB	African Development Bank
APC – Colombia	Colombian Presidential Agency of International Cooperation
APUA	Association of Power Utilities in Africa
AVN	Nubian Vault Association/Association la Voûte Nubienne
BBCDC	Bethel Business and Community Development Centre
BMZ	German Federal Ministry of Economic Cooperation and Development
CAPBOI	Cap Business Océan Indien
CAPES	Brazilian Coordination for the Improvement of Higher Education Personnel
CEDEFOP	European Centre for the Development of Vocational Training
CERC	Clean Energy Research Centre
CIF	Climate Investment Funds
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
COP	Conference of the Parties
CPD	Continuous professional development
CRSES	Centre for Renewable and Sustainable Energy Studies of Stellenbosch University
CUFE	Central University of Finance and Economics
DAAD	German Academic Exchange Service
DCTEC	Brazilian Ministry of Foreign Affairs, Department of Science and Technology
DNP	National Planning Department
EF	Expertise France
EIA	Environmental Impact Assessment
EMSD	Emerging Markets Sustainability Dialogues
ENPCT	National Company for Science and Technology Parks
ESD	Education for Sustainable Development
EU	European Union
FAO	UN Food and Agriculture Organisation

Abbreviations

GDP	Gross domestic product
GIZ	Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (German Development Agency)
GRI	Governance and Regional Integration
HE	Higher education
HEI	Higher education institution
ICT	Information and communications technology
ILO	Intended Learning Outcome
IoT	Internet of Things
IRENA	International Renewable Energy Agency
ISEP	Instituts Supérieurs d'Enseignement Professionnel
ITAM	Instituto Tecnológico Autónomo de México
KPI	Key Performance Indicator
LEEAP	Local energy efficiency action plan
LLL	Lifelong learning
MEMD	Ministry of Energy and Mineral Development
MENA	Middle East and North Africa region
MHM	Menstrual hygiene management
MIER	Master's programme in renewable energies
MME	Ministry of Mines and Energy
MUB	Municipality of Ulaanbaatar
MWI	Jordanian Ministry of Water and Irrigation
NEI	Namibian Energy Institute
NGO	Non-governmental organisation
NUL	National University of Lesotho
NUST	National University of Science and Technology (Namibia)
OECD	Organisation for Economic Co-operation and Development
PIM	Public investment management
PREEP	Promotion of Renewable Energy and Energy Efficiency Programme
PROVED	Ministry of Primary, Secondary and Technical Education / Provinces Educationnelles
PSE Senegal	Plan sénégal émergent

Abbreviations

PtX	Power to X (green hydrogen products)
QA	Quality Assurance
RECP	Africa-EU-Renewable Energy Cooperation Programme
S3	Smart specialisation
S4	Smart specialisation + green transformation
S4GT	Skills for the green transformation
SACREEE	Southern African Development Community Centre for Renewable Energy and Energy Efficiency
SADC	Southern African Development Community
SANEDI	South African National Energy Development Institute
SDC	Swiss Development Cooperation
SDGs	Sustainable Development Goals
SENA	National Apprenticeship Service
SENAI	Brazilian National Service for Industrial Training and Serviço Nacional de Aprendizagem Industrial
SIDA	Swedish International Development Cooperation Agenc
STEM	Science, technology, engineering, mathematics
STI	Science, technology, and innovation
STL	Short-term lecturers
STS	Solar thermal systems
ToR	Terms of Reference
TVET	Technical vocational education and training
UN	United Nations
UNAM	Universidad Nacional Autónoma de México
UNDP	UN Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	UN Industrial Development Organization
VET	Vocational education and training
VTW	Technical and Vocational Education and Training for Jordanians and Syrian Refugees in the Water Sector

1.

How to use this Toolkit

The Skills for the green transformation Toolkit is an interactive PDF file that has a multi-layered structure, allowing the user to navigate the content based on the specific topics they'd like to read.

The Toolkit showcases good practice examples of approaches and process steps in achieving the green transformation. Throughout the Toolkit, you will find interactive PDF links to various sections, as well as links to additional resources for further insights embedded in the text.

The Toolkit has an introduction on key terms and consists of eight approaches linked to the Sustainable Development Goals (SDGs) with detailed project examples and helpful resources. These approaches describe what people are doing right now on green skills and how the approach contributes to achieving the green transformation ↻ (here is an example of linking to a definition!). The focus on green skills means that the main thread throughout the Toolkit is on education at various levels, from vocational education to higher education to continuing professional development. Each

project example consists of a concise summary of the project parameters, including the donor agency, budget, and relevant SDGs. Additionally, there are examples of how the approach has been applied, citing projects and providing insights into success factors and the innovative aspects of each.

The toolkit presents eight main approaches to green skills development

→ Quintuple Helix and living labs
→ Curriculum development
→ Women in green jobs
→ Youth empowerment
→ Aligning skills with regional needs
→ Adopting a circular economy
→ Greening the power sector
→ Sustainability
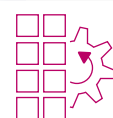
Each approach has a description and steps that can be followed

→ Definition of the approach
→ The purpose
→ The process
→ Examples of when and how to apply it

Project examples

→ Examples of real projects from VET Toolbox partners to share experiences
→ Links to project details
→ Links to further resources

The Toolkit is part of an integrated solution addressing skills for the green transformation within the EU VET Toolbox. There is also a digital dashboard of relevant projects from European implementing agencies with precise and flexible search functions. To convey key concepts and expedite the use of these tools, a colourful poster and four animated videos have been developed: separate explainer videos for the Dashboard and the Toolkit, an overview of skills needed for the green transformation and a summary video to communicate to a broader audience.

Links to the following information are disbursed throughout the text:

➲ Terminology and definitions

➲ Abbreviations

🔗 The "Skills for the green transformation" Dashboard

🔗 The "Skills for the green transformation" Poster

➲ Additional resources

2. Introduction

➲ 2.1 VET Toolbox

➲ 2.2 Skills for the green transformation Toolkit and Dashboard

➲ 2.3 Target group

2.1   VET Toolbox

The European Commission and the German Federal Ministry for Economic Cooperation and Development (BMZ) co-funded the VET Toolbox (www.vettoolbox.eu) from 2017 through 2022. The VET Toolbox was implemented by Enabel, the British Council, LuxDev, AFD, and GIZ and has supported part- ner countries in their efforts to improve their national TVET systems, make them more relevant for the labour market and increase the employability of the gradu- ates. The project focuses on sharing good practices, methods, and tools by:

→   Focusing on evidence-based VET and labour market analysis.
→   Encouraging private sector involve- ment in VET and labour market activ- ities.
→   Enhancing the inclusion of vulnerable groups in VET.

A second phase of the VET Toolbox through 2024, focuses on accompanying mainly European investments with skills development measures and local capacity building to create local jobs.

Partner countries are located in Sub-Saharan Africa, South and East Asia, and Latin America.
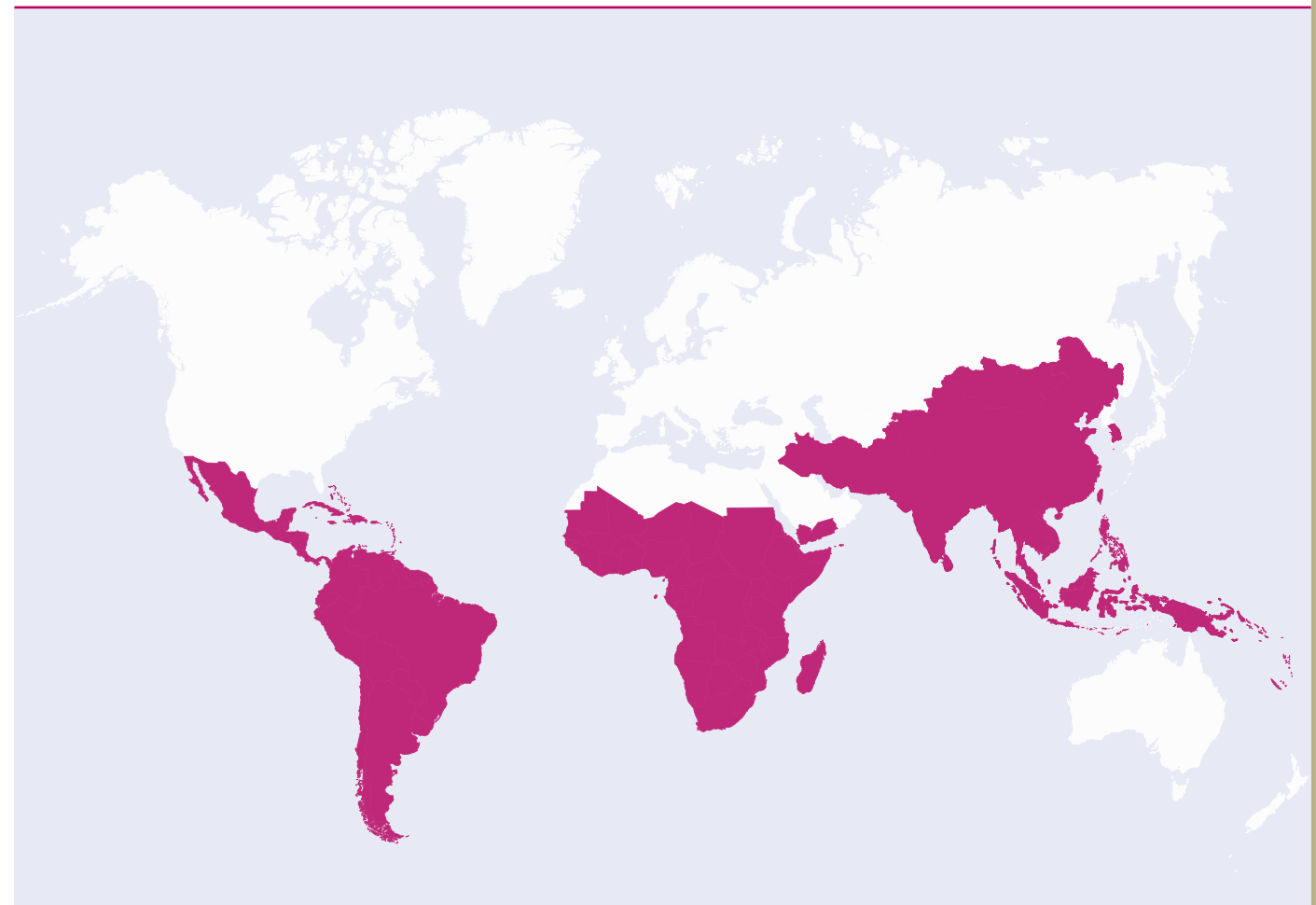
2.2 Skills for the green transformation Toolkit and Dashboard

To contribute to the EU VET Toolbox, the "Skills for the green transformation" measure has identified approaches, tools, processes, and initiatives that contribute to developing the skills needed to achieve the green transformation ⟳. The information is available through a dashboard and a toolkit.

Dashboard – a mapping of projects from VET toolbox partners that contribute to developing green skills and becoming more sustainable. Projects include a wide range of context-specific examples and initiatives on green transformation which stakeholders and interested parties can view by country, SDG, sectoral focus, and other filters.

Toolkit – an interactive PDF that showcases good practice examples of approaches and process steps in achieving green transformation. The Toolkit is divided into eight approaches, with multiple examples of projects in each. These approaches describe what is being done right now on green skills and how the approach contributes to achieving the "green transformation".

The Toolkit and Dashboard are designed to be utilised separately or together and provide a listing and overview of the different approaches, tools, processes, and initiatives that have been elaborated by GIZ, the VET Toolbox partners (AFD, Expertise France, the British Council, Enabel and LuxDev), and other actors who are leading in the field (e.g. United Nations Educational, Scientific and Cultural Organization (UNESCO), International Labour Organisation (ILO), Organisation for Economic Co-operation and Development (OECD)).

The Toolkit explores eight different green skills approaches and links these with ongoing projects and the UN Sustainable Development Goals:

1 Quintuple Helix and living labs
2 Curriculum development
3 Women in green jobs
4 Youth empowerment
5 Aligning skills with regional needs
6 Adopting a circular economy
7 Greening the power sector
8 Sustainability
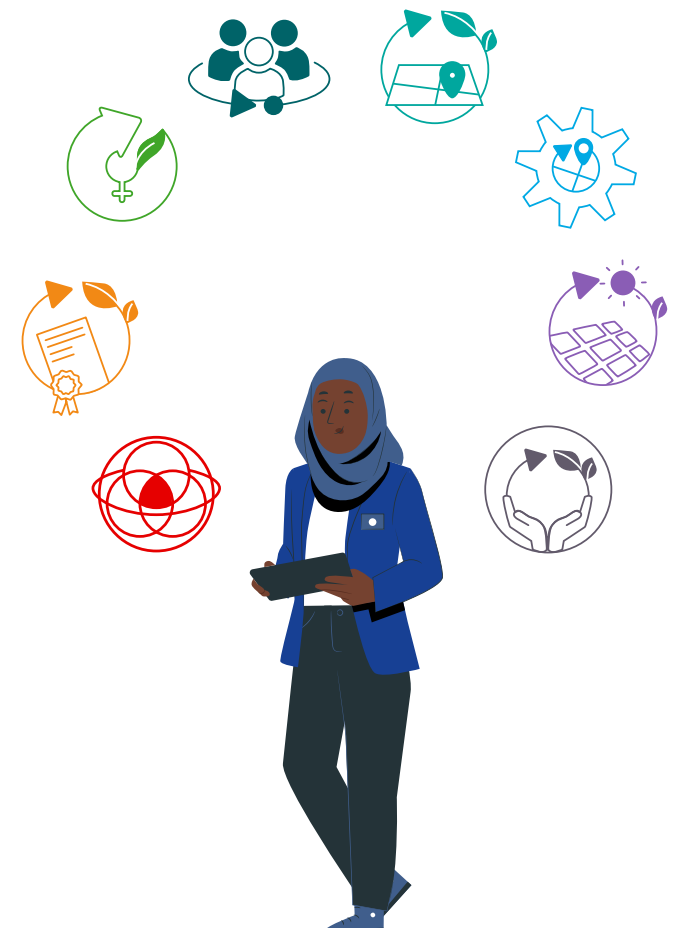
2.3 Target group

The toolbox aims to synthesise information on skills for the green transformation, with concrete examples for stakeholders at the policy, institutional, and individual level as listed below.

Macro level (policy)

Stakeholders: Ministries of (Vocational) Education, Labour, Higher Education and Science as well as international, intergovernmental organisations, and intermediary bodies (e.g. UNESCO, World Bank, ILO, African Union Commission (AUC), OECD, University Associations, Development Co-operation Actors)

Objectives
→ Provide input to national policies, strategies, and legal frameworks to integrate and mainstream the green transformation.
→ Encourage national and international governmental agencies to integrate green transformation assessment mapping and tools into (soft) governance frameworks, policies, regulations, institutional accreditation, quality assurance, and rankings.

→ Raise awareness as to infrastructure requirements (e.g. "Green Campuses" and equipment for TVET and higher education institutions) to support the green transformation.

Meso level (institution)

Stakeholders: VET institutions, universities, research institutions, and continuous professional education institutions

Objectives
→ Ensure knowledge transfer from partners by sharing know-how and good practices (e.g. guidelines, toolboxes and manuals, success stories, and lessons learned).
→ Encourage inclusion in institutional strategy and internal quality assurance.
→ Encourage agenda setting with policy bodies.
→ Raise awareness about infrastructure requirements to achieve the green transformation working with stakeholders at the policy level.

→ Encourage networking in VET and HE and co-creation of knowledge on the green transformation

Micro level (individual)

Stakeholders: Staff members in VET and Higher Education (e.g. VET Leadership, managers and trainers/teachers as well as academics and administrative staff of universities)

Objectives
→ Encourage academic, managerial, and administrative staff to learn about the green transformation
→ Promote the integration of green transformation topics into programmes, initiatives, or staff development programmes within their individual sphere of influence (e.g. curriculum review, pedagogy, collaboration with practice world, school or university events, research).

3. The "green transformation"

Numerous national and international sustainability and green development agendas and frameworks, as well as international and national recovery plans, are calling for a green transformation (e.g. UN Framework Convention on Climate Change ⮌[1], the Paris Agreement on Climate Change ⮌[2], the UN 2030 Agenda for Sustainable Development ⮌[3], including the Sustainable Development Goals. Considering the landscape of international development institutions, multilateral agencies, policy-makers, and governments working on greening the economy, it is not surprising that there are various – and often diverging – visions and strategies. Such positions reflect longstanding debates about how to reconcile economic development, environment, and sustainability. Each narrative embodies a different perspective on what needs to be transformed and how, and each reflects different contexts, agendas, and theories of change.

Integrating sustainable development and social equity

There seems to be common ground as to the necessity to shift away from focusing solely on economic growth towards com

bining progress across all dimensions of sustainable development and harnessing emerging potentials for development. This shift requires rethinking current paradigms in terms of a "just transition" towards a green transformation, i.e. greening the economy in a way that is fair and inclusive, creating decent work opportunities, and leaving no one behind. It involves maximising the social and economic opportunities of climate action while minimising and carefully managing any challenges, engaging in social dialogue with those concerned and respecting fundamental rights and labour principles. Figure 3.1 ⮌ illustrates the technical, generic, and transformative knowledge, skills, and competencies needed to contribute to a socially, economically, and environmentally just society.

Green skills include the technical, generic, and transformative knowledge, skills and competencies needed to contribute to a socially, economically, and environmentally just society.

Figure 3.1
Typology of skills for the green transformation

Technical skills

Skills for new green jobs
Emerging from new occupational profiles in the green transformation (e.g. solar technician or sustainable fashion designer)

Generic skills
Non-technical transversal (soft) skills for green jobs (e.g. collabaration and teamwork, leadership, problem-solving, strategic thinking, teamwork)

Skills for greening existing jobs
Up-skilling existing occupational profiles to match changing labour-market needs
(e.g. upskilling architects with energy efficiency knowledge or farmers with conservation agriculture skills)

Transformative green skills
Non-technical transversal (soft) skills enabling social and economic systems to deliver on a "Just Transition" (e.g. disruptive thinking, political activism, embracing diversity and inclusion, valuing indigenous knowledge)

Transversal skills

Source: Paeradigms 2022

Technical skills for green jobs

The transformation towards a green economy and society will result in wide-reaching changes in the labour market. This places new demands for technical skills:

1   **Existing occupations need to be greened,** thus requiring upskilling programmes for the existing workforce.
2   **New green occupations** (e.g. green hydrogen engineer or sustainable fashion designer) will require new study programmes, qualifications, and training frameworks at all educational levels.
3   **Some jobs will cease to exist,** which will necessitate support programmes and reskilling of workers affected.
4   Educational institutions supported by policies (e.g. policies to create the necessary framework conditions) and industry must **anticipate skill needs to proactively green existing programmes** and develop new programmes responding to and anticipating future needs of the labour market.

Disrupting underlying systems of unsustainability

Technical green skills alone do not guarantee the change of mindset necessary to confront the underlying structures of social inequalities that sustain climate vulnerability. Non-technical transversal (soft) skills – both generic and transformative – are key to enabling social and economic systems to change towards a "just transition". These skills are an important part of the overall picture and must also be addressed. Generic (or life) transversal skills include collaboration, teamwork, critical thinking, empathy, leadership, and resilience (see Figure 3.2 ⟳ for a more complete list) and have largely gained prominence. However, transformative skills (e.g. disruptive thinking, dealing with complexity, political agency, coalition building and collective action, embracing diversity and inclusion, valuing indigenous knowledge) are key ingredients of a larger framework of transforming mindsets and confronting the underlying structures of inequality that sustain climate vulnerability. To integrate these approaches, it is imperative to have a strong policy environment, culture of dialogue and political will among state and nonstate actors to break unsustainable systems.

Role of education

The role of education in shaping sustainable thinking ⟳[4] and contributing to the green transformation has become self-evident. ⟳[5] It requires a more holistic approach and radical re-configuration of vocational education and training, higher education, and continuous professional development at all levels (mega, macro, meso, and micro). Initiatives may include but are not limited to measures and activities such as policy schemes, institutional missions and strategies, teaching and learning (e.g. curricula, pedagogy, extracurricular activities, flexible learning pathways), research, innovation, collaborations, partnerships and communication as well as green campuses.

Figure 3.2
Examples of different typologies of green skills

CATEGORY	Technical skills		Transversal (soft) skills	
SKILLS TYPE	Skills for new green jobs	Skills for greening existing jobs	Generic green skills (or "green life skills")	Transformative green skills
DESCRIPTION	Technical skills emerging from new occupational profiles in the green transformation	Technical skills necessary for up-skilling existing occupational profiles to match changing labour-market needs	Non-technical transversal (soft) skills for green jobs	Non-technical transformative (soft) skills enabling social and economic systems to deliver on a "just transition"
EXAMPLES	New jobs → Eco-Tourism consultant → Green hydrogen engineer (or Electric car engineer) → Solar photovoltaic (PV) technician → Sustainable fashion designer → Urban farmer	Upskilling existing jobs → Electricians with solar energy skills → Construction experts (e.g. architects) with energy efficiency knowledge → Farmers with conservation agriculture skills → Waste recycling worker	→ Collaboration & teamwork → Communication → Creativity → Critical thinking → Decision making → Empathy → Leadership → Problem-solving → Resilience	→ Coalition building and collective action → Disruptive thinking → Embracing diversity and inclusion → Respecting diverse viewpoints → Solidarity → Valuing indigenous knowledge

Source: Paeradigms 2022

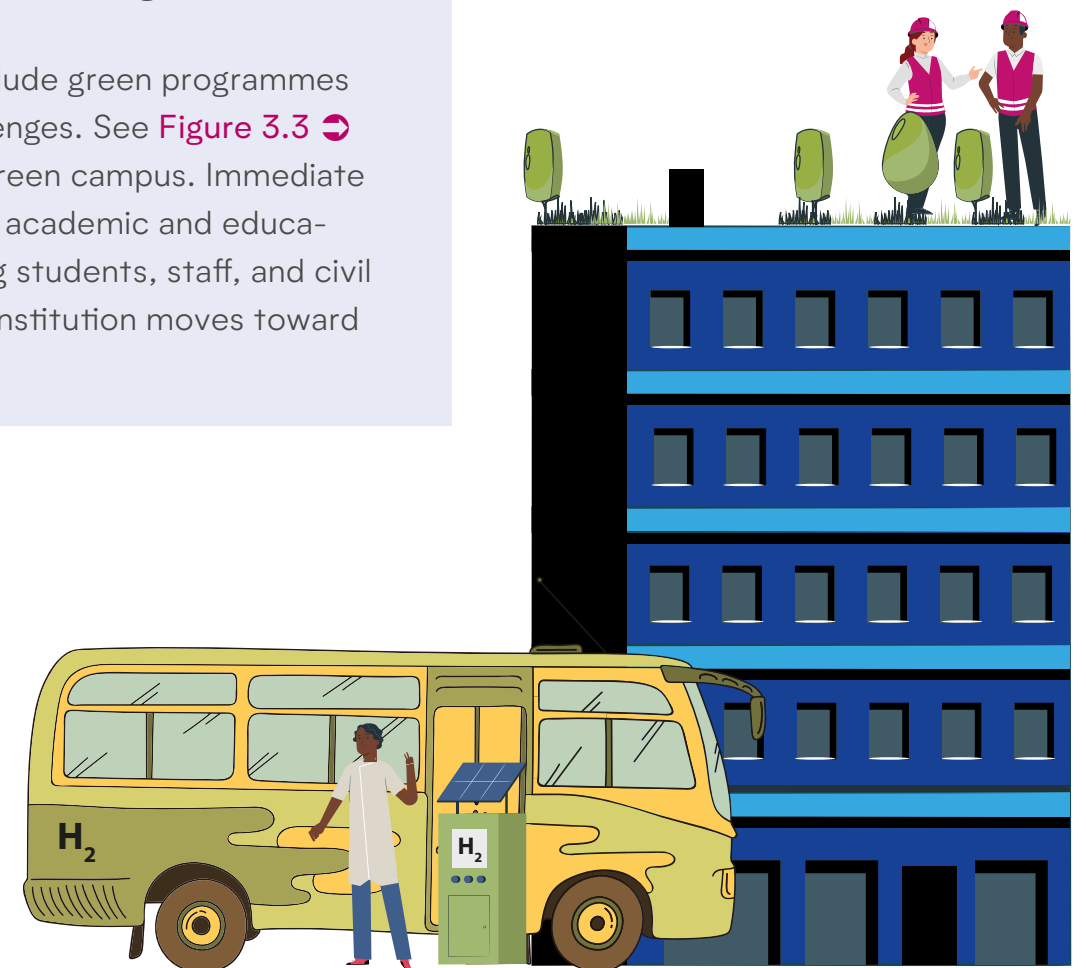**Green campuses**

Green TVET and university campuses have become an issue of worldwide interest as educational institutions play a key role in education for sustainable development (ESD). Green campuses are not just focused on sustainable infrastructure (e.g. energy and water efficient buildings, use of renewable energy, use of eco-friendly, locally sourced materials) but can demonstrate green transformation through integrating the topic into the curricula, linking green hands-on practices to teaching and learning, interaction with the community, and through research and innovation focused on sustainability to contribute to the green transition. In fact, educational institutions can function as living labs that develop and test techniques, technologies, design approaches, and governance systems to help create bottom-up templates of aligned action for larger urban areas. This can result in tangible solutions and enable behavioural changes.

A green campus goes far beyond greening its buildings to include green programmes and research as well as outreach and engaging in global challenges. See Figure 3.3 ⟳ for an illustration of the process involved in implementing a green campus. Immediate tasks are shown in the diagram as "projects" and refer to the academic and educational core tasks of teaching, learning, and research, involving students, staff, and civil society. Over time, initiatives are increasingly complex as an institution moves toward becoming a holistic green campus.

Figure 3.3
Process for achieving a green campus
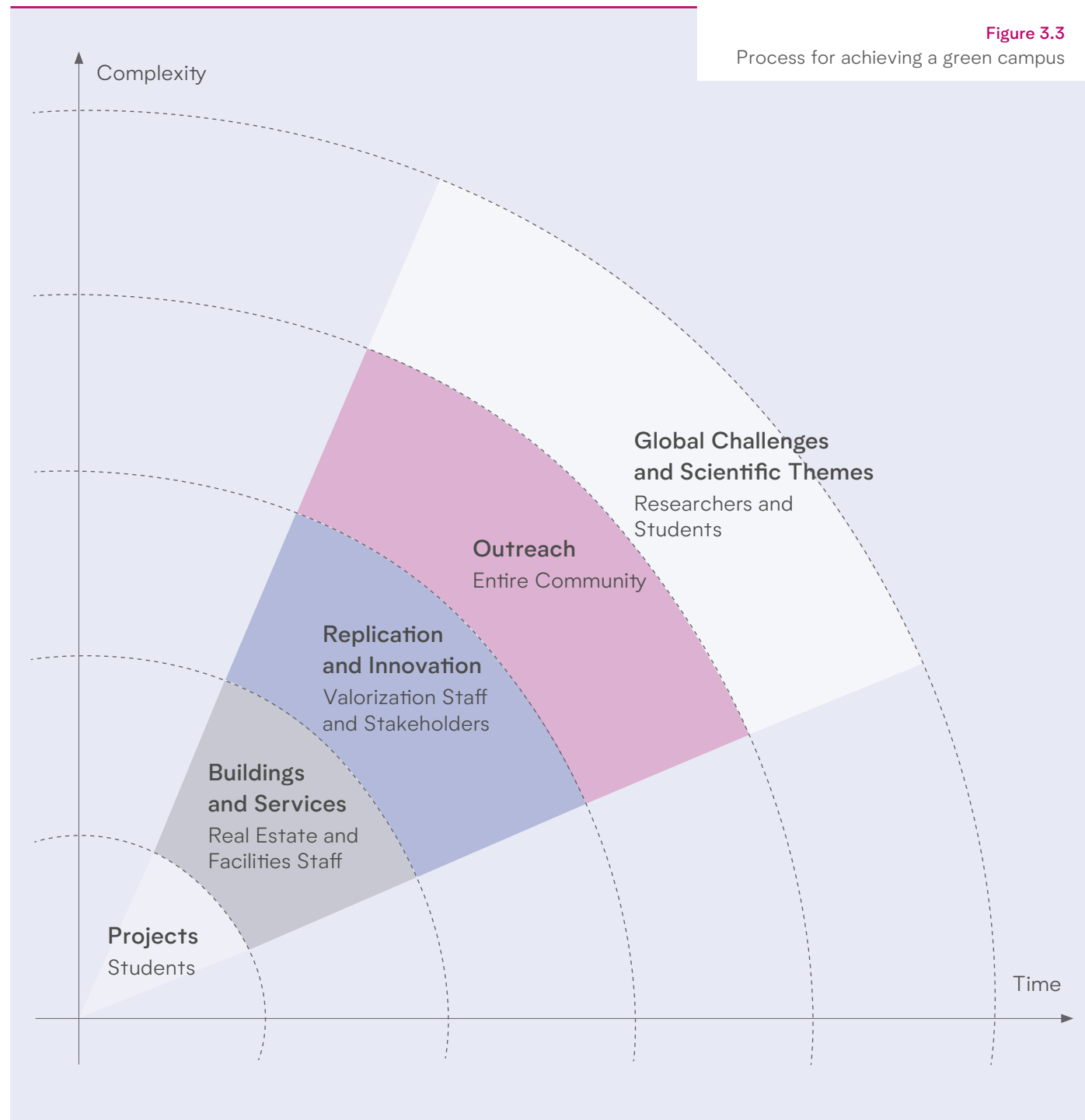
Source: International Sustainability Campus Network 2019 ↻ 6

4. Criteria for featured approaches
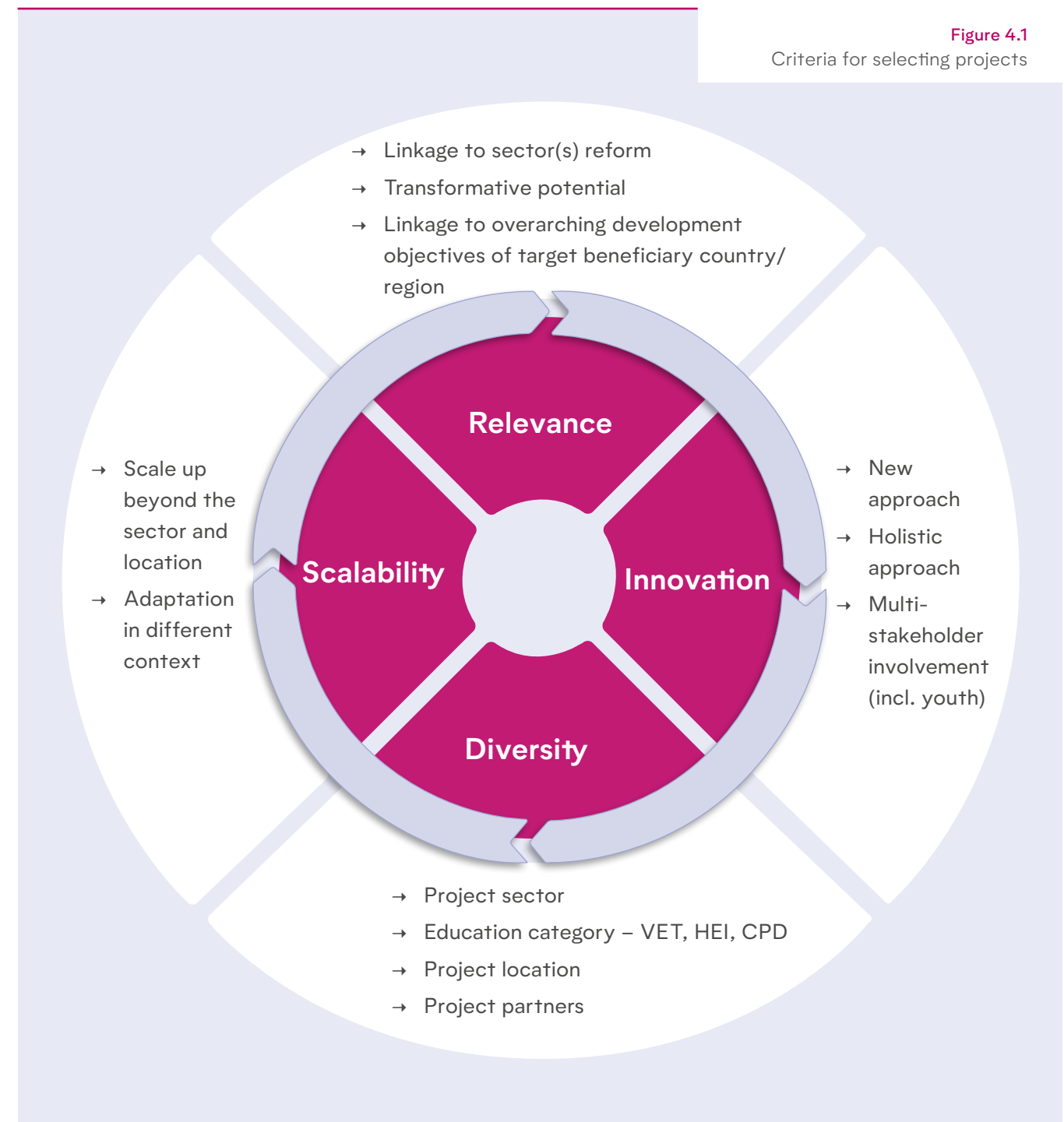
This Toolkit has been developed to include project examples from initiatives implemented by the VET Toolbox partners. The project examples form the basis on which the approaches in this section are designed, providing a narrative on how various interventions and featured examples can be applied to achieve green transformation. The projects were shortlisted from a list of over 80 through a process that was based on ensuring diversity, novelty, scalability, and relevance to the Toolkit's focus as shown in Figure 4.1.

The project examples featured in the Toolkit highlight;

→   The sector and topic they address
→   Regional focus and context
→   Target group
→   How the project was implemented
→   Success factors

Many projects that were not selected as examples for the Toolkit approaches are interesting and can be useful for anyone looking for examples of what has been happening on green skills. These are featured in the Dashboard 🔗 and can be searched by various parameters including sector, SDG, intervention level, country.

Figure 4.1
Criteria for selecting projects

→   Linkage to sector(s) reform
→   Transformative potential
→   Linkage to overarching development objectives of target beneficiary country/region

Relevance

→   New approach
→   Holistic approach
→   Multi-stakeholder involvement (incl. youth)

Scalability   **Innovation**

→   Scale up beyond the sector and location
→   Adaptation in different context

Diversity

→   Project sector
→   Education category – VET, HEI, CPD
→   Project location
→   Project partners

Source: Paeradigms 2022

5. Approaches

➲ 5.1 Quintuple Helix and living labs

➲ 5.2 Curriculum development

➲ 5.3 Women in green jobs

➲ 5.4 Youth empowerment

➲ 5.5 Aligning skills with regional needs

➲ 5.6 Adopting a circular economy

➲ 5.7 Greening the power sector

➲ 5.8 Sustainability

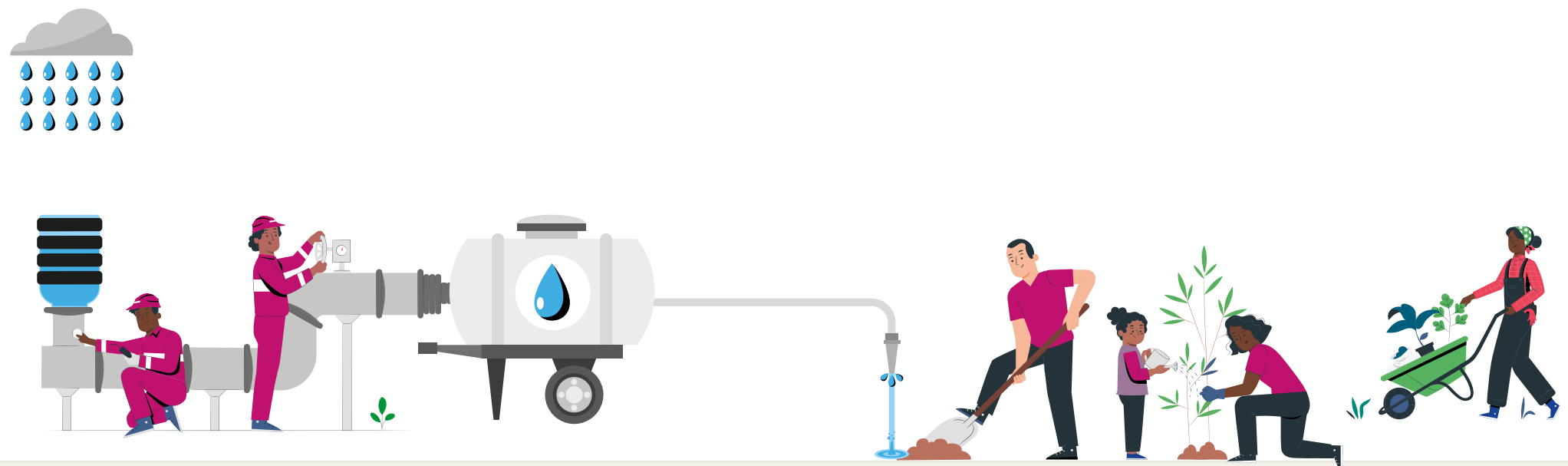The Skills for the green transformation Toolkit provides an overview of the different approaches, tools, processes, and initiatives that have been implemented by GIZ, the VET Toolbox partners (AFD, Expertise France, the British Council, Enabel and LuxDev), and other actors who are leading in the field (e.g. UNESCO, ILO, OECD). For a broader listing of project examples, consult the Skills for the green transformation Dashboard 🔗.

The Toolkit explores eight different green skills approaches and links these with ongoing projects and the UN Sustainable Development Goals:

1 Quintuple Helix and living labs
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5.1 Quintuple Helix and living labs

The green transformation is a complex undertaking that requires a wide range of "green" skills and innovative approaches. Education and research institutions have a central role in generating new knowledge and preparing youth and upskilling and re-skilling the current workforce to contribute towards a sustainable and inclusive future. They are also key actors in the innovation ecosystem, opening the innovation process to third parties.

5.1 Quintuple Helix and living labs

Tackling complex challenges through Quintuple Helix interactions

The Quintuple Helix Model of Innovation ⮌[7] is the evolution of the Triple Helix Model of Innovation ⮌[8] which describes a framework that brings together three spheres that traditionally operate separately (academic, industry, and government). It theorises that in a knowledge economy, boundaries between the different spheres are fading and interaction between them – around knowledge exchange and production – flows dynamically in all directions and creates an innovative environment. The Quadruple Helix adds the civil society sphere as an important player in the innovation process, which further contextualises knowledge production. ⮌[9] The Quintuple Helix adds the green dimension as the fifth sphere "environment" which runs through all the spheres and links them intrinsically towards the green transformation. ⮌[7]

The Quintuple Helix provides a useful framework for productive, collaborative relationships between knowledge genera-tors (universities and research institutes), industry, government, and civil society, leading to strong multilateral relationships between the different spheres. Working together, the five spheres become a new motor of innovation, intertwining common interests, values, strategies, investments, and narratives. Thus, in the process of transforming their own roles towards a green transformation, the four spheres of academia, industry, governmental agencies, and civil society organisations develop a connective tissue embodied by the fifth or environmental sphere. Together, these five spheres make up the Quintuple Helix (see Figure 5.1 ⮌). The embeddedness of innovation in the respective ecosystems is crucial to this process. Pressure on academic institutions to lead this change has impacted the mission of universities and contributed to the emergence of the so-called "third mission", blurring the boundaries of the traditional basic roles of university, industry, and government (e.g. universities increasingly take part in commercial activity through patenting and licensing, moving beyond the production of basic and applied research). The interactive Quintuple Helix also leads to the emergence of intermediaries and hybridisation across overlapping spheres while each entity retains a strong primacy in its original field of expertise: the university remains the main source of knowledge production, whilst industry is the primary vehicle of commercialisation, and the government retains its regulatory role.

It is important to acknowledge that in middle- and low-income countries, there can be fewer interactions between the actors of the Quintuple Helix due to barriers or less overlap between the spheres, and thus fewer consensus spaces. These barriers prevent knowledge flow and collaboration and include conflicting priorities, relationship conflicts, different institutional cultures, diverging technology levels, different power positions, and rigid institutions.

5.1   Quintuple Helix and living labs ▶ 5.1.1 Process

5.1.1 Process

Living labs: overcoming barriers to co-creation

In contexts where the Quintuple Helix of Innovation is less developed, living labs have gained popularity in enhancing innovation in various practical areas, including – but not limited to – sustainable energy, housing, healthcare, information and communication technology (ICT), and transport. Living labs can be seen as temporary network organisations in which Quintuple Helix actors and user groups are brought together in a real-life environment to work on a specific challenge or product. They are user-centred, open innovation ecosystems based on a systematic co-creation approach integrating research and innovation processes in real-life communities and settings. In practice, living labs place the citizen at the centre of innovation and have thus shown the ability to better mould the solutions to the specific needs and aspirations of local contexts and cultures. Figure 5.2 ⟳ shows the living labs approach in the context of development cooperation.

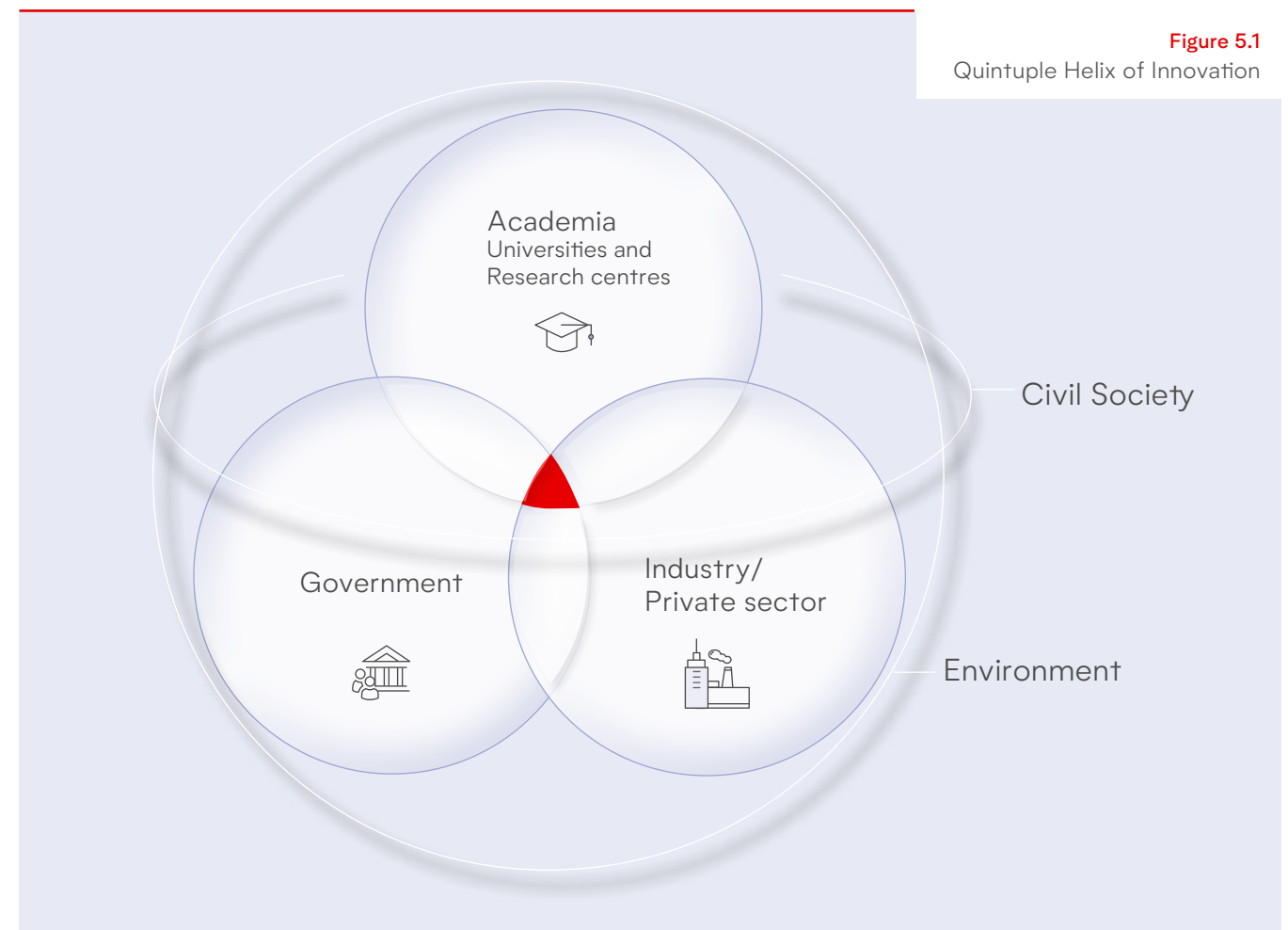**Figure 5.1**
Quintuple Helix of Innovation

Source: Adapted from Carayannis EG, et all (2012) ⟳ [7]

5.1   Quintuple Helix and living labs ▶ 5.1.1 Process
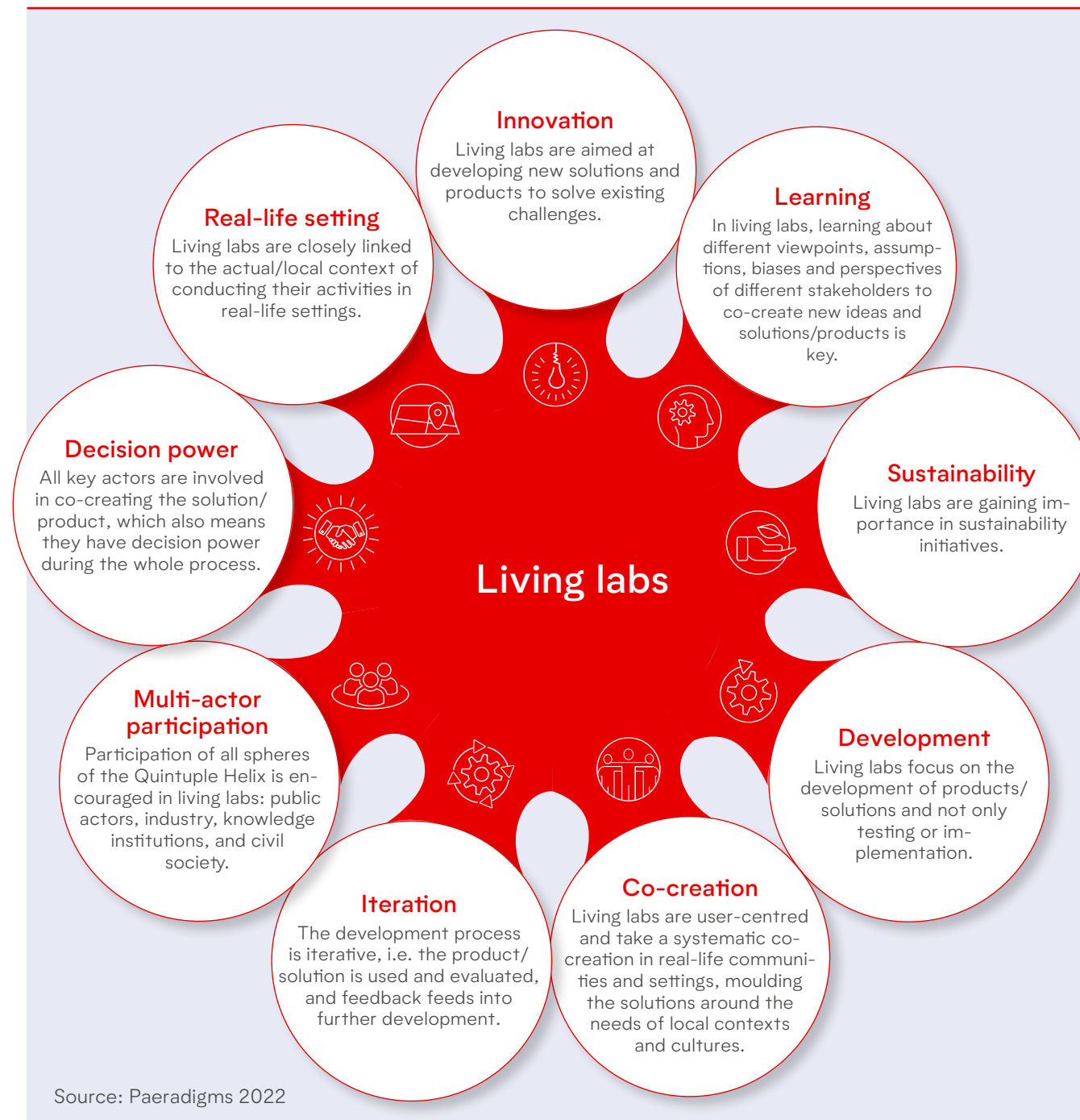

Source: Paeradigms 2022

Figure 5.2
Living labs can be an optimal approach to developing and validating solutions to societal challenges.

Why use a living lab approach in development cooperation?

When approaching complex challenges in an evolving real-life context, it becomes very hard for a single actor to find the right solution. By collaborating and co-creating the solutions with end-users and other actors involved, the complexity and uncertainty are reduced, and the chance of finding a sustainable solution is increased. Research shows that living labs with network structures based on extensive knowledge and information exchange and collaboration between multiple actors lead to radical innovations, while living labs with centralised network structures tend to achieve more incremental innovations ↩ 10.

5.1   Quintuple Helix and living labs ▶ 5.1.2 Forming university-industry partnerships

QUINTUPLE HELIX AND LIVING LABS

Forming university-industry partnerships

| NoPa | Innovation for Sustainable Development

OVERVIEW

	→ Skills for greening existing jobs (technical skills, up-skilling, reskilling) → Generic skills (transversal skills)
	→ Higher education
	Macro, Meso, Micro
	→ Educational institutions → Industry/Private sector institutions → Civil society organisations
	Phase I: 2010 – 2014 Phase II: 2014 – 2018 Phase III: 2022 – 2023 (pilot for continuation)
	EUR 7 million
	Brazil, Germany
	Climate, energy, water and sanitation
	4, 6, **7**, **9**, 13, 15, **17**
	BMZ (DE)

	GIZ (DE) DAAD (DE) CAPES – Brazilian Coordination for the Improvement of Higher Education Personnel, Ministry of Education
	Brazilian Ministry of Foreign Affairs, Department of Science and Technology (DCTEC)
	Brazil only achieved 69th place out of 127 countries in the 2017 Global Innovation Index, despite boasting excellent research institutions and universities. The reasons behind this include marginal international networking and a limited transfer of knowledge into practice. Promoting research and ensuring its practical relevance through cooperation with policymakers and the private sector offers significant potential for innovation. Such cooperation will enable Brazil to achieve its self-imposed climate protection goals more quickly. This project focused on three main areas: → Demand-oriented calls for research proposals on sustainable development. → New partnerships between researchers and the future users of research results. → Implementation of German-Brazilian research projects and support to integrate results into practice.

5.1 Quintuple Helix and living labs ▶ 5.1.2 Forming university-industry partnerships

🔗 | NoPa | Innovation for Sustainable Development

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

Universities are key actors in driving innovation and supporting green transformation in close coopera-tion with the private sector, policymakers, and civil society. However, for universities, collaboration with other sectors does not always come naturally. NoPa has supported academic institutions to create the "connective tissue" between the actors of the Quin-tuple Helix and build partnerships for innovation. The project's innovative aspects are:

→ Strong support for **partnerships for sustainable development between universities and the pri-vate sector.**

→ Development of "The NoPa Toolbox", which provides insights into the methodology, process, key success factors, barriers and learning from taking a Quintuple Helix approach in research and innovations. The Toolbox provides excellent knowhow.

→ Focus on the **sustainability of achieved out-comes** by creating a multi-stakeholder platform to institutionalise relationships formed during the project.

Success factors and learnings

→ Develop an in-depth understanding of existing research capacities and funding channels in the country.

→ Guarantee that r**esearch projects address con-crete needs.**

→ Engage in proactive matchmaking between re-searchers and the private sector.

→ Facilitate **productive dialogue between aca-demia, the private sector, policymakers, and civil society** to overcome different agendas, frames of reference, and logics.

→ Ensure flexibility throughout the project to **adapt to changing (framework) conditions**. Consider using a modular approach.

→ **Understand the culturally diverse backgrounds** of collaborators (e.g. in Brazil, relationships are important).

→ Ensure a **clear definition of roles** and respon-sibilities.

→ Take a **systemic approach and let research directly feed into ongoing policy reform pro-jects** (e.g. NoPa research results fed into a policy reform project in Brazil also implemented by GIZ).
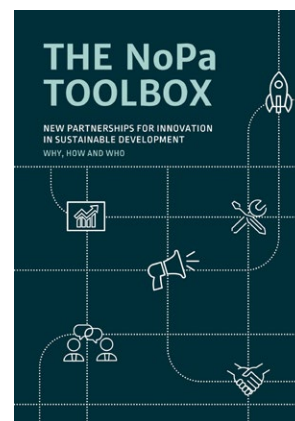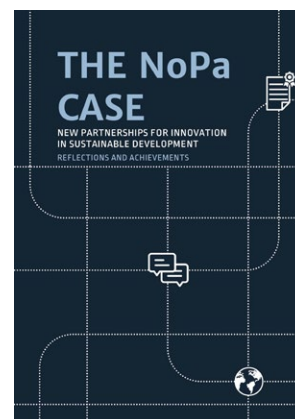
5.1 Quintuple Helix and living labs ▶ 5.1.2 Forming university-industry partnerships

🔗 | NoPa | Innovation for Sustainable Development

Additional information and resources

NoPa Toolbox 🔗
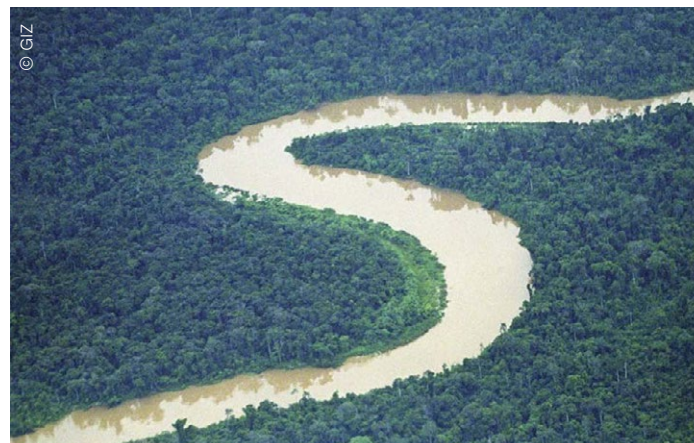

NoPa Final Report 🔗

NoPa Case 🔗

5.1   Quintuple Helix and living labs ▶ 5.1.2 Forming university-industry partnerships

🔗 | NoPa | Innovation for Sustainable Development

The NoPa Toolbox provides an excellent methodology for university-private sector partnerships 🔗

Installation of solar water heaters for industrial application

The Amazon Forest, where Ecorespira team conducted a series of studies to understand the soil respiration in preserved and denuded rainforest areas

5.1 Quintuple Helix and living labs ▶ 5.1.3 Co-creating solutions in a "living forest lab"

QUINTUPLE HELIX AND LIVING LABS

Co-creating solutions in a "living forest lab"

| Varuna | Action together for biodiversity in the Indian Ocean

OVERVIEW		
	→ Skills for greening existing jobs (technical skills) → Generic skills (transversal skills) → Transformative skills (transversal skills)	
	→ Higher education → Continuous professional development	
	Macro, Meso, Micro	
	→ Governments → Educational institutions → Industry/Private sector institutions → Civil society organisations	
	2022 – 2025[1]	
	EUR 10 million	
	Comoros, France, Madagascar, Mauritius, Seychelles	
	Biodiversity, climate, sustainable development	
	3, 4, 9, 13, **14**, **15**, 17	

	AFD (FR)
	Expertise France
	Partner institutions from academia, the private sector and civil society: → L'Association des Réserves Naturelles de France (RNF) → L'Union des Chambres de Commerce et d'Industrie de l'Océan Indien (Cap Business Océan Indien – CAPBOI) → L'Université de Maurice → L'Université des Mascareignes → Le Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) → L'Institut de Recherche pour le Développement (IRD), en lien avec le Muséum National d'Histoire Naturelle (MNHN), → L'Association "Les Naturalistes de Mayotte"

1 The project is still in its inception phase, which is why there is still limited information. So please check out the project website.

5.1 Quintuple Helix and living labs ▶ 5.1.3 Co-creating solutions in a "living forest lab"

| Varuna | Action together for biodiversity in the Indian Ocean

OVERVIEW

The Southwest Indian Ocean is a biodiversity hotspot. The diversity of flora and fauna shape the identity of the countries in the region, yet the erosion of the exceptional endemic biodiversity jeopardises the ecosystem services that benefit the inhabitants of the region. Private sector growth plans still take little account of these ecosystem services, and the level of preservation varies greatly from one country to another and between terrestrial areas and marine areas. This project contributes to preserving the hotspot's biodiversity by raising awareness, building capacity, and pooling the efforts of all the public, private, and civil society stakeholders through:

This project focused on three main areas:
→ Structuring networks of regional stakeholders to encourage coordinated efforts to preserve biodiversity.
→ Supporting ecological transition and the mainstreaming of biodiversity among economic actors.
→ Promoting the contribution of research to science and society dialogue on biodiversity.

5.1 Quintuple Helix and living labs ▶ 5.1.3 Co-creating solutions in a "living forest lab"

🔗 | Varuna | Action together for biodiversity in the Indian Ocean

Relevance and innovative approach

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Varuna's "living forest lab" is an innovative platform that fosters exchange among key stakeholders, centred around those whose livelihood depends on protected areas and natural forest resources. This experimental approach strives for collaborative management of these biodiverse spaces, with research institutions playing a key role. Elements include:

→ Structured **networks of regional stakeholders to coordinate efforts** for the preservation of biodiversity with research programmes dedicated to contributing to the science-to-society dialogue on biodiversity.

→ Experiments with **collaborative management** of "living forest labs", which are spaces co-managed by those whose livelihood comes from the forest and those who are working to preserve the forest.

→ Developing **"transformative skills"** ↻ such as empathy, systems thinking, and environmental stewardship are important aspects of capacity development. The project uses game-based approaches to learning to get participants involved in a practical and meaningful way (e.g., playing theatre).

→ **Engaging with the private sector** to encourage and support the transformation towards a green economy, including training and coaching on measuring companies' impact on biodiversity and addressing issues concerning natural capital.

5.1   Quintuple Helix and living labs ▶ 5.1.3 Co-creating solutions in a "living forest lab"

🔗 | Varuna | Action together for biodiversity in the Indian Ocean

Success factors and learnings

→ Acknowledge the potential role of **universities as major drivers of innovation** within the quintuple helix approach

→ In contexts where collaboration between academia, the private sector, policymakers, and civil society is not yet well established, **living labs strengthen collaboration and support multi-stakeholder approaches.**

→ Be aware that living labs require:

  → An adequate user-group selection and involvement, with rich interaction and absorption.

  → A balanced involvement of all relevant actors.

→ Sufficient (early) attention and commitment to manage and mediate between the different cultures, values, and agendas of diverse actors (multi-disciplinary and multi-sector). **Develop capacity including transversal green skills** (e.g., valuing traditional and indigenous knowledge, political agency, collective action, empathy, systems thinking, solidarity), which are important enablers for the "just transition" ↻.

→ Make use of coaching where appropriate.

→ Be aware that living labs do not compete with other methods but rather reinforce them.

→ **Invest in external communication** to raise awareness and (ensure information flow between participating organisations of the project.

5.1　　Quintuple Helix and living labs ▶ 5.1.3 Co-creating solutions in a "living forest lab"

🔗 | Varuna | Action together for biodiversity in the Indian Ocean

Madagascar companion modelling workshop

5.1   Quintuple Helix and living labs ▶ 5.1.4 Piloting energy-efficient buildings for skills development

QUINTUPLE HELIX AND LIVING LABS

Piloting energy-efficient buildings for skills development

| EEP | Energy Efficient Building Refurbishment in Mongolia

OVERVIEW

	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Continuous professional development
	Macro, Meso, Micro
	→ Educational institutions
	→ Industry/Private sector institutions
	→ Civil society organisations
	1998 – 2021
	EUR 7.5 million
	Mongolia
	Climate, Energy, Water & Sanitation
	4, **7**, **9**, 13, 15, **17**
	→ BMZ (DE)
	→ SDC (CH)
	GIZ (DE)
	Ministry of Energy, Municipality of Ulaanbaatar (MUB)

Mongolia is characterised by extreme climatic conditions with short summers and long, extremely cold winters. Due to outdated coal-based heating facilities and poor building insulation, the capital Ulaanbaatar is covered in smog during the cold season.

This project aims to improve energy efficiency in the building sector in Ulaanbaatar and contribute to the economically and ecologically sustainable use of energy in Mongolia. Activities include:

→ Supporting the introduction of transparent, effective, and gender-sensitive public investment management (PIM) in Ulaanbaatar using the case of energy efficiency in buildings.
→ Supporting the adoption of a local Energy Efficiency Action Plan (LEEAP) for the construction sector.
→ Improvement of the private sector's capacity in energy efficiency.
→ Introduction of energy efficiency technologies in ger neighbourhoods.

The technical and managerial staff of the municipality of Ulaanbaatar are supported with skills development activities on energy efficiency in public buildings. Schools and kindergartens will be renovated and equipped with energy-efficient technologies. Citizens, especially parents and teachers, are trained to participate in public procurement and monitoring of public investment projects.

5.1   Quintuple Helix and living labs ▶ 5.1.4 Piloting energy-efficient buildings for skills development

🔗 | EEP | Energy Efficient Building Refurbishment in Mongolia

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

The EEP project has used a living labs approach, creating a network with an emphasis on involving key stakeholders, including user groups (e.g. teachers and parents), actively early in the process. The strong focus on green skills capacity development and using pilot buildings to create a real-life learning environment has fostered co-creation.

→ **Upskilling with green technical skills** (capacity building) at all levels, from the commissioning parties, construction companies, financial institutions, and policymakers to the energy auditors and the general public, was an important element.

→ Key actors were able to **apply new skills immediately** across the entire supply chain of the energy efficiency housing scheme and understand challenges and best practices (e.g. over 20 construction companies were trained in drawing energy efficient designs using the following new criteria such as alternative heating and cooking solutions instead of a traditional stove, regulated air temperature and ventilation, thermal insulation, clean sanitation facilities, and an ex-post verification by an independent energy auditor).

→ **Policymakers, regulators, low-income households, financial institutions, and construction companies** were brought together for the first time.

→ **Innovative financing was leveraged** by tapping into the strong interest of financial institutions to explore new financial products that could tackle new markets, progress on sustainable finance commitments, and eventually access alternative, lower-cost green funds from outside of Mongolia.

5.1 Quintuple Helix and living labs ▶ 5.1.4 Piloting energy-efficient buildings for skills development

🔗 | EEP | Energy Efficient Building Refurbishment in Mongolia

Success factors and learnings

→ **Developing real-life pilot projects** through the living lab approach can be an interim approach in contexts where the collaboration across different sectors is not yet well established, (here, the refurbished buildings). Prototypes serve several goals:

→ Bringing key stakeholders together for dialogue and co-creation.

→ Developing a multi-perspective approach, which considers the different priorities and needs of stakeholders.

→ Immediate application of skills.

→ Immediate "on-site" validation of solutions in the lab environment.

→ Exposure of the user group to experience the innovation

→ A "real" product that can be easily communicated.

→ **Including the financing of construction works in the project concept and budget from the initial phase.**

→ **Joining forces across development actors** for a project can be highly beneficial.

→ **Using eLearning** introduced flexibility to the time and location of the training, increasing access for trainees from other regions.

→ Working with real life projects can **provide highly effective communication** to raise awareness.

5.1   Quintuple Helix and living labs ▶ 5.1.4 Piloting energy-efficient buildings for skills development

🔗 | EEP | Energy Efficient Building Refurbishment in Mongolia

Additional information and resources

GIZ project webpage: 🔗

EEP project publication 🔗
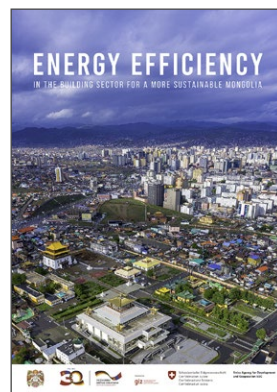
Presentation 🔗

5.1 Quintuple Helix and living labs ▶ 5.1.4 Piloting energy-efficient buildings for skills development

🔗 | EEP | Energy Efficient Building Refurbishment in Mongolia

First officially certified green building – bought by a family through a GIZ-supported financing scheme promoting energy-efficient housing in the ger districts of Ulaanbaatar

Renovating school and kindergarten buildings has set a benchmark for the rehabilitation of public buildings and allowed actors to use newly acquired "green skills"

5.2 Curriculum development

Green transformation brings about economic restructuring and shifts in employment. New jobs and new job tasks require different capacities. A key factor in this process is equipping the current and future workforce with relevant green skills required by the labour market by ensuring curricula are developed with green transformation in mind. Anticipating skill needs, integrating the key components of green transformation, and multistakeholder involvement are critical to achieving green transformation.

5.2   Curriculum development

The ILO states that "the green transition can generate millions of jobs, but these are conditional on the availability of relevant skills and training,"➲ [11] highlighting the importance of curriculum development in green transformation. Educational institutions should continuously review their curricula and programmes to anticipate skill needs, thus ensuring that their graduates keep up with the green skills demanded by an evolving labour market and society. This entails technical skills for greening existing jobs (e.g. energy efficiency knowledge for architects and builders) as well as the need to develop programmes for new greens jobs (e.g. solar photovoltaic (PV) technician or sustainable fashion designer) and important transversal soft skills such as collaboration, teamwork, problem-solving, systems thinking and embracing diversity and inclusion. Moreover, integrating environmental sustainability concepts ensures that students understand urgent sustainability issues and develop environmental stewardship and motivation to develop concrete solutions ➲ [12]. These Education for Sustainable Development

(ESD) concepts should also reorient curriculum development for teacher training at all levels to support teachers, professors, and academic staff to network, develop, and research sound pedagogical practice that addresses SDG strategies. ➲ [13]

Anticipating green skill needs is essential for educational institutions to meet the demands of staffing a green economy. Green skills development measures should anticipate industry needs and support national strategies, programmes, and policies. This requires the identification of future green occupations (new green job profiles) in close cooperation with industry and extracting data from employment databases to provide national overviews of the number of jobs in different types of green occupations. ➲ [14], ➲ [15] Determining employment trends and skill needs should always consider gender – in fact, IRENA ➲ [16] concluded that sector-wide, renewable energies show a better gender balance (32 % women) than the fossil fuels sector (22 %). It appears that new green jobs

generally tend to attract a higher number of women as gender stereotypes are less consolidated than in traditional professions ➲ [17].

Implementing national greening strategies requires field managers with technical skills and policy expertise that are in short supply. To achieve successful outcomes – that the aims of the national strategies are achieved – there is an enormous need for coordination across different levels of government with different stakeholders, including the private sector, education, and training institutes at all levels, including civil society organisations, such as student associations and trade unions ➲ [18]. This Quintuple Helix ➲ collaborative approach applies to all aspects of curriculum development, from jointly assessing skill needs, establishing priorities, and co-creating content modules that can stand alone or be inserted into existing courses to sharing in delivering the curriculum through developing industry experts as trainers ➲ [13] in aspects of technical programmes. Across the whole curriculum, transversal soft skills

5.2   Curriculum development ▶ 5.2.1 Process

the whole curriculum, transversal soft skills must be integrated. Outcomes need to be monitored so that curriculum can continuously be updated to improve employability and environmental impact.

The mechanism of developing content modules is worth special attention for several reasons. The focus on content rather than the level of study, to some extent, diminishes the stigma often associated with VET education (credentialism) and gives access to students across vocation education and training, higher education, and continuous professional development. This breaking down of barriers benefits both the learners and the instructors. It facilitates collaboration between academia and industry by potentially training industry experts to deliver the module within a course. And it increases the ownership of new content (e.g. sustainable finance) by instructors who integrate it into their own classes, thus becoming ambassadors for new curricula and ensuring that the practice continues (sustainability). This ongoing development of the programmes with a feedback loop allows adaptation of the curriculum ➲ [18].

5.2.1 Process

Designing curriculum for the green transformation

Successfully identifying and anticipating the skills required for greening the economy and green jobs often demands that educational institutions adapt their approach to curriculum development and reform to the new frame of reference as shown in Figure 5.3. They must closely cooperate with multiple stakeholders, including industry, civil society organisations, and governments and allow for continuous improvement with a strong focus on integrating future labour market and sustainable development needs. However, it is not enough to create new curricula that address green transformation. Existing curricula must be adapted by integrating the key components of a "just transition" ➲: sustainable finance, soft skills, and transwformative skills, leading to a system-wide shift in mindset and skillset. Moreover, it is important to take into consideration the up- and reskilling of the existing workforce through continuous professional development and training.

5.2   Curriculum development ▶ 5.2.1 Process

→ What technical and transversal green skills are needed?

→ What type and how many green jobs are needed?

→ Which new green jobs require new training programmes?

→ Which existing jobs need to be "greened"?

→ What training is required to meet these needs?

Figure 5.3
Curriculum development process for green skills

→ Revising and updating regularly to adjust for innovation in teaching and in green technology

→ Evaluating students, courses, and instructors

→ Measuring graduate employability

→ Cooperating with industry and government to determine impact

Reviewing and updating

Anticipating green skill needs

Monitoring, evaluation, learning

Developing

Delivering green skills

"Just transition" concepts embedded in green skills training

Education–industry–government collaboration throughout

→ Designing with the principles of Education for Sustainable Development

→ Aligning with national green policies

→ Cooperating with employers

→ Integrating transversal skills (generic skills and transformative skills)

→ Training trainers and professors on innovative pedagogy

→ Including diverse inputs from external experts
   → Field visits
   → Guest speakers

Source: Paeradigms 2022

5.2 Curriculum development ▶ 5.2.2 Anticipating skill needs

CURRICULUM DEVELOPMENT

Anticipating skill needs

H2Brasil | Promoting Green Hydrogen in Brazil

OVERVIEW	
	→ Skills for greening existing jobs (technical skills, upskilling, reskilling) → Generic skills (transversal skills)
	→ Vocational education and training → Higher education
	Macro, Meso, Micro
	Educational institutions
	2021–2023
	EUR 39 million
	Brazil
	Energy
	4, 7, 9, 11, 13
	BMZ (DE)
	GIZ (DE)
	Ministry of Mines and Energy (MME)

Brazil's low production costs, in combination with its geological and climatic conditions, make it a promising country for producing green hydrogen.

This project aims to improve legal, institutional, and technological conditions for the development of a green hydrogen market by supporting universities and other educational institutions to include green hydrogen in their curricula. It supports the establishment of green hydrogen laboratories with learning infrastructure for vocational training in green hydrogen technologies. The project specifically focuses on gender inclusion, aiming to reach a target of at least 20% women enrolment.

5.2   Curriculum development ▶ 5.2.2 Anticipating skill needs

🔗 | H2Brasil | Promoting Green Hydrogen in Brazil

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ Promoting universities and vocational institutions to **include green hydrogen in the curricula.**

→ Setting up a **skills committee on green hydrogen** with Brazilian National Service for Industrial Training and Serviço Nacional de Aprendizagem Industrial, SENAI.

→ **Identifying new jobs and changes in job profiles** emerging along the entire value chain of the developing market for green hydrogen.

→ Analysing and **reflecting on respective training needs** at higher education, VET, and further education levels.

Success factors and learnings

→ Close **consultation between industry, university, and international experts.**

→ **Identify changes in occupations in the sector**.

→ **Identify training needs** at higher education, VET and further education level.

→ Acknowledge that **green skills development** must not only follow market developments but can also be **a driver for green transformation.**

→ **Collaboration Committee on green hydrogen** with Brazilian National Service for Industrial Training (Serviço Nacional de Aprendizagem Industrial, SENAI).

→ **Developing further training programmes** with three 40-hour modules on green hydrogen, Power to X (PtX), and their application.

→ Training over 200 multipliers on green hydrogen as of fall 2022, with ongoing enrolment.

5.2   Curriculum development ▶ 5.2.2 Anticipating skill needs

🔗 |H2Brasil | Promoting Green Hydrogen in Brazil

Installing solar panels to generate electricity necessary for the production of green hydrogen

Green hydrogen storage

5.2   Curriculum development   ▶   5.2.3 Integrating sustainable finance into curriculum

CURRICULUM DEVELOPMENT

Integrating sustainable finance into curriculum

| EMSD III | Emerging Markets Sustainability Dialogues

OVERVIEW

	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Higher education → Continuous professional development
	Mega
	Educational institutions
	2019 – 2021
	EUR 4 million
	China, Mexico
	Climate change, energy, finance
	4, 7, 9, 13
	BMZ (DE)
	GIZ (DE)
	China: → Central University of Finance and Economics (CUFE) Mexico: → Universidad Nacional Autónoma de México (UNAM) → Tecnológico de Monterrey → Instituto Tecnológico Autónomo de México (ITAM)

The transition towards a sustainable future is a global challenge. While emerging economies already play a key role in shaping global agendas thanks to the size of their populations and their increasing economic power, the potential solutions they develop are still not given sufficient attention in global policy processes, and few are implemented.

This project addresses the gap between academic knowledge and the availability of sustainable finance courses. It convenes change agents from think tanks and the public, private, and financial sectors in multi-stakeholder dialogues. These agents work together to develop and implement solutions that are economically successful, socially inclusive, and ecological in three core topics:

→ Sustainable Infrastructure
→ Sustainable Finance
→ Digital Solutions for Sustainability

Under its Sustainable Finance Component, EMSD worked with universities and practitioners to develop and pilot a Sustainable Finance Fundamentals Course, aiming to mainstream sustainability in finance studies.

5.2 Curriculum development ▶ 5.2.3 Integrating sustainable finance into curriculum

🔗 | EMSD III | Emerging Markets Sustainability Dialogues

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ **Integrate sustainability in finance curricula** to build the capacity of decision-makers and finance professionals of today and the future.

→ Focus on **aligning the financial sector with national sustainability strategies.**

→ **Green transformation integrated into national sustainability strategies** (e.g. on SDGs and Climate Policy).

Success factors and learnings

→ Strong **motivation of partner university professors to participate** and contribute to a collaborative approach to learning and knowledge creation. Professors contributed to the project on a voluntary basis and facilitated the adoption of course contents in their institutions.

→ Flexibility on how the **institutions could tailor the project.**

→ **Developing institutional relationships** based on personal motivation and interest of the professors from the partner institutions.

→ **Planning for scalability** to facilitate adoption and customisation of contents.

Sustainability was achieved through **full ownership of participating professors** who integrated the course or its contents into their standard course offer and included:

→ Dialogue with universities and university professors, enquiring if there was interest in co-developing content and offering the courses.

→ **Collaboration among participating universities and experts** (three universities from Mexico and one from China) to develop and tailor content to their context.

→ **Training of trainers** element integrated into the programme (training of professors who deliver the lectures).

→ **Developing independent modules** for a full semester (14 three-hour lectures), with additional exercise and reading materials that can be tailored to the specific partner universities and course programmes.

→ **Flexible modules:** in one Mexican example, it was run as a semester course for master's students, another at the bachelor level, and another as an

5.2 Curriculum development ▶ 5.2.3 Integrating sustainable finance into curriculum

🔗 | EMSD III | Emerging Markets Sustainability Dialogues

executive programme. The university in China ran it as a voluntary course (3 seminars) and later developed it as an MBA programme.

→ Course **teaching was left entirely to the university partners.**

→ **Developing an evaluation framework** for the course by professors and students.

Additional information and resources	🔗
	Sustainable-Finance-Course-Syllabus 🔗

Environment, Sustainability and Governance Training

Lecture at the Shahe Campus of the Central University of Finance and Economics (CUFE) in Beijing, China

5.2　Curriculum development　▶ 5.2.4 Collaborating in curriculum design

CURRICULUM DEVELOPMENT

Collaborating in curriculum design

⌗ | PREEEP | Promotion of Renewable Energy and Energy Efficiency

OVERVIEW

	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Vocational education and training → Continuous professional development
	Mega, Macro, Meso, Micro
	Educational institutions
	2019 – 2023
	EUR 11.7 million
	Uganda
	Energy
	4, 7　[4 QUALITY EDUCATION] [7 AFFORDABLE AND CLEAN ENERGY]
	BMZ (DE)
	GIZ (DE)
	→ Uganda Ministry of Energy and Mineral Development (MEMD) → The Renewables Academy (RENAC)

Uganda's natural resource base is one of the richest and most diverse in Africa. It has abundant biomass, water resources, and the potential to generate solar, geothermal, and wind energy. However, the country has an insufficient energy supply due to unsustainable and inefficient use of available resources.

This programme supports the process of increasing the amount of electricity generated from renewable sources, improving access to energy and enhancing energy efficiency. It does this by improving the framework conditions for increased access to clean energy in rural and peri-urban areas through enabling policies and market and skills development. The programme works through six commissions, bringing together educational institutions and the private sector to develop curricula that respond to labour market needs.

5.2   Curriculum development ▶ 5.2.4 Collaborating in curriculum design

🔗 |PREEEP | Promotion of Renewable Energy and Energy Efficiency

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ **Integrating the private sector throughout the training process** from assessing needs to delivering training.

→ Developing **needs-based curricula** informed by a baseline study on skills needs. Training has focussed on mini-grids and is now moving to mobility.

→ **Multistakeholder partnership across VET institutions and the private sector** to develop hands-on curriculum content, updating the national curriculum to ensure that energy and energy efficiency is included.

→ Professionals from the **private sector trained to be trainers** in the courses.

→ A two-stage approach to the training of trainers— **online and face-to-face, specifically targeting women** (the online aspect contributed to enrolling more women).

→ All learning content transformed into **digital content offered for free** (via online learning and an app).

→ Combination of **technical training and training on participatory planning**.

Success factors and learnings

Success factors

→ Flexibility in the implementation process; adapting to the pandemic by **shifting to eLearning**.

→ **Working across VET Institutions** gives focus to the project, including assessment, growth, and a well-structured approach,

→ Enhancing the attractiveness of training by **granting recognised certificates** from the internationally known institution, The Renewables Academy (RENAC).

→ Cooperating, exchanging knowledge, and **aligning with other energy projects** in the country.

Barriers

→ Taking a holistic approach to include policy and private sector stakeholders is lengthy, and bringing all stakeholders together can be difficult.

→ Distances from Kampala to Northern Uganda (idea creation to idea implementation) have sometimes caused challenges.

→ The online approach is not suitable for all training (especially practical training) and requires a change in mindset.

5.2   Curriculum development ▶ 5.2.4 Collaborating in curriculum design

🔗 |PREEEP | Promotion of Renewable Energy and Energy Efficiency

Sustainability

→ **Formalisation of institutional partnerships** (letters of intent and grant agreements). Partnership with selected institutions gives the project a focused approach and long-term engagement.

→ Market-oriented approach ensures that the courses **enhance graduate employability**.

→ **Strong ownership by VET institutions** was developed by a jointly elaborated marketing strategy

→ **Upscaling potential** – Openly available course content enhances uptake from other VET Institutions.

→ Participative training contributes to a change in mindset and to a dialogue culture.

Training of trainers on solar mini-grids

Training of trainers, cohort 2022

5.3 Women in green jobs

The transition to a green economy will create many new jobs around the world, including in middle- and low-income countries. But will women have access to these jobs – even the highly paid, stable jobs that require better education and more skills? A recent study by UN Women ➲ [17] says "yes", but only if programmes and policies are put into place to support this change.

5.3   Women in green jobs

The transition to the green economy is a major trend that will shape socioeconomic development worldwide over the next 50 years. This transition will create new economic opportunities, new jobs, and the greening of existing jobs. Although the green transformation has become a key theme in policy circles, the gender dimension has received little attention so far. It is worth asking now how many – and which – green jobs will be accessible to women and whether the green transition will be fair and equitable or biased against women and girls.

Studies show that women are well represented in sectors where they have traditionally held strong positions, such as agriculture, waste management and certain areas of renewable energy (biomass), which are more likely to create lower-end jobs. Yet, they are underrepresented in high-end green careers such as jobs in renewable energy (wind and solar), transportation, construction, and advisory.

Women face a number of barriers that limit their access to **green jobs** in the years to come, according to ILO ↩ [19] and **UN Women** ↩ [17]. Some of these barriers are sector-specific, for instance, social norms that consider construction jobs inappropriate for women. Other barriers are general, such as (a) women's and women-led businesses' limited access to land, finance, and technology; (b) gender segregation in the education system and labour market; (c) laws that limit women's access to certain tasks and jobs; and (d) structural inequalities reflecting social norms dictating that women should shoulder the great majority of unpaid care work, effectively depriving them of opportunities for other jobs.

Green economy as an opportunity to reduce gender inequalities

The transition to the green economy offers unique opportunities to reduce gender inequalities and place women and girls in high-value green jobs. Special focus should be put on:

→ Changing mindsets about what are traditionally considered acceptable male and female jobs.

→ Assigning an economic value to unpaid work (largely born by women) on behalf of the environment.

→ Investing into preparing women and girls for the green economy through education and skills and capacity development.

→ Developing policies to level the playing field by addressing structural barriers that women face in accessing green jobs.

→ Ensuring policies that promote a gender-responsive green economy so that change can happen within a reasonable time frame.

5.3   Women in green jobs ▶ 5.3.1 Process

5.3.1 Process

Way forward

Improving women's access to green jobs must begin with country-level public and cross-sector dialogue about national processes of green economy transition. This requires country-level analysis to find appropriate solutions that fit each country's green economic transition strategy, specific to post-Covid-19 fiscal realities and gender dynamics in national labour markets. The formulation of national green jobs strategies, currently underway in several countries, presents an opportunity to contextualise and apply or adapt the activities highlighted in the Toolkit that have yielded positive outcomes. In this process, it will be important for states to build their capacity to formulate and implement gender-responsive green-economy strategies. This includes strengthening their capability to collect and analyse sex-disaggregated data, an important gap identified in the research, and to formulate gender-responsive economic policy, planning and budgeting. It will also be critical to increase women's participation in green economy decision-making fora and technical task forces, and to create institutional spaces for dialogue and the co-creation of policy solutions where women's advocates can actively participate.

Recommendations to get women ready for the green economy: ↻ [17]

→ Overcome gender segregation in education and promote women's participation in science, technology, engineering, and math (STEM) fields.

→ Reskill and upskill women.

→ Develop women's networks and platforms in male-dominated sectors.

→ Support the transition towards the formal green economy

→ Address social norms and improve the enabling environment.

→ Invest in role-modelling and focusing on youth to change stereotypes about broadly accepted ideas of green jobs for men and women.

5.3   Women in green jobs ▶ 5.3.1 Process

Resources

Green jobs policy brief English, UN Women 🔗

Green Jobs report English, UN Women 🔗

Emplois verts pour les femmes en Afrique: note de politique générale, French, ONU Femmes 🔗

Emplois verts pour les femmes en Afrique: Rapport, French, ONU Femmes 🔗

5.3   Women in green jobs   ▶ 5.3.1 Process

Success Factors for Gender Equality in Vocational Education and Training 🔗

Renewable energy: a gender perspective, IRENA 🔗

Gender equality and green jobs policy brief, ILO 🔗

5.3   Women in green jobs ▶ 5.3.1 Process

Access to finance and technology by women-owned green businesses can be a game changer

© GIZ / Guenay Ulutunçok

Video showing how women's lives can change through reskilling for green jobs.

© GIZ / Zelalman Communications

Abebech Tama
Former Firewood Collector & Now Silk Producer

Collecting firewood is strictly forbidden

▶ ⏭ 🔊 0:00 / 6:12

5.3   Women in green jobs ▶ 5.3.2 Empowering women waste pickers

WOMEN IN GREEN JOBS

Empowering women waste pickers

🔗 | PREVEC | Green Jobs Programme in the Circular Economy

OVERVIEW

🖧	→ Skills for greening existing jobs (technical skills, upskilling, reskilling) → Generic skills (transversal skills)
🎓	→ Continuous professional development
⌒	Macro, Meso, Micro

⚖	→ Governments
	   → City and district authorities
	→ Industry/Private sector institutions
	→ Civil society organisations
	   → Waste-pickers and their recycling associations

⏰	2019 – 2023
💲	EUR 7.5 million
🌐	Colombia
◔	Waste management
🎨	1, **4**, 5, **8**, 12, **13** [SDG icons: 1 NO POVERTY, 4 QUALITY EDUCATION, 8 DECENT WORK AND ECONOMIC GROWTH, 13 CLIMATE ACTION, 5 GENDER EQUALITY, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION]
🏭	BMZ (DE)
⚙	GIZ (DE)

🤝	Political level: Colombian Presidential Agency of International Cooperation (APC) Implementation level: → Ministry of Environment and Sustainable Development → Ministry of Housing, City and Territory → Mayor's Offices of Bogotá and Cúcuta → National Apprenticeship Service (SENA) → National Planning Department (DNP) → Private sector → Associations of recyclers and waste pickers
🌱	Steady economic growth in the last decade has increased prosperity in Colombia, thereby boosting consumption, which has resulted in an increasing amount of waste. Most waste is disposed of in properly managed landfill sites, and the task of collecting and separating out recyclables such as plastics, glass, and cardboard has been performed by an army of some 47,000 waste-pickers. This project supports its Colombian partners in deadling with the many social, economic, and environmental challenges involved in moving towards a circular economy. Columbia's waste pickers play an important role in this transformation. A five-year strategy has been adopted to gradually formalise their status, regulate their activities, and reduce the social stigma associated with their work with the following objectives:

5.3 Women in green jobs ▶ 5.3.2 Empowering women waste pickers

| PREVEC | Green Jobs Programme in the Circular Economy

→ Increase the percentage of waste recycled in Bogotá and Cúcuta.

→ Create an enabling environment for those involved in recycling with a specific focus on women.

→ Improve circular economy training opportunities for all stakeholders involved (e.g. recycling and waste picker associations, municipalities, private sector).

5.3 Women in green jobs ▶ 5.3.2 Empowering women waste pickers

| PREVEC | Green Jobs Programme in the Circular Economy

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

This project provides a possible route to **sustainable integration of vulnerable groups** such as waste pickers into the formal sector and public services value chain. Their role as important actors in the circular economy is strengthened, while at the same time, their working conditions improve, i.e. through access to health insurance and pension schemes. This example zooms in on the project's work with women waste pickers and thus does not cover the entire scope of the project.

Approximately one-third of the waste pickers in Colombia are women, and 54% of waste picker organisations in Bogotá are led by women. Contrary to their male colleagues, they not only have the added burden of having to deal with hierarchical gender relations at home, in the workplace, and in their respective communities, but they are also faced with caregiving duties and health challenges such as menstrual health. The PREVEC project has taken an innovative approach to address these challenges by strengthening women's voices and capacities and working with partners to offer them tools to work towards equality in the workplace by:

→ **Increasing women's leadership roles** in waste picker representative organisations.

→ **Providing training opportunities** to build transversal and technical skills (e.g., identification of materials, security) of women waste-pickers to elevate their status. Some training is co-organised with universities which are considered prestigious. Illiterate women are supported by tutors.

→ **Offering childcare** also during the night as waste picking predominantly takes place during the dark hours.

→ **Setting up a "School of Menstrual Education"** that works with waste-picker associations to improve menstrual hygiene management by providing access to public toilets, affordable and appropriate menstrual hygiene materials (e.g. menstrual cups), information on good practices, and a supportive environment. Not losing wages during the menstrual cycle contributes to women's economic empowerment.

→ **Providing access to basic services** such as showers and internet.

5.3 Women in green jobs ▶ 5.3.2 Empowering women waste pickers

|PREVEC | Green Jobs Programme in the Circular Economy

Success factors and learnings

→ **Gain the trust of partners.**

→ Support the **integration of vulnerable groups** into the public services value chain.

→ **Consult leaders of associations before deciding on any initiative**. Work hand in hand, involving them in the design, implementation, monitoring and follow-up. Consistently use a participatory approach throughout the project.

→ Ensure that activities are **needs-based and have a pilot** run before implementing.

→ Provide **training for informal workers** to elevate their status. Consider tutors for literacy-related goals and integrate a train-the-trainer approach.

→ **Document all processes for upscaling and sustainability** (e.g. methodological guidelines for civil society organisations and municipalities).

→ **Disseminate and share all information widely** all the way down the hierarchy (e.g. waste picker associations) to improve the reputation of waste pickers.

→ **Involve different stakeholders** (e.g., Universities, foundations, policymakers, NGOs, enterprises) –

the more stakeholders involved, the more sustainable the initiative will be.

Waste pickers

Waste pickers are women and men of all ages who earn their livelihood by recovering, collecting, transporting, warehousing, and marketing potentially recyclable waste material from garbage produced in cities. This includes containers, packaging, glass, cardboard, paper, plastic, metals, and other materials. Waste pickers carry out their work primarily in two contexts: on the streets, where garbage is left in bags on the sidewalk or in containers, and in open-air dumpsites.

5.3 Women in green jobs ▶ 5.3.2 Empowering women waste pickers

|PREVEC | Green Jobs Programme in the Circular Economy

First two pictures top left:
By providing affordable access to menstrual products, water, sanitation, and hygiene (WASH) facilities during their work, women have been able to not miss out on earning a living during their periods

First meeting of women recyclers discussing menstrual care, childcare, education and entrepreneurship
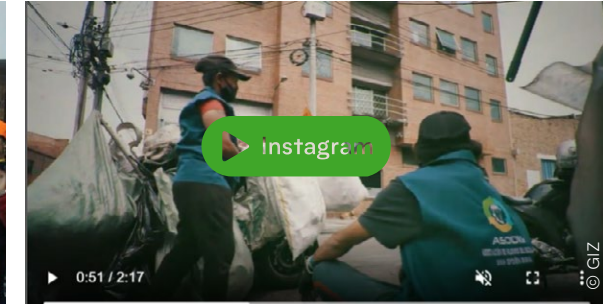
This video published on Colombia's National Recycling Day, commemorates the social and ecological importance of waste pickers in the circular economy. They are (almost) superheroes giving "trash" a second life

On the road to a circular economy with PREVEC

Kick-off of the leadership diploma course for strategic and sustainable management of organisations in recycling in Bogotà and Villavicencio of recyclers

5.3 Women in green jobs ▶ 5.3.3 Designing context-based programmes

WOMEN IN GREEN JOBS

Designing context-based programmes

Technical and vocational education and training for Jordanian and Syrian refugees in the Jordanian water sector

OVERVIEW	
	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Vocational education and training
	Meso, Micro
	→ Governments → Educational institutions → Civil society organisations
	2017 – 2020
	EUR 5 million
	Jordan
	Water, sanitation
	4, 5, 8
	BMZ (DE)
	GIZ (DE)
	Jordanian Ministry of Water and Irrigation (MWI)

Jordan is one of the world's most arid countries. The demand for water is rising continuously because of the expansion of irrigation farming, increasing industrialisation, and an increase in population due to demographic changes, as well as the influx of refugees from neighbouring Syria. The inefficient management of Jordan's scarce water resources is currently leading to enormous technical and administrative water losses.

This project supported the Jordanian Vocational Training Corporation in creating training courses for semi-skilled and qualified water and sanitation specialists. Courses are open to residents of Jordan and Syrian refugees all over Jordan, with an emphasis on enrolling women. Participants also gained general skills, improving their employment prospects and potential income. Trained workers ensure efficient maintenance and repair of household sanitary installations, thereby reducing water loss.

5.3 Women in green jobs ▶ 5.3.3 Designing context-based programmes

| Technical and vocational education and training for Jordanian and Syrian refugees in the Jordanian water sector

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ **Promoting women in male-dominated technical professions** through VET that is designed to be accessible to women and refugees; 50% of trainees are women, and 30% are refugees. The training provides:

→ Green skills for participants to become fully qualified plumbers.
→ Upskilling for people who are already plumbers to learn new technology towards preserving water.

→ Providing **technical training for semi-skilled and qualified sanitation specialists**.

→ **Providing transversal skill development** for trained workers to improve employability and economic prospects.

→ **Developing the capacity of the Jordanian water authorities** to support an extensive skills enhancement programme for technical operating staff (training needs assessment, rehabilitation of a training centre, and training implementation).

→ **Integrating environmental and economic aspects** to ensure sustainability: reducing water loss in homes and supply networks while safeguarding investments in water infrastructure.

→ **Promoting employment through partnerships with cooperatives:** labour market needs assessment and addressing challenges in finding jobs; formation of "hygiene ambassadors" during Covid-19 (visiting ministries, schools).

Success factors and learnings

Key success factors

→ Mobilising women by understanding and adapting the programme to women's needs:

→ **Short training time** (~3 months) with an initial focus on "easy" maintenance work, followed by an upskilling programme for complex installations for interested trainees.
→ Ensuring **equal access to training** (e.g. by providing daily allowances to selected participants with limited financial resources).
→ **Cultural sensitivity** in training implementation (e.g. by providing separate courses for women and men).
→ Including a **woman trainer** from Germany during the first weeks, followed by integrating locally trained women as trainers or co-trainers to serve as role models and success stories.

5.3 Women in green jobs ▶ 5.3.3 Designing context-based programmes

| Technical and vocational education and training for Jordanian and Syrian refugees in the Jordanian water sector

→ Identify **professional "niches" for women trainees** (e.g. only women plumbers can do maintenance work in private homes where only women are present.

→ Visibility and **incentives for course enrolment** resulting in massive interest through:

→ Minimal entry requirements to encourage enrolment of unskilled trainees.

→ Entrepreneurship and transversal skills training with the support of cooperatives.

→ Empowerment of partner VET institutions (e.g. responsibility for disseminating the call for applicants.

→ International exchange (e.g. session during the Stockholm Water Week).

→ Plumber's toolbox as a starter kit for participants after course completion.

→ Integration of trained plumbers into the "hygiene ambassadors programme", creating awareness for water usage and hygiene, e.g., at schools.

→ Exploring **regional transferability** – the same approach was applied in a course for a project in Palestine and Yemen.

Barriers

→ Recognition of training level (e.g. job entry into the public sector requires a certificate).

→ Addressing a lack of organisation in the sector because the occupation is considered "informal".

→ Facilitating employability and access to cooperatives for refugees after course completion due to limited work permissions.

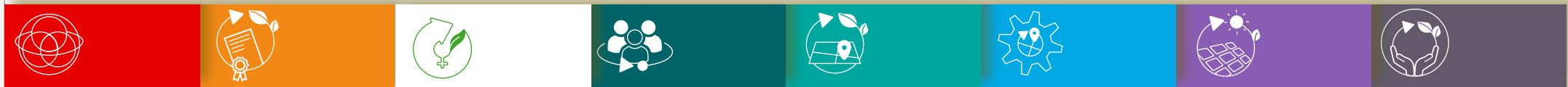**5.3   Women in green jobs ▶ 5.3.3 Designing context-based programmes**

🔗 | Technical and vocational education and training for Jordanian and Syrian refugees in the Jordanian water sector

Acquiring plumbing skills to contribute to reducing water loss
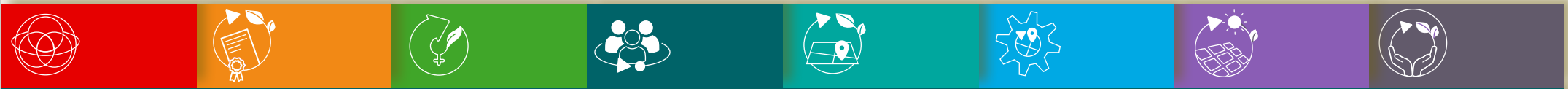
5.4   Youth empowerment

Young people are driving efforts to change the future by demanding immediate climate action from their governments. Different initiatives are exploring ways to further the meaningful engagement of young people on climate action and ensure they have the support they need so to participate in climate conversations and contribute to the Sustainable Development Goals.
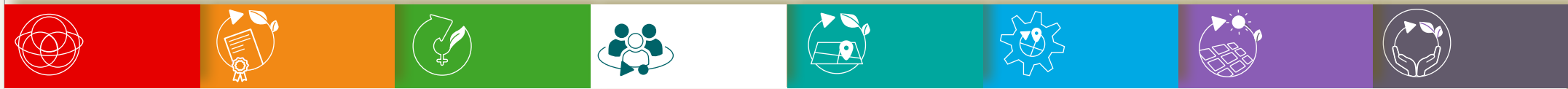
5.4   Youth empowerment

The UNDP's People **Climate Vote** of 2021 showed that youths under 18 are the most likely to believe Climate Change is a global emergency. ⟳ 20 Young people are in a strategic position of acting as critical partners to governments, businesses, civil society and communities. The existential challenge and threat of not achieving the sustainable development goals calls for approaches that enhance meaningful youth engagement that genuinely empowers young people to drive the green transformation through activism, advocacy, and policy engagement as shown in **Figure 5.4**. Equipping youth with transformative skills (see typology of skills framework), is especially essential in empowering young people to enact and participate in change. ⟳ 21 **Investment** in youth ideas is one approach that can considerably enable young people to practically address climate challenges and be change-makers. ⟳ 22 In addition, funding youth-led projects can contribute to strengthening the transversal skills they require to accelerate social and economic systems towards a just transition. Youth engagement approaches should aim to build their skills in the three dimensions of change in **Figure 5.4** below. ⟳ 23
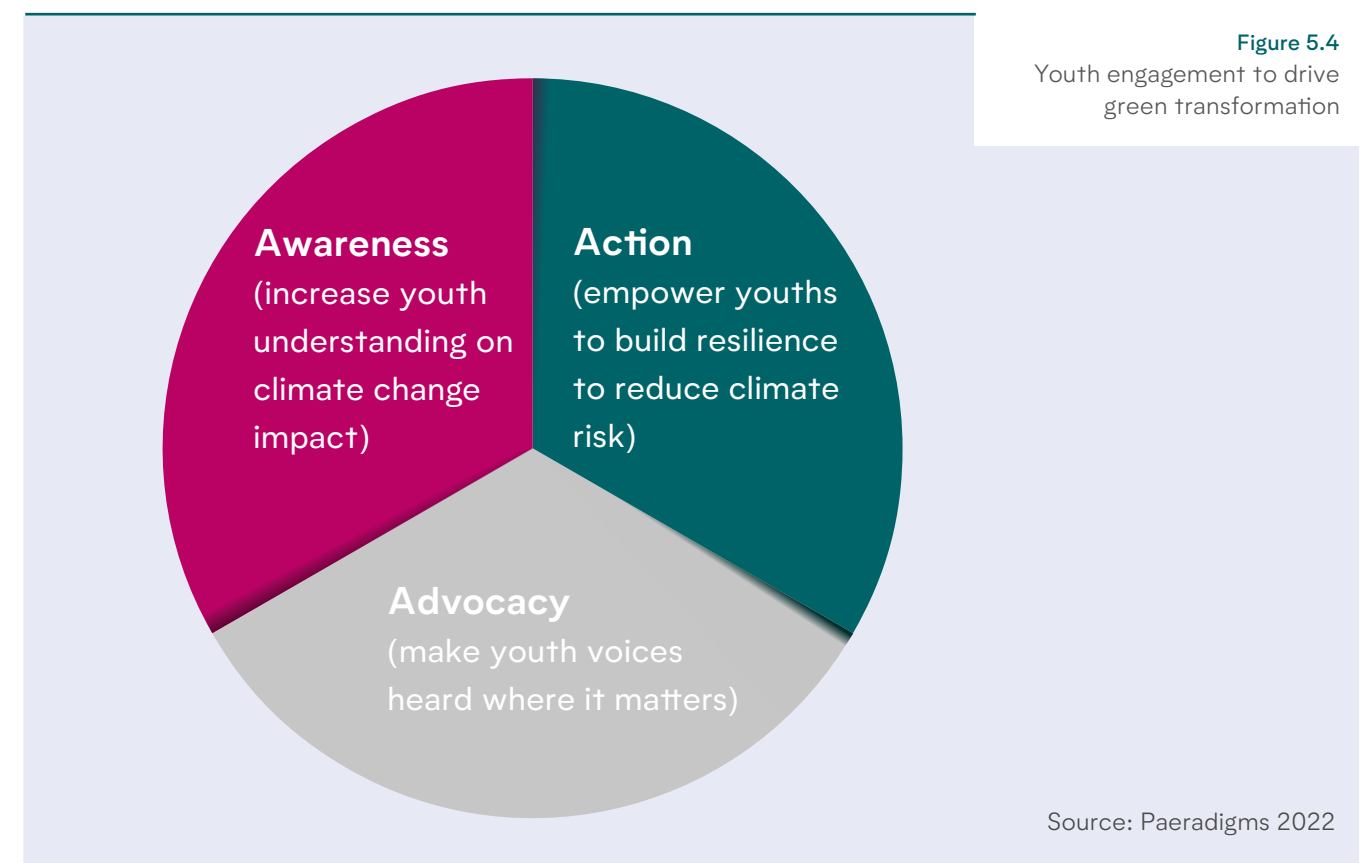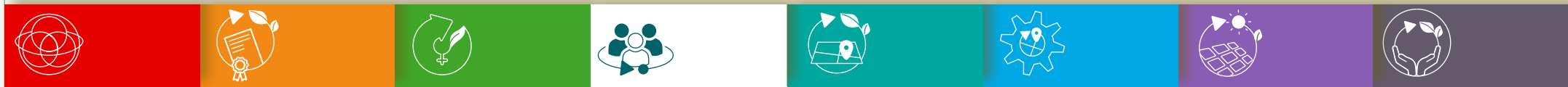
Figure 5.4
Youth engagement to drive green transformation

Awareness (increase youth understanding on climate change impact)

Action (empower youths to build resilience to reduce climate risk)

Advocacy (make youth voices heard where it matters)

Source: Paeradigms 2022

5.4   Youth empowerment ▶ 5.4.1 Process

5.4.1 Process

There are various key-considerations that should be noted when promoting and supporting meaningful youth participation in climate action.↩ [21]

→ Meaningful youth participation is about sharing power in youth-adult partnerships in decision-making.

→ Meaningful youth participation is enabled by systemic empowerment, which involves addressing adult-centric structures, structural inequality and systemic discrimination.

→ Meaningful youth participation is about sharing power to influence institutional responses to climate change and securing positive outcomes for youth development and climate ambition and justice.

→ Meaningful youth participation occurs when youth narratives are radical in challenging the status quo that created and recreates the climate crisis, and in proposing alternatives for a net-zero carbon and just society.

→ Meaningful youth participation enlarges the space where young people can participate, acknowledging that youth participation should be embedded in all dimensions, all steps of the policy cycle at all levels of governance, and in multi-stakeholder settings.

Climate challenge grants: challenge grants are often a good way to financially invest and purposefully empower youth to build resilience and reduce climate risk. Successful implementation of such grants requires careful planning to ensure inclusivity and impact. Key elements to consider include:

→ What types of organisations and stakeholders involved in the green transformation will you work with to implement the grant process so that you ensure inclusivity and reach?

→ Clearly define the objectives of the climate challenge grant and criteria - Do you intend to support new social actions targeting climate challenges or upscale existing projects? What specific challenges should the projects address?

→ Consider scalability of the proposed climate projects as a criterion.

→ Be clear on how many projects you will fund and the amounts – managing applicants' expectations is important.

→ Ensure that the challenge is aligned to the bigger picture of the target country and region – check for climate policies, green transformation, COP priority areas and other strategies.

5.4   Youth empowerment   ▶ 5.4.2 Translating ideas into climate action

YOUTH EMPOWERMENT

Translating ideas into climate action

🔗 The Climate Connection

OVERVIEW	
⛓	→ Transformative skills (transversal skills)
🎓	→ Continuous professional development
📈	Micro
🕯	→ Civil society organisations
⏰	2021 – 2023
🔍💲	
🌐	Bangladesh
◔	Climate change
🎯	4, 5, 13 ![SDG 4 Quality Education] ![SDG 5 Gender Equality] ![SDG 13 Climate Action]
🏛	FCDO (UK)
⚙	British Council (UK)
🤝	none

Bangladesh is committed to reducing environmental degradation and has adopted policies on sustainable development, such as the National Adaptation Plan. It is one of the most vulnerable countries to climate change, despite contributing only 0.41% of global emissions. Young people are at the frontline of facing these climate risks in Bangladesh.

This project aims to understand youth perceptions of climate change and the potential action to combat it. Within the context of the enabling policy environment, the Bangladesh office of the British Council has implemented activities on youth leadership, adopting best practices from the Climate Connection Global Programme, including:

→ The Climate Innovation Challenge, which provides funding opportunities for young people to turn their ideas into concrete climate action.
→ Access to a global knowledge exchange platform with information and resources pertaining to climate action (e.g. integrating environmental issues into lesson plans, interviews, examples, and podcasts).

5.4   Youth empowerment ▶ 5.4.2 Translating ideas into climate action

⬦ | The Climate Connection

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ **Providing funding to youth through a Challenge Fund.** The challenge was implemented in partnership with a local NGO.

→ **Developing new social action projects and up-scaling existing projects** that target climate challenges in communities.

→ The challenge fund required that the projects be aligned to COP26 priority **areas:**

   → Adaptation and resilience
   → Nature-guarding ecosystems

→ 32 projects were funded (approx. GBP 1000/project) and addressed awareness of Climate Change at the community level, capacity development, environment-friendly cooking, deforestation, and other climate-related topics.

Success factors and learnings

Key success factors

→ **Providing financial support** to translate ideas into action.

→ Using the British Council name and platform **gave youth leverage in communities.**

→ Ensuring that participants in the challenge have gone through **leadership training** from the Active Citizens Programme.

→ **Intrinsic motivation** plays a big role in the success and scalability of funded projects.

→ **Clearly defining scope, criteria, and expected outcomes** in the design process.

→ **Monitoring spending** is important to ensure funds are used for activities covered in the guidelines.

→ **Measuring the impact of the funded projects** can be difficult, for instance, in projects that raise awareness; this needs to be taken into account.

Barriers

→ Fund was limited to the Active Citizens Alumni and therefore not inclusive, potentially leaving out great ideas from other young people.

→ Inexperienced individuals lacked capacity to manage grant funds and therefore needed training (e.g. administrative skills, grant policies). It would be worth evaluating the skill level of individuals who should receive the grant to ensure better results – such as individuals who have a track record and are looking to scale up.

5.4   Youth empowerment ▶ 5.4.2 Translating ideas into climate action

🔗 | The Climate Connection
_____

→ Fixed-amount grants were not aligned to the type
   and scalability of the projects.

Sustainability
_____

→ **Signposting other activities and opportunities**
   from which participants can benefit.

→ Some funded **projects received further funding**
   following their success with the challenge fund.
_____

5.4   Youth empowerment ▶ 5.4.2 Translating ideas into climate action

🔗 | The Climate Connection

Planting trees in 64 districts of Bangladesh

© British Council

Clean cooking for sustainable future

© British Council

Raising public awareness for planting trees on the roofs and balconies of houses

© British Council

5.5 Aligning skills with regional needs

The supply-side focus of skills development has been dominant over the last generation, with educational institutions emphasising supplying more and higher-level graduates. However, identifying synergies across skills and regional development policies supports balancing the demand and supply of green skills. To meet the place-specific and evolving needs of cross-border and regional economic structures, cooperation among stakeholders is essential.

5.5 Aligning skills with regional needs

A constant narrative around capacity building and skills development for the green transformation is the element of cooperation and its necessity - between actors, sectors, institutions, and regions. Section VI of the United Nations Conference on Sustainable Development (Rio +20) for instance, recognises the importance of North-South, South-South and triangular cooperation in building capacity on **sustainable development**. It also calls for approaches that promote exchange of experiences and expertise, and knowledge transfer.➲[24] The essence of the green transformation is achieving a paradigm shift. Models such as the Quintuple Helix mentioned in **Section 5.1**➲ can achieve this to a substantial extent. In some instances, propelling the shift calls for added innovative interventions such as aligning skills development to region specific needs and challenges. This process requires a targeted response and application of models that recognise the strengths and gaps of the places in question. It also requires cooperation beyond sectors to regional (different regions nationally) and

cross-regional (cross-country/continental cooperation) levels.

Smart Specialisation – a tool for identifying and aligning needs

Smart Specialisation (S3) is a place-based approach conceived by the European Commission as a European research and innovation policy. Since 2018, the Joint Research Centre of the European Commission recognises it as one of the global methodologies for Science, Technology and Innovation (STI) Roadmaps for the achievement of SDGs. In its original framing, the method is pivoted on identifying strategic areas of intervention based on the strengths and potential economy of a specific area. Ideally, it builds on the assets, resources and socio-economic challenges of the target place to identify specific opportunities for development and growth. Smart specialisation has recently further evolved to take on a more-mission oriented approach, especially in relation to the **Green Transition**, transforming into what can be termed as S4.➲[25] S4 is an

evolved version of S3 that proposes that smart specialisation strategies should be designed to include sustainability and inclusive growth. S4, therefore, advocates for moving beyond innovation and entrepreneurship as the sole focus for growth in smart specialisation strategies. The Joint Research Centre has further published a handbook on how the Higher-Education sector can contribute to the design and implementation of **smart specialisation (Figure 5.5)**.➲[26]

5.5 Aligning skills with regional needs ▶ 5.5.1 Process

Figure 5.5
Design and implementation of smart specialisation

Moving up along value chains; Adding value to existing activities; Niches to complete on international markets

Reorientiering the economy towards human well-being

Economic potential

Innovative potential

Social challenges

European Green Deal

Creating new innovative solutions

Aligning social and environmental objectives

Scientific potential

Environmental challenges

Harnessing knowledge to avoid negative environmental impacts

Source: Publications Office of the European Union 2021 ➲ 27
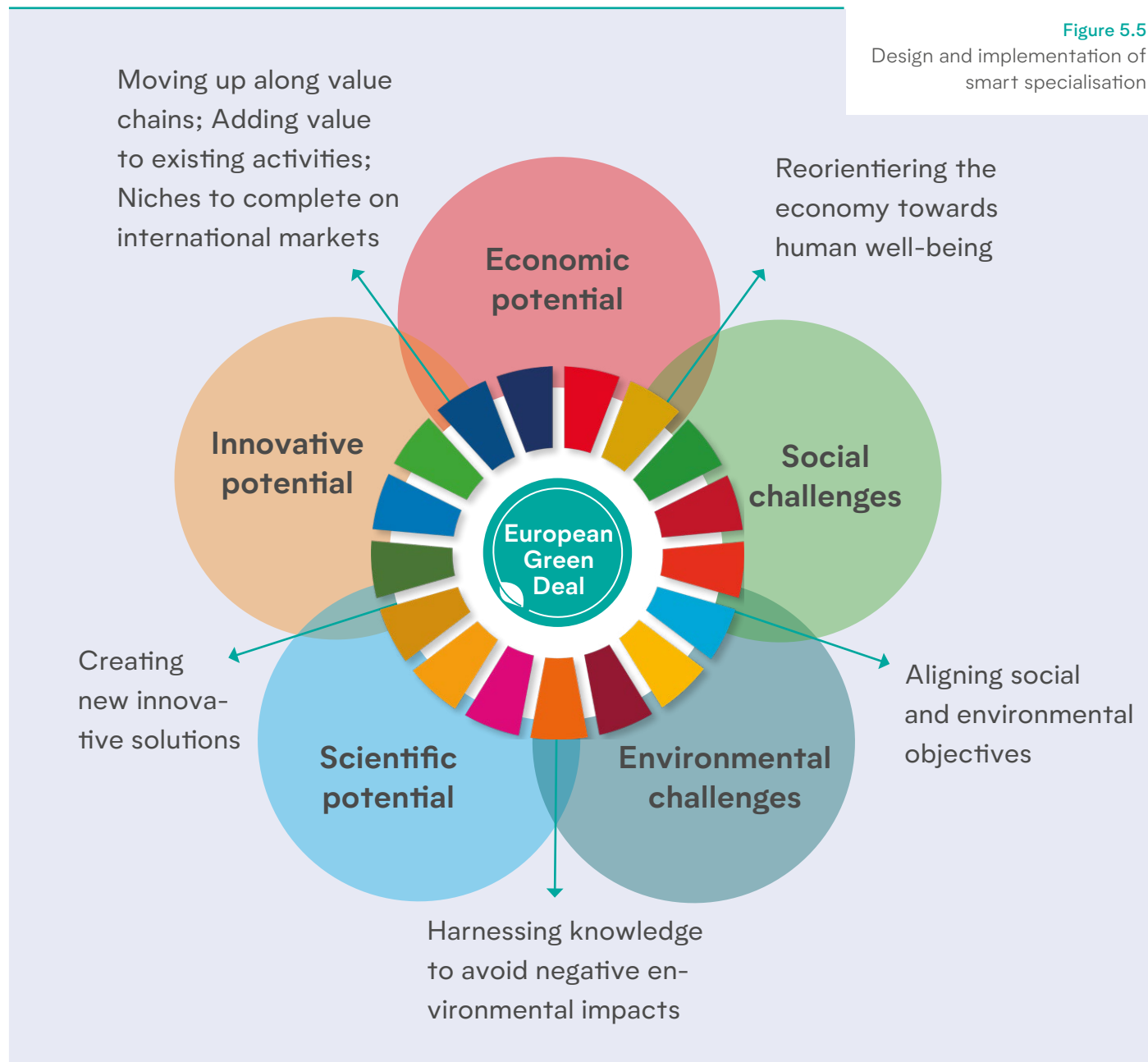
5.5.1 Process

Joint study programmes, such as master's level courses in renewable energy, climate change, and other sustainable development themes relevant to the green transformation can create a pathway for filling in regional-specific skills gaps while taking advantage of the benefits that come from knowledge exchange between students and partner institutions. Establishing such programmes however requires extensive planning. Common challenges with such initiatives primarily are issues around funding, sustainability, differences and interests of partners, degree duration, credit transfer, accreditation, and language requirements. The Joint Programmes from A to Z is a reference guide for practitioners and has identified various elements to consider when planning a joint programme briefly illustrated below. ➲ 28

5.5   Aligning skills with regional needs ▶ 5.5.1 Process

Definitions	→ Clarify explicitly what you mean by a joint programme
Develop a checklist	→ What do you need to take into account?
Define the added value	→ What are the advantages, disadvantages and added value does the programme bring?
Legal frameworks	→ What national legislative frameworks, institutional regulations, guidelines and screening processes of all partner institutions do you need to take into account
Curriculum development	→ Jointly develop the curriculum, consider recognition and access to further studies. Define the level of integration and anticipate degree awarding.
Marketing, recruitment, admission	→ Agree on and develop a joint marketing strategy, adopt a common selection procedure and committee
Student administration	→ Consistent information to students across all partner institutions, shared policy on student assessment, regular communication among all partner institutions
Management model	→ Establish the management structure based on the set of tasks for which joint arrangements are needed
Financial management	→ What are the full costs of running the programme? Where do you get your income from? How do you divide the income among the partners?
Cooperation agreement	→ Develop a flexible agreement detailing all the elements of the joint planning and decisions
Quality assuarance and accreditation	→ Focus on the internal and external quality assurance issues that need to be taken into account when developing and managing joint programmes
Recognition	→ Assess guidelines and regulations to ensure the degrees are recognised in countries where students would want to pursue further studies

Source: Adapted from Stichting Nuffic 2020 ⟳ [28]

5.5   Aligning skills with regional needs ▶ 5.5.2 Collaborating to address regional needs

ALIGNING SKILLS WITH REGIONAL NEEDS

Collaborating to address regional needs

GAMP | Bicultural regional master's programmes focusing on the MENA priority areas

OVERVIEW

	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Higher education
	Meso, Micro
	→ Educational institutions
	2005 – 2017
	EUR 13.8 million
	Egypt, Jordan, Lebanon, Syria
	Energy
	4, 6, 7, 8
	BMZ (DE)
	GIZ (DE)
	Joint partnership programmes between: Cologne University of Applied Sciences — University of Jordan, Amman Damascus University, Syria (2005–2011) Ludwigsburg University of Education — Helwan University, Egypt

Philipps-Universität Marburg — Lebanese American University in Beirut, Lebanon
University of Kassel — Cairo University, Egypt

Many development efforts in the Middle East and Northern Africa region (MENA) focus on water, economic reforms, and renewable energy. However, the lack of qualified experts in the region hinders the development of these sectors and the implementation of sustainable concepts. Therefore, education is another important consideration in development cooperation within the MENA region.

This project supports the establishment of four bicultural regional master's programmes, including Integrated Water Resource Management and Urban Development. Each study programme is offered by one German and one Arab university with scholarships for young Arab and German professionals to study side by side in the MENA region and in Germany. At the end of the programme, graduates receive a double master's degree awarded by both universities. The study programmes are practical, interdisciplinary and development-oriented, fostering a high level of expertise and promoting cross-cultural and management skills.

5.5   Aligning skills with regional needs ▶ 5.5.2 Collaborating to address regional needs

| GAMP | Bicultural regional master's programmes focusing on the MENA priority areas

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ Joint master's degree **enhances expertise in sustainable development**, providing an important foundation for developing skills for the green transformation.

→ Providing an **alternative to public sector employment** for graduates; many graduates from the Water programme went into teaching institutions, and renewable energy graduates went into the private sector.

→ **Provided an intercultural dimension**, which enhances soft skills for graduates.

Graduates went into self-employment and private-sector employment, which is uncommon in the MENA region. They are therefore acting as multipliers and catalysts of the skills.

Success factors and learnings

Key success factors

→ Providing **training for students, academic staff** capacity development on curriculum and teaching, and focusing on structural reform to attract and host international students.

→ **Funding student costs** (e.g. visa, administrative, living) to expand access and foster diversity.

→ **Institutionalising personal relationships** and common research interests of the professors secured the longevity of the programmes.

→ Requiring funded projects to **include a sustainability element** in their proposals.

→ **Committing to projects** such as International Education Management (INEMA), which conducted teaching in tandem and had higher costs but more impact in terms of learning and experience.

Barriers

→ Different educational levels in the region, which required a willingness to change – for instance, comparing knowledge levels between MENA professors and their German counterparts or MENA students with German students.

→ Administrative processes in the MENA institutions were not well equipped for handling international collaboration (e.g. in some instances, there was a need to change participating country laws to support the collaboration).

→ Short funding period (IWRM 2007–2017, INEMA 2011–2018) limited the sustainability of the programme.

5.5 Aligning skills with regional needs ▶ 5.5.2 Collaborating to address regional needs

| GAMP | Bicultural regional master's programmes focusing on the MENA priority areas

«Change something» Berlin Module

© GIZ / Matthias Weiter

5.5 Aligning skills with regional needs ▶ 5.5.3 Supporting practice-focussed teaching

ALIGNING SKILLS WITH REGIONAL NEEDS

Supporting practice-focussed teaching

🔗 | PESEREE II | Higher Education Programme for Renewable Energy and Energy Efficiency

OVERVIEW

	→ Skills for new green jobs (technical skills) → Generic skills (transversal skills)
	→ Vocation education and training → Higher education
	Meso, Micro
	→ Educational institutions
	2015 – 2022
	EUR 8 million
	Senegal
	Energy
	4, 7, 8, 9
	BMZ (DE)
	GIZ (DE)
	Ministry for Higher Education, Research and Innovation, Senegal (MESRI)

Creating an efficient energy economy is one of the central goals of the Senegalese government's development strategy. It includes a significant increase in the share of renewable energies in power generation through the promotion of solar and wind power, electricity price reduction and rural electrification expansion. Qualified professionals with academic degrees are needed to achieve this modernisation.

This project operates in three fields of activity to support modernisation:

→ Training institutions (Instituts Supérieurs d'Enseignement Professionnel, ISEP) are advised on developing practical degree courses on the productive use of renewable energies and energy efficiency in locally relevant sectors.

→ Four partner universities (Universities of Bambey, Saint-Louis, Ziguinchor; Engineering College in Thiès) are accompanied in the implementation of an inter-university master's programme in renewable energies (MIER).

→ The programme supports the partner universities and ISEPs in establishing business incubators and developing relevant offers. One focus is on promoting women as entrepreneurs.

5.5 Aligning skills with regional needs ▶ 5.5.3 Supporting practice-focussed teaching

🔗 | PESEREE II | Higher Education Programme for Renewable Energy and Energy Efficiency

Relevance and innovative approach

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

→ Inter-University Master's Programme (3 years bachelor's + 2 years master's).

→ **Each university has a specialisation** designed to address challenges/needs in their specific region (e.g. Southern region focuses on biomass, Northern region focuses on Photovoltaics, Central region focuses on Solar Thermal).

→ **Foundation learning is conducted together before cohorts break into specialisation groups** to take technical modules.

→ **Students can use facilities from the four participating universities**, and the lecturers can also move between the universities (staff mobility).

→ Collaboration with the private sector.

→ GIZ facilitates **dialogue with the private sector** on sector needs, enabling the institutions to design a curriculum addressing the needs.

→ **Private sector professionals lecture** and teach in participating institutions.

→ **Private sector provides projects for students** to work on and opportunities for 2 – 4 months internships.

→ Higher Institute Programmes (2 years Vocational Professional Education)

→ **Transversal skills training** on professional development that aims to prepare graduates for work in the private sector.

→ **Technical skills training** on solar thermal, biomass, construction, and biodiversity protection.

→ Strong **collaboration between the higher institutes and the private sector.**

→ Enhancement of acquired experience for those working in the informal sector by offering them short-term training.

→ Sustainability

→ Each partner is required to **provide partial financial support** to the activities.

→ **Partners implement** the activities fully – GIZ only supports coordination and offers technical and financial support.

5.5 Aligning skills with regional needs ▶ 5.5.3 Supporting practice-focussed teaching

| PESEREE II | Higher Education Programme for Renewable Energy and Energy Efficiency

Success factors and learnings

Key success factors

→ The approach of **integrating theory and practice** in teaching and adapting the programme to the needs of the private sector

→ Having an **inter-university approach** to delivering the programme (network approach)

→ **Linking the private sector, universities, and qualified experts** to strengthen practice focus in higher education for the Senegalese market.

→ Inter-University Master's Programme is a **national accreditation model** for future other inter-university master's programmes. It is the first inter-university master's in Senegal.

→ **Promoting applied research** in close collaboration with the private sector

Barriers

→ Uptake of eLearning as a method of teaching and learning (also at the government level due to fear of increased teacher absence).

→ Lack of well-equipped laboratories for hands-on training.

→ Access to computers and the internet.

→ Limited funding available for academic staff mobility.

Risks

→ Sustainability of the programme due to the equipment and infrastructure needed to run the programme.

→ Over-reliance on infrastructure from other projects due to constrained financial resources of participating universities.

→ The relationship between the 4 universities can be strained if any partner does not have sufficient resources to continue the programme.

5.5   Aligning skills with regional needs ▶ 5.5.3 Supporting practice-focussed teaching

🔗 | PESEREE II | Higher Education Programme for Renewable Energy and Energy Efficiency

Transveral skills training in Senegal

Short-term practical training on the maintenance of solar mini-power stations at the Vocation Institute ISEP Matam

Social start-up "Bio-Boudjek", a student enterprise of the University Assane Seck in Ziguinchor (UASZ) led by Adja Mariata Rella Tall

Higher technician training programmes on renewable energies visit to a photovoltaic solar power plant
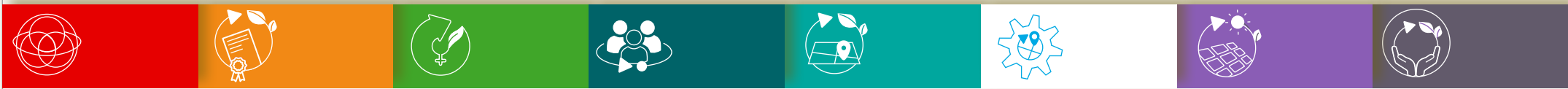
5.6 Adopting a circular economy

A circular economy is a systemic approach that tackles global challenges, such as climate change, biodiversity, waste, and pollution, by rethinking how we make and use things. With its focus on using and re-using raw materials efficiently and for as long as possible, it benefits both the environment and the local economy.

5.6 Adopting a circular economy ▶ 5.6.1 Process

The focus on circular economy (CE) as a concept and system change approach has gained considerable prominence in the last couple of years. Previous attitudes that the world has infinite materials and the extractive practices driven by industrialisation have changed in the face of Climate Change and other negative environmental impact. In its essence, a circular economy is based on three principles

→ Eliminate waste and pollution
→ Circulate products and materials
→ Regenerate nature

Despite its global recognition as one option for driving the green transformation, its application in low-income countries (LMICs) remains a challenge – which can strategically be positioned as an opportunity. One reason for this gap has been the little attention paid to CE pathways in low-income countries. Furthermore, the idea itself is heavily influenced by the existence of robust manufacturing industries in high-income countries (HICs) a scenario that is not reflective of most of the eco-

nomic activities of many LMICs. Other sectors, such as Agriculture, have not been accorded sufficient **inclusion in CE** debates, and yet it forms the core economic driver of many LMICs.↩[29] Equally missing from the conversation is the important role of traditional knowledge and practices that already emphasise circularity both in agriculture and other sectors such as construction. Importantly, the informal sector, which makes up large percentages of LMICs economic activity already practices CE to a large extent. CE, therefore, needs to be seen as broader than waste management and recycling and instead be recognised as a framework that can be adapted and localised to LMIC contexts, providing new opportunities for economic diversification, value creation and skills development.

5.6.1 Process

Localising the circular economy – country specific assessments

There are various approaches through which CE can be contextualised to support the shift to a green transformation, such as carrying out country specific CE assessment and prioritisation to determine specific sectors that could benefit by shifting to a CE model. A good example on how to conduct such as an assessment can be found in **Figure 5.6** ↩. Developed to identify the CE opportunities in Africa, it highlights four areas that should be considered to narrow down sectors that require further research and inclusion in a **CE.**↩[30]

→ Circularity potential – the potential of eliminating waste and emissions, reducing resource use.
→ Economic significance – the importance of the sector to the target economy using indicators such as GDP.

5.6 Adopting a circular economy ▶ 5.6.1 Process

→ Transformative impact – potential for significant positive economic and social outcomes

→ Sector momentum – current and potential growth of the sector towards CE.

Figure 5.6
Circular economy assessment process

CRITERIA	SUB-CRITERIA	RATIONALE	WEIGHT
Circularity potential (CP)	→ Energy and resource intensity → Waste and CO_2 emissions	Will help assess sector circularity potential by analysing the intensity of material and energy consumption, and existing inefficiencies within a sector (waste and CO_2).	30%
Economic significance	→ Sector GDP and gross/total output → Labour force size → Export/import flows → MSME involvement	Will identify sectors with the largest relevance to the economy through contribution to GDP, employment, trade flows, and growth, as well as MSME involvement.	30%
Transformative impact potential	→ Inclusion of marginalised communities → Socioeconomic outcomes → Potential to drive industrialisation	Will help assess sectors based on the inclusion of marginalised populations on the Continent (women, youth, and rural residents), the potential for positive socioeconomic outcomes, and potential to drive industrialization on the Continent.	20%
Momentum	→ Sectoral commitments → Regulatory/policy frameworks → Disruptive potential → Covid-19 resilience	Will provide information on the willingness/ability to engage in CE opportunities, government and international institution priorities, and potential opportunities for developing the circular economy in the region. The Covid-10 criteria will aid in identifying opportunities to build resilience from pandemic shocks. Opportunities with momentum are likely to lead to immediate outcomes for the alliance.	20%

Source: adapted from World Economic Forum 2021 ↻ [30]
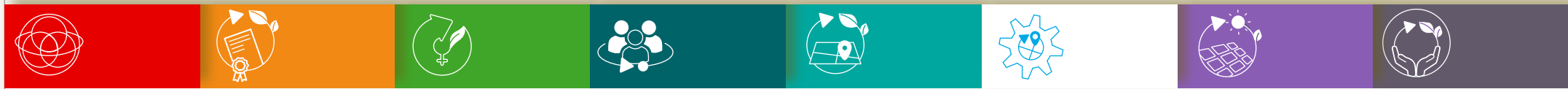
5.6 Adopting a circular economy ▶ 5.6.1 Process

Upskilling for a circular economy

Adoption of circular strategies requires skills that can be applied in business models that are involved in closing material cycles and reducing waste. In addition, successful adoption of CE is strongly hinged on changing mindsets and behaviour and having policies that create an enabling environment for developing successful training programmes and CE driven businesses. Training for CE should therefore be integrated at three levels: ↺ 31

→ Systemic level: skills are introduced into institutional frameworks, specialised occupations, advanced qualifications and economic, social and environmental drivers.

→ Institutional level: skills are developed through coordination between industry and VET providers and schools, in response to industry demands. Here sustainable practices, such as using refurbished equipment for teaching, can help to encourage acceptance and mindsets that value reuse.

→ Programme level: new skills requirements are translated into teaching and learning materials, training for teachers and foundational—including transferable and digital skills—for learners.

HEIs have been more involved in providing courses and training on CE to a greater extent than VET institutions. Yet VET institutions provide a great opportunity to fill in skills gaps due to the many possibilities they offer, for instance in accommodating training of both formal and informally trained workers, and training on skills relevant to a specific trade or vocation. To take up a considerable role in upskilling for the CE, VET institutions will need to utilise the following strategies (Figure 5.7 ↺).

→ Partnership and cross-sector learning
→ Institutional transformation
→ Adopting novel approaches
→ Building on existing knowledge and transformation

5.6 Adopting a circular economy ▶ 5.6.1 Process

Figure 5.7
Upskilling strategies for the circular economy

Partnership and cross-sector learning	Institutional transformation	Adopt novel approaches	Build on existing knowledge and information
Work with industry and research as knowledge partners on learning for the circular economy	Facilitate a systems-level revisioning of VET, ensuring that VET systems do not merely exist to satisfy economic demands, but also generate new workers and entrepreneurs with the know-how to spark a new economic model rooted in principles of sustainability	Create new (digital) learning arrangements and tools that combine online learning with on-the-job and workplace-oriented learning.	Take advantage of existing resources developed under sectoral industry alliances and blueprints for green- and circular economy-related skills development
Work with companies across industries where multiskilled and interdisciplinary work is becoming the norm		Support new VET qualifications and pathways to be translated into professions that contribute to the circular economy into high quality careers guidance for workers of all ages and positions along value chains	Utilise up-to-date skills data and labour market information systems where possible to increase the relevance of training provision to industry and forecast skills demands.
Create and support civil society and adult learning possibilities to ensure circular economy skills development in all societal sectors.			

Source: Adapted from Brown EG et al. 2021 ➲ [31]

5.6   Adopting a circular economy ▶ 5.6.2 Greening VET to local context

ADOPTING A CIRCULAR ECONOMY

Greening VET to local context

🔗 | EDUT | Support for Technical Education and Vocational Training in Tshopo Province, Congo

OVERVIEW

📊	→ Skills for greening existing jobs (technical skills)
🎓	→ Vocational education and training → Continuous professional development
📈	Meso, Micro
👤	→ Educational institutions
⏰	Phase I: 2015 – 2019 Phase II: 2020 – 2023
💲	EUR 16 million
🌐	Democratic Republic of the Congo
◿	Transversal
🎨	4, 5 [SDG 4 QUALITY EDUCATION] [SDG 5 GENDER EQUALITY]
🏛	Belgium
⚙	Enabel (BE)
🤝	→ Regional/Provincial Ministry for Technical Education and Vocational Training, Kisangani, Province of Tshopo → Ministry of Primary, Secondary, and Technical Education/ Provinces Educationnelles (PROVED) → 10 VET Institutions in Kisangani and the province of Tshopo

Kisangani is the capital of the Tshopo province in the Democratic Republic of the Congo in the midst of the vast and isolated Congo Basin, the second largest tropical woodlands on the planet. Agriculture and livestock play a leading economic role in the region.

This project supports efforts to improve the institutional (provincial) and organisational (institutions) framework by developing technical training of relevant quality, including practical courses, internships, and support for professional integration. The project emphasises technical and vocational training that responds to the province's employment and self-employment prospects, with a strong focus on entrepreneurship and including a greater proportion of women. The training also covers green transformation aspects such as green agriculture and skills related to hydropower. Activities include:

→ Setting up structures and working groups in educational institutions.

→ Establishing relationships between training operators and economic operators.

→ Preparing and implementing practical training methods such as work camps and income-generating activities.

→ Supporting graduates, especially women, transition into employment, with particular emphasis on self-employment.

→ Strengthening the capacity of training institutions by training managerial staff and providing equipment.

5.6   Adopting a circular economy ▶ 5.6.2 Greening VET to local context

⌗ | EDUT | Support for Technical Education and Vocational Training in Tshopo Province, Congo

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

EDUT has a strong **link with the local context**. It valorises traditional work methods and optimises using materials from the local value chains. The project supports:

→ **Entrepreneurship that focuses on working with local materials and green innovation.** For example:

  → "Green" non-fired bricks: A group of young people is currently being trained to produce bricks with a minimum amount of cement and without burning them. This method minimises the use of cement and reduces energy consumption and thus deforestation.

  → "Greening" carpentry: EDUT works with the local Carpenter Association to upgrade the skills of carpenters preventing wood waste. The objective is to improve the efficiency of primary wood utilisation significantly, helping to reduce the environmental impact.

  → VET institutions develop curricula in sustainable agriculture and support young entrepreneurs in launching small agribusiness projects, for instance, in ecologically sustainable honey production, mushroom cultivation, or poultry farming.

→ **Activities strengthening the relationships with the private sector** for internships and developing continuous education initiatives for **upskilling the workforce** (including green skills) is a key component of the project.

Success factors and learnings

→ Proactively tackling the image problem of agriculture, **encouraging youth to stay in the region** and invest in a future in green agriculture instead of waiting for a job in the public sector.

→ **Emphasising entrepreneurship**, the future of green innovation and the importance of the use of local materials.

→ **Focussing on agriculture and livestock**, which can operate without electricity. This is important because uninterrupted availability of energy and affordable energy access is challenging (Ressourcenschonendes Wirtschaften).

5.6   Adopting a circular economy ▶ 5.6.2 Greening VET to local context

🔗 | EDUT | Support for Technical Education and Vocational Training in Tshopo Province, Congo

EDUT supports young adults to invest in a future in agriculture as a key sector for the region

Learning about sustainable methods of honey production avoids unsustainable practices. As seen here, using smoke is more effective than burning out and cutting down a tree to access honey
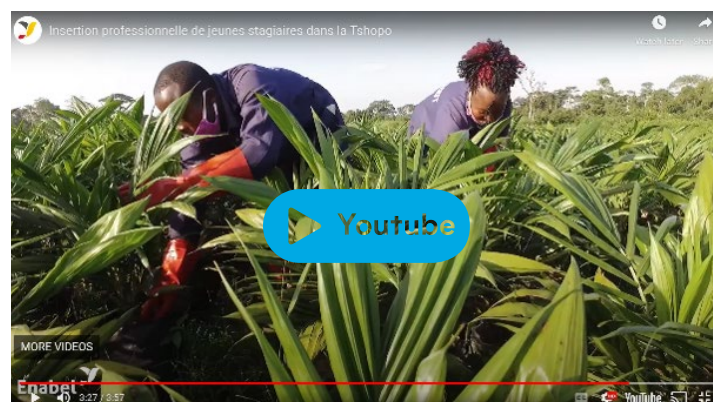
EDUT in Tshopo is working to integrate young people into internships in private companies in order to improve their technical training in-situ.

5.6   Adopting a circular economy ▶ 5.6.3 Reviving local sourcing for a circular economy

ADOPTING A CIRCULAR ECONOMY

Reviving local sourcing for a circular economy

Support for the development of inclusive and sustainable entrepreneurship in the Centre-East region

OVERVIEW

	→ Skills for greening existing jobs (technical skills)
	→ Vocational education and training → Continuous professional development
	Meso, Micro
	→ Educational institutions → Civil society organisations → Artisanal masons specialising in conventional construction and apprentice masons, → The local population in need of decent housing
	Programme: 2018 – 2023 Project: "Deployment of a green eco-construction sector": 2020 – 2023.
	EUR 0.6 million
	Burkina Faso
	Sustainable construction
	4, 8
	Belgium
	Enabel (BE)

For the specific component "Deployment of a green eco-construction sector"
→ Nubian Vault Association/Association la Voûte Nubienne (AVN)

Burkina Faso experiences some of the most radical climatic variations in the world, ranging from severe flooding to extreme drought, which has affected the agriculture-based economy and exacerbated food insecurity. These issues, combined with political instability, have resulted in un- and underemployment.

This project aims to improve Burkina Faso's competitiveness by building capacities of rural and urban businesses in the Center-East region with a view to contributing to the creation of decent jobs. The objectives of the project include:

→ Structuring the network of micro, small and medium-sized enterprises (MSMEs) around emerging opportunities in promising sectors (e.g. production and marketing of organic fertilizers).

→ Diversifying and improving the supply of financial and non-financial services for the creation and development of businesses.

→ Creating a business environment favourable to development.

→ Structuring investments to facilitate the region's economic development.
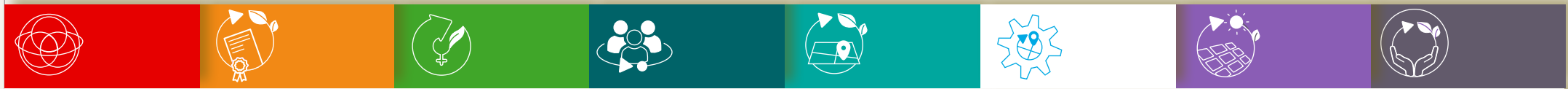
5.6   Adopting a circular economy   ▶ 5.6.3 Reviving local sourcing for a circular economy

🔗 | Support for the development of inclusive and sustainable entrepreneurship in the Centre-East region

The project facilitates the creation of a green construction sector within local development to strengthen the resilience and well-being of the people. To this end, it promotes emerging know-how and a competitive entrepreneurial dynamic through an innovative and sustainable Nubian Vault building solution.

5.6 Adopting a circular economy ▶ 5.6.3 Reviving local sourcing for a circular economy

🔗 | Support for the development of inclusive and sustainable entrepreneurship in the Centre-East region

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

In many countries, including Burkina Faso, concrete has replaced clay as the material of choice in housing construction. Concrete is seen as a more resistant, modern material. However, as climate change is becoming a pressing issue and the **construction sector is considering more sustainable building materials**, clay is making a comeback. The advantages of building with clay include:

→ It keeps the house cooler by keeping out the heat.

→ It is more environmentally friendly than concrete. Producing cement, a key ingredient in concrete, accounts for around 5% of global CO_2 emissions. And people with concrete homes often need to use air conditioning.

→ It can be locally sourced.

In recent years, architects, including renowned Burkinabé architect Francis Kéré, are returning to their countries' ancient traditions. However, many builders have lost the know-how of building with clay.

Enabel has partnered with the Nubian Vault Association, which promotes using the innovative and **sustainable architectural technique of building with clay** (and without the use of wood, which is a rare resource).

→ The partnership focused on **training apprentices, masons, artisans, and entrepreneurs**, accommodating diverse abilities.

→ **Graduates of the programme received coaching**.

→ **Institutional and civil society actors were made aware of and trained** in Nubian vault techniques.

→ The **curriculum is scalable** and can be implemented in other regions.

Success factors and learnings

→ **Incorporate "training building sites"** which can be used for community buildings.

→ **Consider that the sit-down classroom setting might not be conducive to workers** (project resorted to 80% time on the building site and 20% classroom time).

→ **Accommodations for adults working on reading skills.**
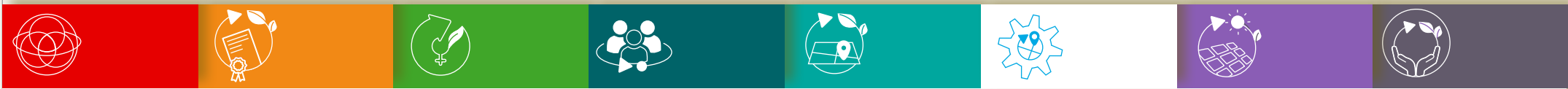
5.6   Adopting a circular economy ▶ 5.6.3 Reviving local sourcing for a circular economy

🔗 | Support for the development of inclusive and sustainable entrepreneurship in the Centre-East region

→ Ensure the **economic advantages of the approach are sufficiently emphasised**. It is important to attract interest beyond the advantage for the environment which requires a change in mindset:

→ Employability with new green skills.
→ Savings in building efficiency to lower air conditioning costs.

→ Foresee a **mechanism to reduce absenteeism** (e.g. harvest time) and drop-out rates because of immediate job opportunity.

→ Be aware that the market might not be ready for the new technique. Therefore, **ensure sufficient resources for advocacy**.

→ **Develop the capacity of business mentors to include green skills** along the entire value chain.

→ **Rely on partner operators**, Village Development Committees, and former local beneficiaries to raise awareness of Nubian Vault eco construction and financial incentives.

© Enabel/ Aimé Nana

Built from widely available earth (adobe) bricks and mortar, the Nubian Vault provides a solution for affordable and well-adapted buildings suitable for private and community use, in both rural and urban settings

© Enabel/ Bastiaan Stekelín

Construction of a vaulted doorway with adobe bricks

5.7 Greening the power sector

Promoting the green transformation requires measures that promote growth while guiding the energy sector into "green" modes of production and consumption. Greening the power grid is a core step in building a sustainable economy and serves as a base for the greening of other industries.

5.7 Greening the power sector

To achieve decarbonisation by 2050, the power sector will be required to accelerate its shift towards the use of renewables, increasing efficiency and making power systems more flexible. ⟲[32] This transformation will require a skilled workforce that is able to capitalise on this opportunity. Currently, the power sector employs on average 20 million people globally.⟲[33] However, the move to decarbonisation will require an extended labour force. In some studies, it's been estimated that the transition could create 14 million new jobs related to clean energy technologies, shift around 5 million workers from fossil fuels, and require additional skills and training for an estimated 30 million employees.⟲[34] IRENA estimates this trajectory will lead to 28.84 million jobs by 2050 as shown in Figure 5.8.⟲[32].
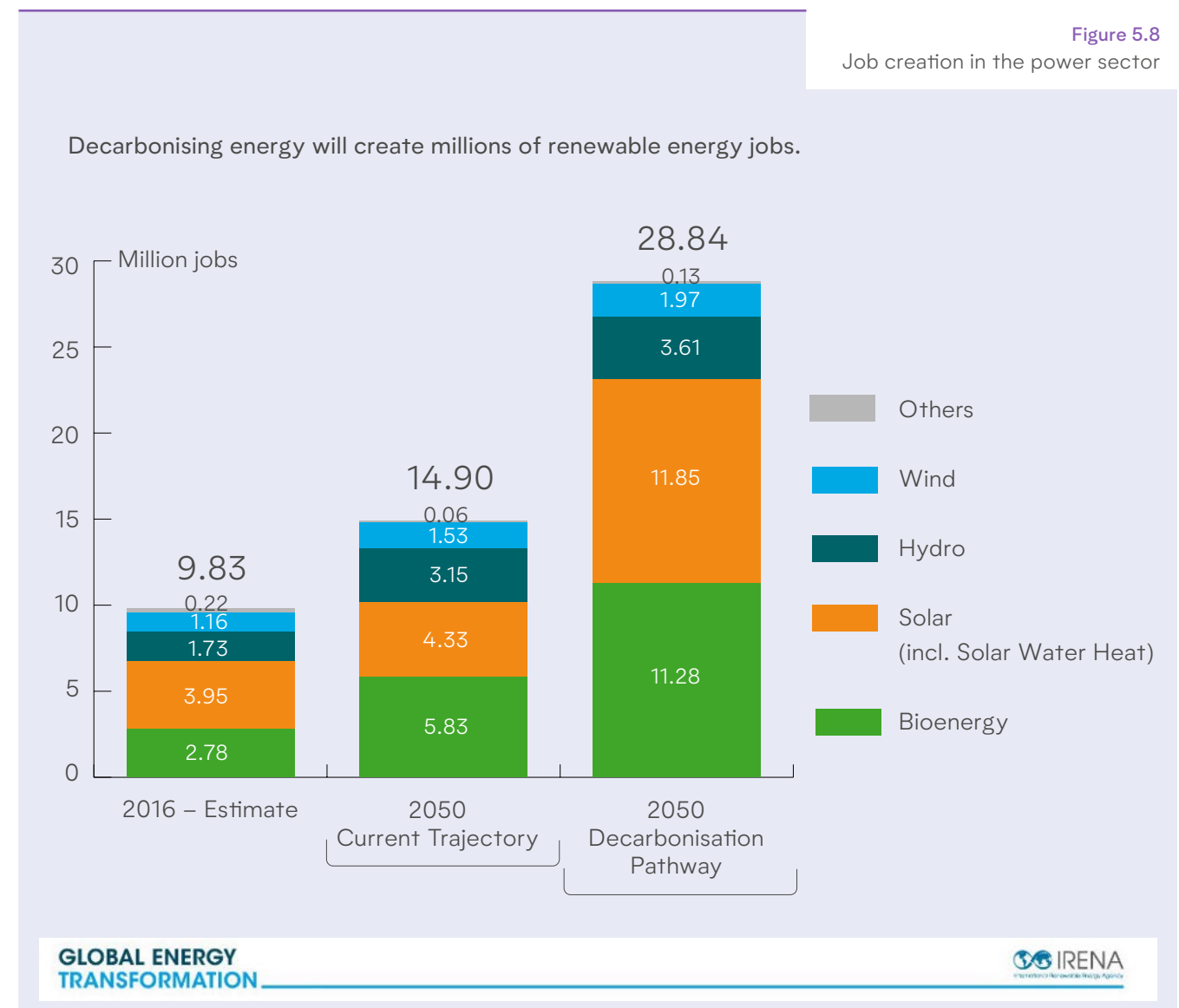
Figure 5.8
Job creation in the power sector

Decarbonising energy will create millions of renewable energy jobs.

Legend:
- Others
- Wind
- Hydro
- Solar (incl. Solar Water Heat)
- Bioenergy

2016 – Estimate: 9.83 (0.22 Others, 1.16 Wind, 1.73 Hydro, 3.95 Solar, 2.78 Bioenergy)
2050 Current Trajectory: 14.90 (0.06 Others, 1.53 Wind, 3.15 Hydro, 4.33 Solar, 5.83 Bioenergy)
2050 Decarbonisation Pathway: 28.84 (0.13 Others, 1.97 Wind, 3.61 Hydro, 11.85 Solar, 11.28 Bioenergy)

GLOBAL ENERGY TRANSFORMATION

IRENA

Source: International Renewable Energy Agency ⟲[35]

5.7   Greening the power sector   ▶ 5.7.1 Process

To achieve greater impact, training in the sector will need to address these three gaps at the least. ↺ [36]

→ **Clean energy skills training** – an opportunity for countries that are in their early stage of energy transition.

→ **Reskilling and upskilling** – ideal for large emerging economies and countries heavily reliant on traditional energy sectors such as oil, coal, and gas, and have a large workforce in the automotive sectors.

→ **Inclusivity** – Beyond identifying training needs in the sector, all training programmes should have diversity and inclusion at their core to avoid underrepresenting women and minority groups in the energy labour force. Targeted 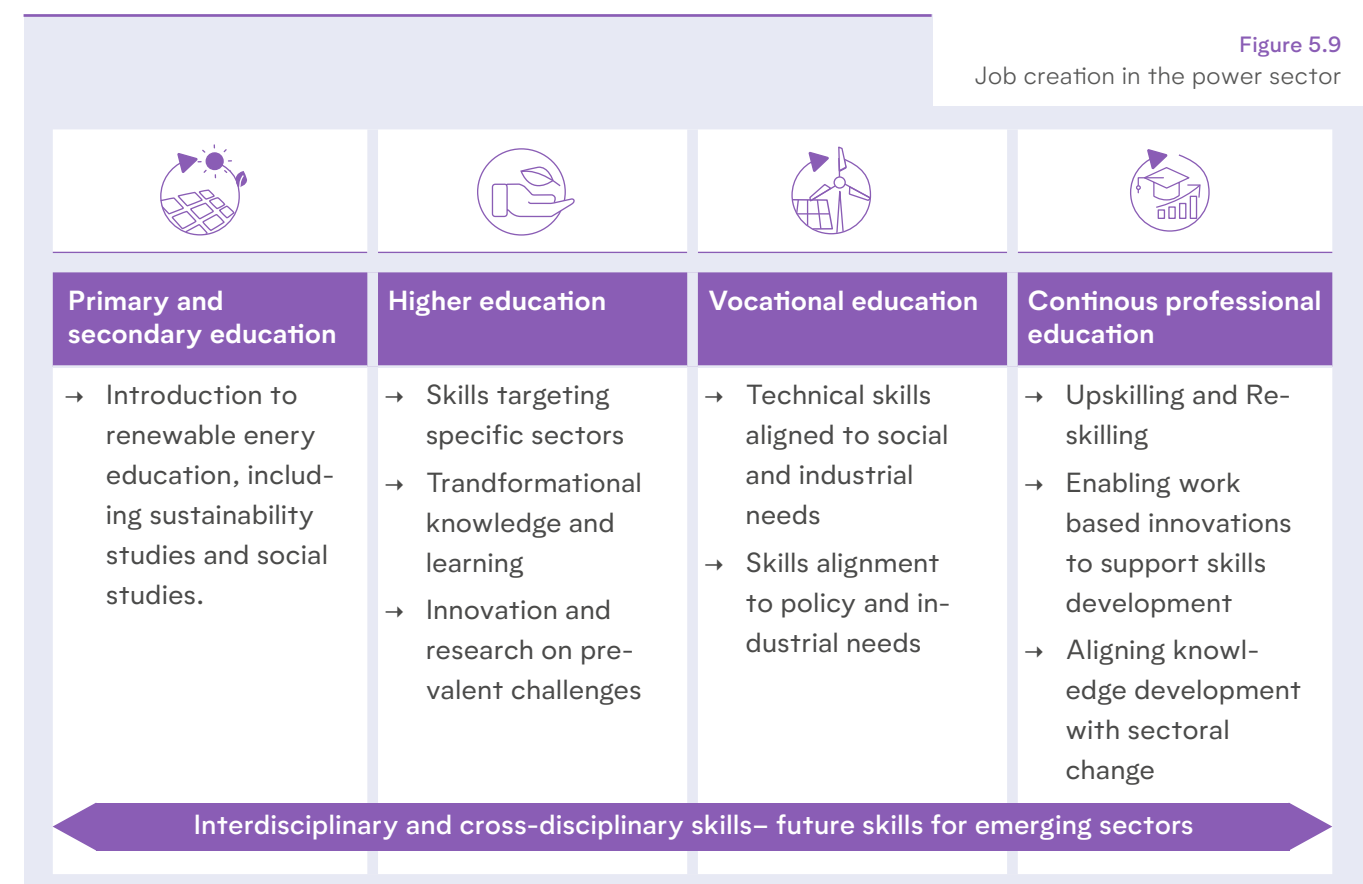training programmes for youth, women, and those who are marginalised in communities will therefore be paramount (see approach 5.3 on Women in Green Jobs ↺).

5.7.1   Process

Addressing the above skills gaps and attaining decarbonisation will require a holistic strategy to skilling programmes. It is vital that focus should not be solely aligned to one specific educational level and should instead target building skills from an early age. ↺ [37] Such a holistic approach would entail early exposure to skills necessary for the green transformation – ideally at early educational levels. This process of learning should be supported throughout vocational training, higher education, and continuous professional development as shown in Figure 5.9.

Figure 5.9
Job creation in the power sector

Primary and secondary education	Higher education	Vocational education	Continous professional education
→ Introduction to renewable enery education, including sustainability studies and social studies.	→ Skills targeting specific sectors → Trandformational knowledge and learning → Innovation and research on prevalent challenges	→ Technical skills aligned to social and industrial needs → Skills alignment to policy and industrial needs	→ Upskilling and Reskilling → Enabling work based innovations to support skills development → Aligning knowledge development with sectoral change

Interdisciplinary and cross-disciplinary skills– future skills for emerging sectors

Source: Paeradigms 2022

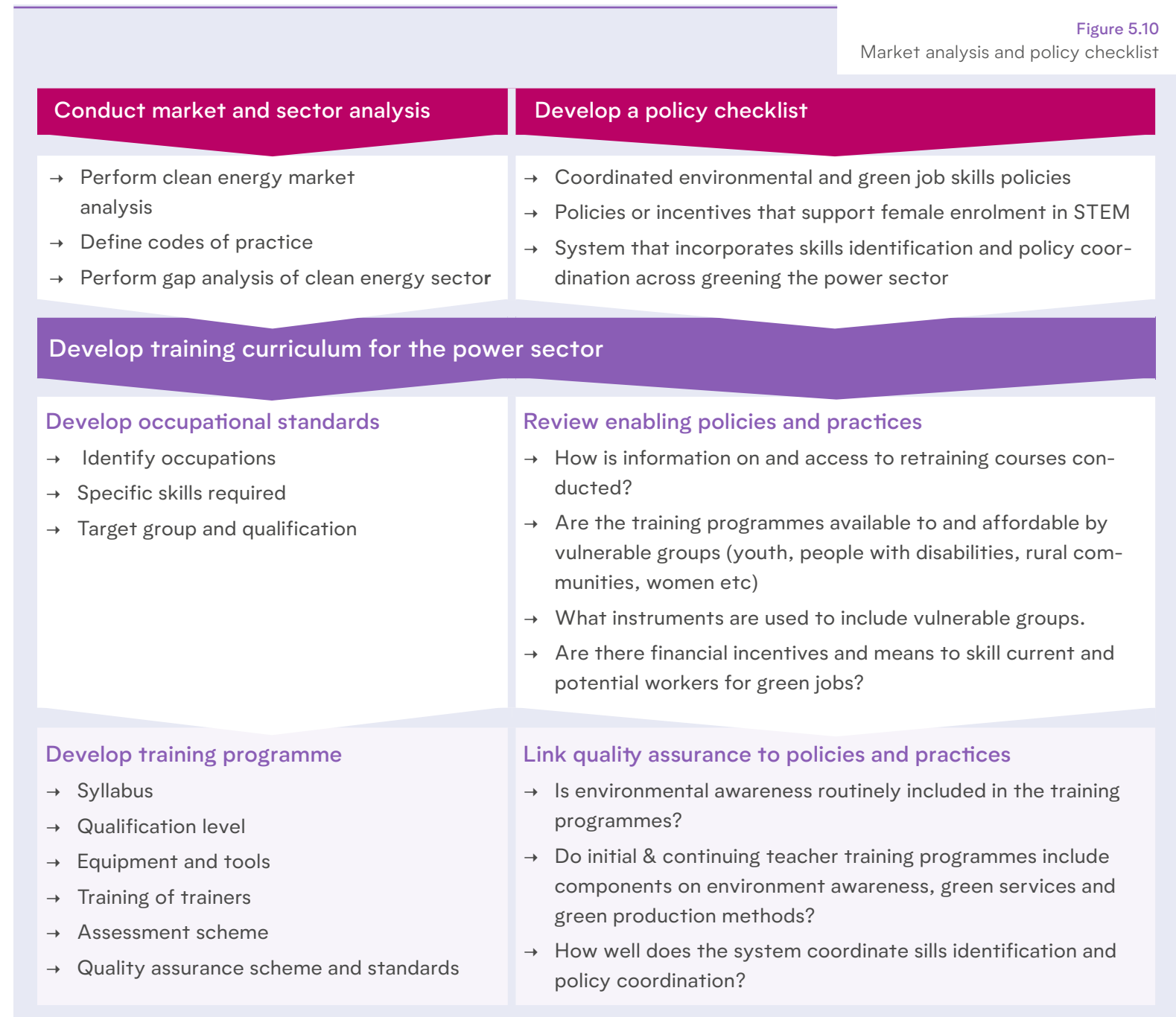## 5.7 Greening the power sector ▶ 5.7.1 Process

The process of determining what to teach, to whom and how, should be conducted with insight from an array of stakeholders, ranging from end-users, policy makers, educational institutions, and private sector. In addition, having adequate policies in place supporting the green transformation creates an enabling environment for developing targeted skills programmes (Figure 5.10). On a practical level, it could be said that these three key elements should be considered when planning training for the renewable energy industry:

→ Market and sector gap analysis

→ Training curriculum development

→ Existence of coherent and well-developed policies

Figure 5.10
Market analysis and policy checklist

Conduct market and sector analysis

→ Perform clean energy market analysis
→ Define codes of practice
→ Perform gap analysis of clean energy sector

Develop a policy checklist

→ Coordinated environmental and green job skills policies
→ Policies or incentives that support female enrolment in STEM
→ System that incorporates skills identification and policy coordination across greening the power sector

Develop training curriculum for the power sector

Develop occupational standards
→ Identify occupations
→ Specific skills required
→ Target group and qualification

Review enabling policies and practices
→ How is information on and access to retraining courses conducted?
→ Are the training programmes available to and affordable by vulnerable groups (youth, people with disabilities, rural communities, women etc)
→ What instruments are used to include vulnerable groups.
→ Are there financial incentives and means to skill current and potential workers for green jobs?

Develop training programme
→ Syllabus
→ Qualification level
→ Equipment and tools
→ Training of trainers
→ Assessment scheme
→ Quality assurance scheme and standards

Link quality assurance to policies and practices
→ Is environmental awareness routinely included in the training programmes?
→ Do initial & continuing teacher training programmes include components on environment awareness, green services and green production methods?
→ How well does the system coordinate sills identification and policy coordination?

Source: Adapted from UNESCO-UNEVOC 2020 ➲ [38], International Labor Organization 2019 ➲ [39]

5.7 Greening the power sector ▶ 5.7.2 Committing to capacity development

GREENING THE POWER SECTOR

Committing to capacity development

🔗 | ANCEE | African Network of Centers of Excellence in Electricity

OVERVIEW

	→ Skills for greening existing jobs (technical skills)
	→ Generic skills (transversal skills)
	→ Transformative skills (transversal skills)
	→ Continuous professional development
	Meso, Macro
	→ Governments
	→ Industry/Private sector institutions
	2014 – 2022
	EUR 12 million
	Algeria, Côte d'Ivoire, Egypt, Ghana, Kenya, Morocco, Nigeria, South Africa, Tunisia, Zambia
	Energy
	4, 7, 8
	AFD, (FR) African Development Bank (AfDB)
	Association of Power Utilities in Africa (APUA)
	African power pools

African power utilities (production, transmission, and distribution) tend to face similar problems in terms of human resources and skills development gaps.

This project seeks to improve the performance of the energy sector in Africa and intensify regional trade by strengthening technical and managerial skills across the continent. Activities include:

→ Supporting the establishment and operation of a network of centres of excellence capable of providing training tailored to the local needs of the APUA power utility members.

→ Providing technical and financial support to the centres to further develop their training offer in newer technologies such as renewable energy and energy efficiency.

→ Strengthening the capacities of companies in terms of forecasting jobs and skills, assessing training needs and promoting gender equality in the workplace.

→ Supporting training centres not yet part of ANCEE to eventually integrate them into the network of excellence, thereby scaling activities in training of trainers, infrastructure renovation, and technical expertise.

→ Promoting regional cooperation and integration.

5.7 Greening the power sector ▶ 5.7.2 Committing to capacity development

| ANCEE | African Network of Centers of Excellence in Electricity

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

→ Support the establishment and operation of a **network of centres of excellence** capable of providing training tailored to the local needs of the APUA power utility members with a specific focus on renewable energy with VET diplomas for wind and solar power.

→ **Provide technical and financial support to the centres** to further develop their training offer, specifically in newer fields of study aimed at "green skills" in renewable energy and energy efficiency.

→ **Strengthen the capacity of companies** in terms of jobs and skills forecasting, training needs assessment, and promotion of gender equality in the workplace.

→ **Support other training centres that are not yet part of the ANCEE** to eventually integrate them into the network of excellence through training of trainers, infrastructure renovation, and technical expertise.

→ **Promote regional cooperation** and integration. now-how of building with clay.

Success factors and learnings

→ Clear **assessment of current and future training needs** with key stakeholders, including policy-makers and power companies (including their HR department).

→ A **national strategy that considers diversity in new energy**, balancing use between hydro-energy, solar, and wind.

→ **Commitment from power utility company top management** to a cultural shift with a strong focus on human resources development and re-spective funding.

→ **Incentivisation of power utility companies** through higher subsidies for training linked to green skills (e.g. gender mainstreaming, re-newable energy, and smart grids have higher subsidies than other topics).

→ **Establishment of clear objectives** (e.g. power utilities aimed to increase "green training" from 20 % to 25 %).

5.7　Greening the power sector ▶ 5.7.2 Committing to capacity development

🔗 | ANCEE | African Network of Centers of Excellence in Electricity

→ **Capacity development of human resources management** to

→ Identify staff training needs, thus developing green skills.

→ Develop a succession plan to replace experience staff upon retirement.

→ Address staff retention problems to keep trained and experienced staff.

Additional information and resources

AFD Webpage: 🔗

AfDB Webpage: 🔗

ANCEE provides technical and financial support to the members of the Association of Power Utilities in Africa (APUA)
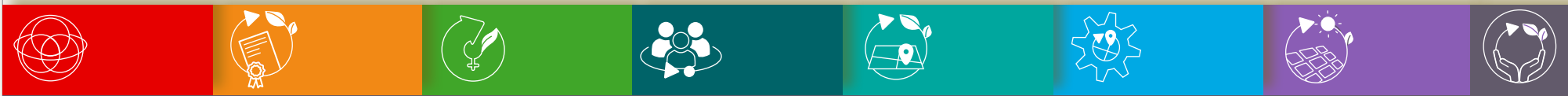
5.8 Sustainability

Multistakeholder partnerships and strategic collaborations form an integral part of skills development initiatives. However, in such partnerships, the sustainability of the programmes has remained a matter of concern. How can cooperation evolve into long-term partnerships to build sustainable skilling models?

5.8   Sustainability   ▶ 5.8.1 Process

Taking a systemic approach to providing skills for the green transformation is vital to ensure sustainability and to achieve the long-term impact that is needed for this change. Enabling policies that support both the demand and supply for green skills are considered to play a significant role in that regard. However, policies alone can't lead towards the development of effective skills programmes and their eventual scale-up. The process by which training programmes are developed and implemented is equally important. ➲ [18] Focusing on the process would entail a critical look at:

→ the role and mode of engagement of various stakeholders during the development of skills programmes (e.g. private sector, government, education and training organisations, trade unions, and civil society).

→ the policymaking process for forecasting and identifying skills to respond to existing and future gaps (e.g. foresight, coordination, monitoring and evaluation).

5.8.1   Process

Developing enabling policies

The policy aspects that will ensure sustainability should include drivers for creating demand for technologies that contribute to a green transformation – both from a consumer and production angle. They should also enhance the knowledge and skills needed at a national level. **Figure 5.11** ➲ : Example of enabling policies for green job creation, illustrates the types of policies that support the creation of green jobs.

Policy development should also look at filling the gaps that currently exist, such as incoherence between skills and environmental policies. Policy coherence can be improved at the planning, design, and implementation stages, by combining top-down coordinated policymaking and bottom-up initiatives. To enhance the policymaking process, there is a need to include continuous professional development for policymakers that specifically address policymaking for the green transformation.

Further sustainability can be achieved through collaboration between private-sector and multinational companies and the public sector through promoting and empowering a public–private partnership (PPP) for green jobs. PPP can boost innovative and new approaches for financing lifelong learning and support for TVET/HEI systems. These kinds of partnerships are fostered by proven incentives for collaboration and effective policies that support the same. ➲ [39]
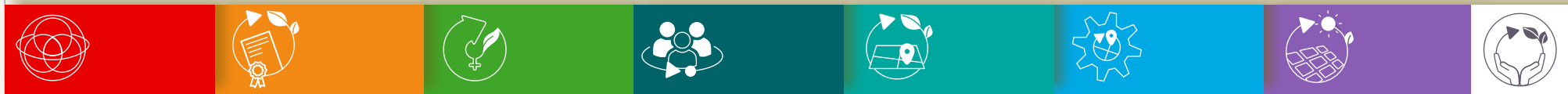
5.8   Sustainability ▶ 5.8.1 Process

Figure 5.11
Example of enabling policies for green job creation

Policy type	Objective
Subsidies	Phase out subsidies for environmentally harmful industries and shift part of those subsidies to renewable energy, energy efficiency, clean production methods, and public transit.
Carbon markets	Price carbon and address shortcomings in carbon trading and the clean development mechanism so that they can become reliable and adequate funding sources for green projects and employment.
Tax reform	Scale-up eco-taxes. Eco-taxes can be used to reduce the tax burden on workers, while discouraging polluting and carbon-intensive economic activities.
Targets and mandates	Use regulatory tools to develop greener technologies, products, and services. Examples are building codes, energy-efficiency standards (for appliances, vehicles, etc.) and targets for renewable energy.
Energy alternatives	Adopt, for instance, feed-in laws that secure access for renewable energy to the electrical grid at guaranteed prices.
Product takeback	Adopt "extended producer responsibility" laws for all types of products.
Eco-labelling	Adopt eco-labels for all consumer products to ensure that consumers have access to information needed for responsible purchasing decisions (and thus encourage manufacturers to design and market more eco-friendly products).

Source: UNIDO 2020 ⤶ [18]

5.8   Sustainability ▶ 5.8.1 Process

Effective processes for skills development programmes

The process by which a programme addressing skills for the green transformation is developed, whether at an institutional or national level, can play a significant role in determining the impact and sustainability. Non-exclusively, **Figure 5.12** shows three aspects that should be considered:

→ Coordination across stakeholders (including students from vocational and higher education)
→ Monitoring and evaluation of outcomes
→ Forecasting future needs for training and retraining

Figure 5.12
Process for skills development programmes

Coordination – to identify gaps in capabilities (skills, know-how) and to increase synergy across policy interventions

Monitoring and evaluation of outcomes – ensure adaptation to changing market conditions

Forecasting future needs and retraining – to address the high level of uncertainty and novelty associated with the transition to a green economy

Source: Adapted from UNIDO 2020 ➲ 18

5.8   Sustainability ▶ 5.8.2 Supporting institution building

SUSTAINABILITY

Supporting institution building

🔗 | NUL-ERC | National University of Lesotho Energy Research Centre

OVERVIEW	
	→ Skills for new green jobs (technical skills)
	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Generic skills (transversal skills)
	→ Transformative skills (transversal skills)
	→ Higher education
	→ Continuous professional development
	Meso, Micro
	Educational institutions
	2016 – 2018
	EUR 89,325
	Lesotho
	Energy
	4, 7, 9 [4 QUALITY EDUCATION] [7 AFFORDABLE AND CLEAN ENERGY] [9 INDUSTRY, INNOVATION AND INFRASTRUCTURE]
	ADA (AT), Finland
	GIZ (DE)
	National University of Lesotho (NUL)

In Lesotho, about 47 % of households have access to electricity, concentrated mainly in urban areas. The government has set a goal of increasing the electrification rate to 75 % of households by 2022. Lesotho has identified hydropower, wind generation, and solar power as potential renewable energy sources to help reach these targets.

This project established the National University of Lesotho (NUL) Energy Research Centre (ERC) to respond to energy and climate change challenges. Its main activities are:

→ Developing human resource capacity in sustainable energy through short courses and a master's programme.

→ Performing relevant research that informs national energy policy for sustainable development.

→ Conducting all-inclusive low-carbon research work (e.g. solar, wind, hydro, bio-energy).

→ Providing social engineering training (e.g. energy policy, economics, finance & project management, climate change & environment)

→ Supporting capacity building through training and outreach programmes.

5.8 Sustainability ▶ 5.8.2 Supporting institution building

🔗 | NUL-ERC | National University of Lesotho Energy Research Centre

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

Sustainability after project closure was achieved by **linking green skills to higher education and professional training.**

→ **Connecting with other universities** through regional and international exchange (e.g. staff mobility and international exchange).

→ Establishing an **advisory board with participation from future employers** – this facilitated accreditation by addressing stakeholder needs.

→ Organising a **conference to create visibility in the research community** (e.g. RERIS Renewable Energy Research and Innovation Symposium).

Success factors and learnings

→ **Change methodology on structuring programmes.**

→ Close interaction with stakeholders who drive programme contents.

→ Emphasis of skills over knowledge (e.g. through industry visits and international exchange).

→ **Integrate students in all activities** (e.g. mini-grid design, tariff determination, workshops and events with externals) to develop hands on technical and transversal skills; connect dissertation projects to consultancies.

→ **Emphasise visibility and communication** through:

→ Awareness campaigns for communities, regions, and rural areas.

→ Maintaining a media presence (social, press, and video).

→ **Incentivise research** through collaboration with the public and private sectors (consultancies) and international partners (research), and research awards.

→ Use results as case studies to make teaching relevant to the local or regional context.

→ Strengthen strategic partnerships, which improve employability, attract prospective students and lecturers (e.g. lecturers from industry), and facilitate opportunities for field visits to industry partners.

→ **Establish financial stability** through tailored short courses and innovative fee structures that open master's courses to continuous professional development participants.

5.8   Sustainability ▶ 5.8.2 Supporting institution building

🔗 | NUL-ERC | National University of Lesotho Energy Research Centre

Photo above left:
MSc Bio-Energy
Course – Biodiesel
Making Practical

Photo above right:
MSc Hydropower
Course - River Flow
Rate Measurement
Practical

*Photo below left,
courtesy of National
University of Lesotho:*
NUL Executive
Management
attending aware-
ness campaign

Photo below right:
Community Public
Gathering discuss-
ing erection of ERC
mini-grid project

5.8 Sustainability ▶ 5.8.3 Linking training to real-life installations

SUSTAINABILITY

Linking training to real-life installations

SOLTRAIN | Southern African Solar Thermal Training and Demonstration Initiative

OVERVIEW

	→ Skills for greening existing jobs (technical skills, upskilling, reskilling)
	→ Vocational education and training
	→ Higher education
	→ Continuous professional development
	Macro, Meso, Micro
	→ Governments
	→ Educational institutions
	→ Industry/Private sector institutions
	→ Civil society organisations (e.g. hospitals, community centres)
	→ Tourism facilities (e.g. lodges and hotels)
	Phase IV: 2019–2022 (project start: 2009) Phase V (SOLTRAIN+): 2022–2026
	EUR 3 million (phase IV)
	Botswana, Lesotho, Mozambique, Namibia, South Africa, Zimbabwe
	Renewable Energy
	1, 4, **7**, 12, 13
	ADA (AT), Finland
	Austrian Institute for Sustainable Technologies (AEE INTEL)

→ Centre for Renewable and Sustainable Energy Studies, Stellenbosch University, South Africa (CRSES)

→ Namibian Energy Institute (NEI), University of Science and Technology, Namibia (NUST)

→ Southern African Development Community Centre for Renewable Energy and Energy Efficiency (SACREEE)

→ South African National Energy Development Institute (SANEDI)

Up to 50 % of electricity consumed by residential buildings in Southern Africa is for hot water. Therefore, introducing solar water heaters to homes, businesses, and public buildings alleviates dependency on the grid by dramatically reducing the demand for electricity.

This project is a regional initiative promoting solar thermal systems (STS) in six SADC countries through:

→ Supporting political stakeholders to implement national solar thermal roadmaps.

→ Strengthening capacity in the field of solar thermal systems.

→ Encouraging investment in solar water heaters (also for demonstration systems).

→ Raising awareness for solar thermal technology and demonstrating that solar water heaters work.

5.8 Sustainability ▶ 5.8.3 Linking training to real-life installations

🔗 | SOLTRAIN | Southern African Solar Thermal Training and Demonstration Initiative

FOCUS ON SPECIFIC GREEN SKILLS AND LEARNING

Relevance and innovative approach

SOLTRAIN has **promoted solar thermal systems in Southern Africa**, where the population can benefit from renewable energy products and off-grid production. The project's approach to sustainability is noteworthy. Key innovative elements include:

→ **Financial incentives to encourage the installation of solar water heaters**. These have served as demonstration systems and allowed the immediate application of acquired knowledge on the ground.

→ **Quality assurance and certification of STS installations** have been an integral part of SOLTRAIN, supporting high-quality standards, trust, and broad implementation – and, in some cases, even national uptake.

→ SOLTRAIN has **emphasised awareness campaigns**, explaining the benefits of the technology and aiming to influence regulations, encourage investment in R&D capacity, and achieve support for local STS production.

Success factors and learnings

→ **Equitable partnership** with strong ownership by Southern African partners

→ Training and advocacy for **financial incentives for installations** through grants.

→ **Quality certification** by external national actors provides immediate feedback on how well technicians have installed the solar thermal system (continuous improvement loop).

→ **Immediate application of newly acquired technical skills** to meet the increase in demand to install and maintain solar water heaters.

→ Flexibility to **localise implementation** approaches as each country is different. This is of utter importance to keep skills relevant because skills generally have a short "half-life".

5.8   Sustainability ▶ 5.8.3 Linking training to real-life installations

🔗 | SOLTRAIN | Southern African Solar Thermal Training and Demonstration Initiative

Project partners from Botswana and South Africa

Training course for plumbers in Beira, Mozambique

Thermal solar systems for the girls' home of Young Africa

6. Resources

Toolkit Reference	Theme	Year of Publication	Title	Organisation	Type of organisation	Type	Link
3	Green skills	2021	Fit for the future of finance: Fundamentals in sustainable finance	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Emerging Markets Sustainability Dialogue	Development agency	Course	🔗
3	Green skills	2021	The green employment and skills transformation: insights from a European Green Deal skills forecast scenario	European Centre for the Development of Vocational Training	Intergovernmental	Publication	🔗
3	Green skills	Webpage	Green skills (European Climate Pact)	European Union	Intergovernmental	Resource platform	🔗
3	Green skills	2021	Green resilient and inclusive development	World Bank	Development bank	Publication	🔗
3	Green skills	Website	SME Green skills hub	SME (Small and Medium sized Enterprises) Green Skills Hub	Platform	Project	🔗
3	Green skills	2018	Education and skills for inclusive growth, green jobs and the greening of economies in Asia: Case study summaries of India, Indonesia, Sri Lanka and Viet Nam	Asian Development Bank	Development bank	Publication	🔗
3	Green skills	Website	The ILO's green jobs programme	International Labour Organization	Intergovernmental	Programme; Resources	🔗
3	Green skills	Webpage	Green growth and sustainable development	Organisation for Economic Co-operation and Development	Intergovernmental	Programme; Resources	🔗
3	Green skills	2017	Growth indicators green growth 2017 – highlights	Organisation for Economic Co-operation and Development	Intergovernmental	Publication	🔗
3	Green skills	2020	Green industrial skills for a sustainable future	United Nations Industrial Development Organization	Intergovernmental	Publication	🔗
3	Green skills	2022	What are green skills?	United Nations Industrial Development Organization	Intergovernmental	Publication	🔗
3	Green skills	2021	These are the sectors where green jobs are growing in demand	World Economic Forum	NGO/ThinkTank	Publication	🔗

3	Green trans-formation	Project	Skills and jobs for the green transition	European Centre for the Development of Vocational Training	Intergovernmental	Programme; Resources	🔗
3	Transforma-tive skills	2022	Future trends and competencies for the Swiss international cooperation sector	Cinfo	NGO	Publication	🔗
5.2	Curriculum Development	Website	ECO-UNESCO Training Programmes	ECO-UNESCO	Intergovernmental	Programme	🔗
5.2	Curriculum Development	Website	Generic green skills for TVET	UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training	Intergovernmental	Resource platform	🔗
5.2	Curriculum Development	2022	Recognizing green skills through non-formal learning – a comparative study in Asia	n.a.	Academic	Publication	🔗
5.2	Curriculum Development	Webpage	Greening TVET	UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training	Intergovernmental	Resource platform	🔗
5.2	Curriculum Development	2017	Greening technical and vocational edu-cation and training: A practical guide for institutions	UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training	Intergovernmental	Publication	🔗
5.2	Curriculum Development	2021	Global guidance for education on green jobs: connecting higher education and green opportunities for planetary health	UNEP	Intergovernmental	Publication	🔗
5.2	Curriculum Development	2021	Green principles for TVET sector	BC	Development agency	Project	🔗
5.2	Curriculum Development	2021	A new green learning agenda: approaches to quality education for climate action	BI	NGO/ThinkTank	Publication	🔗
5.2	Curriculum Development	2019	How to better integrate environmental and climate issues into education and training programmes		Network	Project	🔗
5.2	Curriculum Development	2022	Greening TVET and skills development: A practical guidance tool	ILO	Intergovernmental	Publication	🔗
5.2	Curriculum Development	2021	Energy start-up toolkit	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Development agency	Handbook	not avail-able

5.3	Women in green jobs	2021	The future is equal: success factors for gender equality in vocational education and training	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Development agency	Publication	🔗
5.3	Women in green jobs	2015	Gender equality and green jobs	International Labour Organization	Intergovernmental	Publication	🔗
5.3	Women in green jobs; Approach 5: Aligning Regional Needs	2021	Green jobs for women in africa: Opportunities and policy interventions	UN Women and the African Development Bank	Intergovernmental	Publication	🔗
5.4	Youth Engagement	2021	Green jobs for young people in africa: Work in progress	Include Knowledge Platform	NGO/ThinkTank	Publication	🔗
5.4	Youth Engagement	2021	Economic stimulus of climate action in developing countries: A framework for sustainable and pro-poor COVID-19 recovery	NewClimate Institute	NGO/ThinkTank	Publication	🔗
5.4	Youth Engagement	2022	"Aiming higher: Elevating meaningful youth engagement for climate action"	United Nations Industrial Development Organization	Intergovernmental	Publication	🔗
5.5	Aligning Regional Needs	2019	Skills for a greener future: A global view based on 32 country studies	International Labour Organization	Intergovernmental	Publication	🔗
5,5	Aligning Regional Needs	2022	Towards a regional approach for skills policy	Individual researchers (Carlo Corradini, David Morris, Enrico Vanino)	Academic	Publication	🔗
5.1.1	University-industry partnerships	2014	The NoPa toolbox: New partnerships for innovation in sustainable development; why how, and who	Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), German Academic Exchange Service e.V. (DAAD), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Project	Publication	🔗

5.1.1	University-industry partnerships	2015	**The NoPA Case: New partnerships for innovation in sustainable development; Reflections and Achievements**	Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), German Academic Exchange Service e.V. (DAAD), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Project	Publication	🔗
5.1.1	University-industry partnerships	2018	**Innovation for Sustainable Development – New Partnerships (NoPa)**	Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), German Academic Exchange Service e.V. (DAAD), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Project	Publication	🔗
5.2 5.8	Curriculum Development; Sustainability	Website	**Education for Climate Coalition**	European Commission	Intergovernmental	Platform	🔗
5.3 5.7	Women in green jobs; Greening the Energy Industry	2019	**Renewable Energy: A Gender Perspective**	International Renewable Energy Agency	Intergovernmental	Publication	🔗
5.5 5.7 5.8	Greening the Energy Industry; Sustainability; Aligning Regional Needs	2022	**Energy Effciency in the Building Sector for a More Sustainable Mongolia**	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Swiss Agency for Development and Cooperation	Development agency	Project	🔗

7.

Terminology

Green transformation (green transition)

Green transformation is sustainable and inclusive socio-economic structural change that allows the economy and society to move from the current environmentally unsustainable situation towards a new sustainable environment. The plan of action for achieving this transformation is Agenda 2030. The terms "green transformation" and "green transition" are often used interchangeably, however, transition refers to the multiple, interrelated, and simultaneous processes involved in this shift, while transformation emphasises the structural and systemic change. Green transformation demands rethinking economic, environmental, and social policies and how they interrelate. It focuses on the competence of the process – efficient, responsible, rational, and respectful use of available resources – combining economic growth with environmental consciousness to achieve a high quality of life for present and future generations. The transformation encompasses all spheres of society and the economy. There is no single approach to green transformation because approaches depend on the context and different perspectives within a context. Progress in one field can cause unintended consequences in another. Thus, green transformation requires strong collaboration across multiple stakeholders. The term "green transformation" is increasingly linked to the concept of "just transition" which reflects the comprehensive approach and paradigm shift. ➲ [40] [41] [42]

Agenda 2030

On 25 September 2015, the 193 member states of the UN approved the 2030 Agenda for Sustainable Development, an ambitious plan to achieve prosperity that is respectful of the planet and its inhabitants. This endorsement of Agenda 2030 and its 17 Sustainable Development Goals (SDGs) reaffirms the world community's commitment to all three dimensions of sustainable development, namely, economic, social, and environmental. The overarching goal is to leave no one behind. Education is perceived a public good and is an essential step in the process of achieving a green transformation. ➲ [43]

Building back better and building forward better

The term "Building Back Better" refers to and can imply "carry on as before, just a bit better". In essence, this is a continuation of the long-standing non-sustainable growth philosophy. Alternatively, there has been a general call for "Building Forward Better", which demands a paradigm shift to avoid going back to "how things were" (e.g. before the 2020 pandemic, the 2008 financial crisis, or a natural disaster) and instead move forward with the sustainability agenda. Building forward implies a balance of social, economic, and environmental priorities in planning, reform, and investing for a liveable future. It demands radical rethinking, redirection, and behavioural change. This paradigm shift has now been taken up by several international organisations, such as the EU and the UN (FAO, UNDP, UNESCO, UNEP). The EU, for instance, has made stimulus packages available to encourage investment and behavioural change that reduce the likelihood of future crises and increase society's resilience to such crises when they occur. Wellbeing and inclusion are at the heart of this approach. Well-designed stimulus measures can simultaneously address several dimensions, e.g. promoting the transition to accessible mobility systems and investing in low-carbon and decentralised electricity systems. (e.g. OECD 2020). Building Forward Better shares many common elements with green recovery. ⟳ [44]

Education for sustainable development (ESD)

ESD empowers learners with knowledge, skills, values, and attitudes to take informed decisions and make responsible actions for environmental integrity, economic viability and a just society. It includes people of all genders while respecting cultural diversity in a life-long learning process and is an integral part of quality education that enhances cognitive, social, and emotional, and behavioural dimensions of learning. It is transformational and holistic, encompassing learning content and outcomes, pedagogy, and the learning environment itself. ESD is recognised as a key enabler of all SDGs and achieves its purpose by transforming society. ⟳ [45]

Green economy

Several definitions of green economy have been defined by different organisations, but the central idea of improved human well-being and social equity while significantly reducing environmental risks and ecological scarcity appears to be common. One of the most

cited and generally agreed definitions derives from the UN Environment Programme (UNEP), which defines the green economy as low carbon, resource efficient, and socially inclusive. According to UNEP, in a green economy, growth in employment and income is driven by public and private investment into 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. These green investments need to be enabled and supported through targeted public expenditure, policy reforms, and changes in taxation and regulation. UNEP promotes a development path that recognises natural capital as a critical economic asset and a source of public benefit, especially for poor populations whose livelihoods depend on natural resources. The notion of green economy does not replace sustainable development but creates a new focus on the economy, investment, capital and infrastructure, employment and skills, and positive social and environmental outcomes. ↻ [46] [47]

Green growth

Green growth is a paradigm in which green policies, innovation, and investments drive sustainable economic development. More broadly, green growth is an approach for achieving a number of simultaneous objectives of sustainable development: (1) avoiding and curbing greenhouse gas emissions, (2) building resilience to climate extremes and longer-term change, (3) using resources more efficiently, (4) providing sustainable and equitably distributed increases in GDP and standards of living, and (5) valuing the often economically invisible natural assets that have underpinned economic success over the centuries. The concept of green growth has been informed by leading international organisations (e.g. UN, EU, OECD) involved in green growth planning and development. From a theoretical viewpoint, green growth advocates point out that GDP only measures the value of traded goods and services; it does not measure their environmental impact. Some economic activities have much higher energy and resource content and waste impact per dollar than others. Consequently, a gradual shift to less environmentally harmful activities (e.g. using renewable energy and organic materials, increasing energy efficiency, shifting consumption from material to digital products) would decouple GDP growth from environmental damage and greenhouse gas emissions. Technological innovation, along with social organisation and a change in consumption patterns, can make

such a shift possible. Yet, ecological economists argue that technological progress has its limits. First, the level of production (global GDP) is limited by the resources, land, and energy needed. And second, technological progress is unable to sufficiently mitigate the impact of economic production on the Earth's critical ecosystems that regulate our climate, pollinate our plants, and clean our water. Also, critics of green growth highlight that green growth approaches do not fully consider the underlying economic system change needed to address the climate crisis, biodiversity crisis, and other environmental degradation. They point instead to alternative frameworks for economic change such as a circular economy, degrowth, doughnut economics, or similar systemic changes that better account for planetary boundaries. It is worth mentioning that the concepts of green growth, green economy, and low carbon development are often used interchangeably.

Green jobs

ILO defines green jobs as decent jobs that contribute to preserving or restoring the environment. These jobs can be in traditional sectors such as manufacturing and construction or emerging green sectors such as renewable energy and energy efficiency. Green jobs thus help to (1) improve energy and raw materials efficiency, (2) limit greenhouse gas emissions, (3) minimise waste and pollution, (4) protect and restore ecosystems, and (5) support adaptation to the effects of climate change. At the enterprise level, green jobs can produce goods or provide services that benefit the environment, for example, green buildings or clean transportation. However, these green outputs (products and services) are not always based on green production processes and technologies. Therefore, green jobs can also be distinguished by their contribution to more environmentally friendly processes. For example, green jobs can reduce water consumption or improve recycling systems. Yet, green jobs defined through production processes do not necessarily produce environmental goods or services. As illustrated by the diagram below, a distinction can thus be drawn between employment in green economic sectors from an output perspective and job functions in all sectors from an environmentally friendly process perspective. For ILO, green jobs are all those jobs that fall in the dashed area:
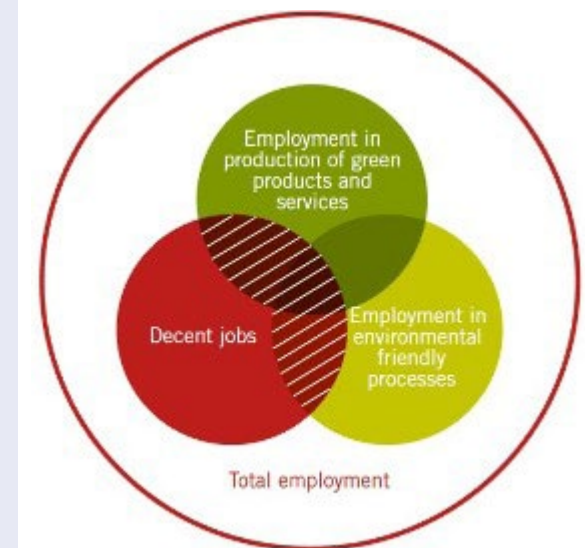
Source: International Labor Organization 2016 ➲ 48

Green knowledge

Green knowledge is a person's capacity to understand and evaluate practices and strategies of sustainability for the development of greener performance trajectories in society and the environment.

Green recovery

Green recovery is the expression used for public and private economic recovery measures aligned with long-term climate change and sustainability objectives. These measures target structural reforms and transformative change necessary to move towards sustainability, resilience, and climate neutrality (e.g. as economic and social life gets back on track post-Covid-19). Green recovery leads to long-term green growth while ensuring that natural livelihoods are preserved for future generations. Green recovery measures should therefore have a twofold effect: on the one hand, they should be quick, time-limited and target group-specific, and geared to acute needs; on the other hand, they should set the course for socio-economic and ecological transformation in the medium and long term. ⟳ [49] [50]

Green technology

The term green technology (also green tech) can be broadly defined as technology that has the potential to significantly improve environmental performance relative to other technology.

Just transition

ILO defines "just transition" as the need for nations and businesses to transition towards greener, more resilient and climate-neutral economies and societies in order to tackle pressing environmental challenges like climate change, pollution, and plummeting biodiversity. The term "just transformation" is used interchangeably. It means 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. a just transition involves maximising the social and economic opportunities of climate action while minimising and carefully managing any challenges – including through effective social dialogue among all groups impacted and respect for fundamental labour principles and rights. ⟳ [51]

Living labs

Living labs are open innovation ecosystems in real-life environments using iterative feedback processes throughout a lifecycle approach of an innovation to create sustainable impact. They focus on co-creation, rapid prototyping and testing, and scaling-up innovations and businesses, providing (different types of) joint-value to the involved stakeholders. In this context, living labs operate as intermediaries and orchestrators among citizens, research organisations, companies and government agencies/levels.⟳ [52]

Skills for the green economy or skills for green jobs (green skills)

Internationally, the terms "green skills" or "skills for green jobs" are widely used. However, as these are not actually green skills, but the environment and framework in which they are used, it is preferable to use the phrase "skills for the green economy" rather than "green skills". ILO defines "skills for green jobs" as an overarching term for the knowledge, competence, and experience needed to successfully perform tasks for green jobs and to make any job greener. The term includes both core and technical skills and covers all types of occupations that contribute to the process of greening products, services, and processes, not only in environmental activities but also in other sectors. The UNIDO definition of green skills is also widely accepted: "Green skills are the knowledge, abilities, values and attitudes needed to live in, develop, and support a sustainable and resource-efficient society."⟳ [53]

Transdisciplinarity

Transdisciplinarity can have different meanings depending on the field (e.g. research, education, arts). At a general level, transdisciplinarity can be defined as a strategy in the process of knowledge production that brings together actors from different sectors and disciplines to tackle complex issues that cross boundaries and disciplines (e.g. climate change) using a holistic approach.

The Triple, Quadruple, and Quintuple Helix of innovation

The Triple Helix Model theorises that in a knowledge-based society, boundaries between different spheres are increasingly fading, giving rise to a system of overlapping actions: (a) universities and research centres are the source of new knowledge and technology; (b) industry operates as the centre of production; and (c) government provides an enabling environment (e.g. providing incentives, autonomy and stability). The interactions between the three spheres provide an innovative environment where knowledge flows dynamically in all directions. And each sphere, while retaining its primary role and identity, "takes the role of the other" ➲[54] – for example, universities support green start-up creation in incubator and accelerator projects, thus entering into the industrial sphere. The Quadruple and Quintuple Helix expand the model to consider societal and environmental challenges inherent in the causes and effects of climate change that require political and social measures that are implemented in coordination with the government, businessmen, universities, and society in favor of the environment.
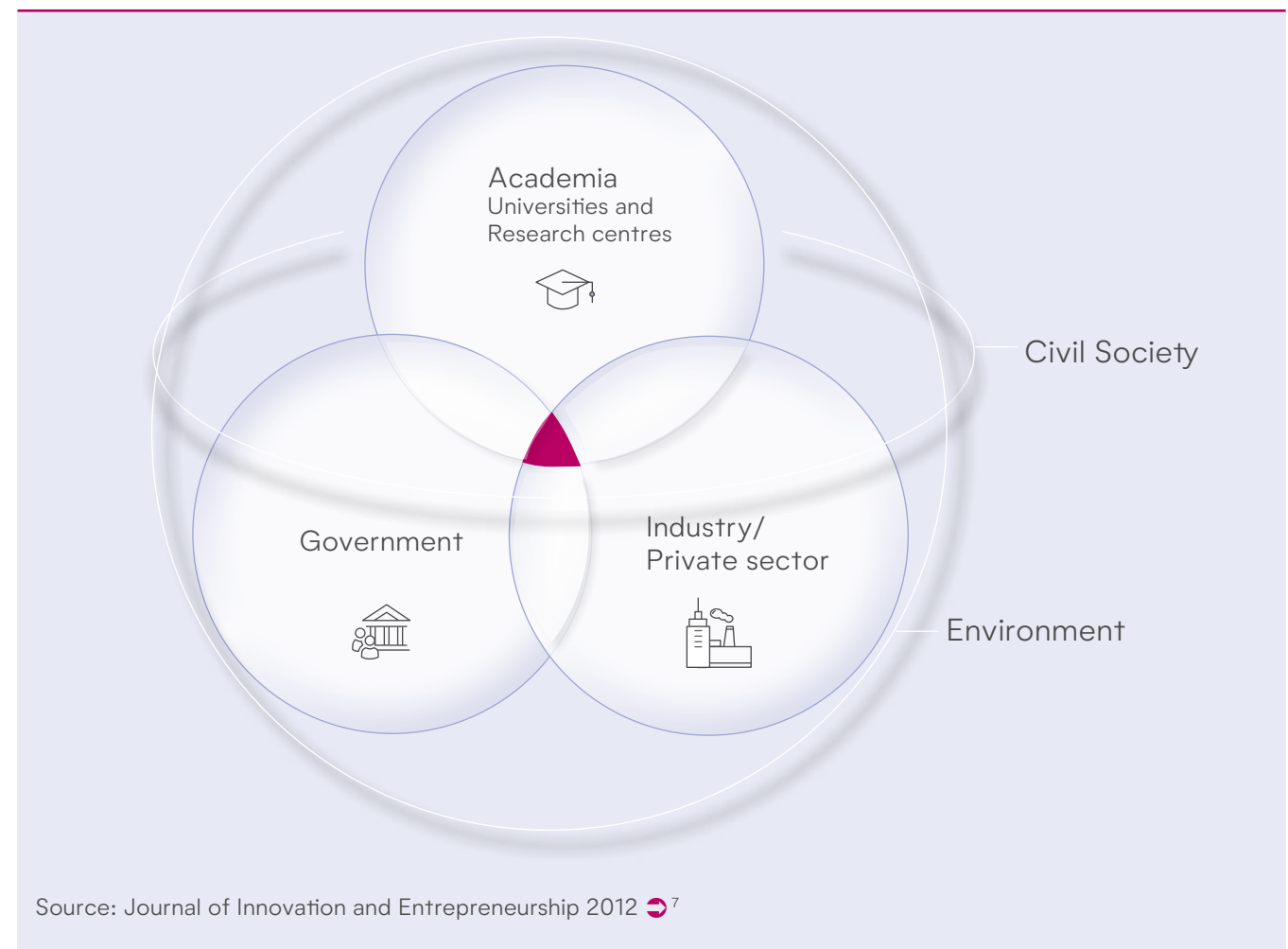
Source: Journal of Innovation and Entrepreneurship 2012 ➲[7]

8. References

1. **United Nations.** *United Nations Framework Convention on Climate Change.;* 1992:33.

2. **United Nations. Paris Agreement on Climate Change 2015. United Nations;** 2015:27.

3. **United Nations.** *TRANSFORMING OUR WORLD: THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT.* United Nations; 2015:41. http://www.un.org/en/development/desa/news/sustainable/un-adopts-new-global-goals.html#more-15178

4. **Richter-Beuschel L, Bögeholz S.** Student teachers' knowledge to enable problem-solving for sustainable development. *Sustain Switz.* 2020;12(1):1 – 24. doi:10.3390/SU12010079

5. **Williams S, McEwen LJ, Quinn N.** As the climate changes: Intergenerational action-based learning in relation to flood education. *J Environ Educ.* 2017;48(3):154-171. doi:10.1080/00958964.2016.1256261

6. **Verhoef L, Bossert M.** *The University Campus as a Living Lab for Sustainability: A Practitioner's Guide and Handbook.* TU Delft, Hochschule für Technik Stuttgart, International Sustainability Campus Network; 2019.

7. **Carayannis EG, Barth TD, Campbell DF.** The Quintuple Helix innovation model: global warming as a challenge and driver for innovation. *J Innov Entrep.* 2012;1(1):2. doi:10.1186/2192-5372-1-2

8. **Leydesdorff L, Etzkowitz H.** Triple Helix of innovation: introduction. *Sci Public Policy.* 1998;25(December 1998). doi:10.1093/spp/25.6.358

9. **Carayannis EG, Campbell DFJ.** "Mode 3" and "Quadruple Helix": Toward a 21st century fractal innovation ecosystem. *Int J Technol Manag.* 2009;46(3 – 4):201-234. doi:10.1504/ijtm.2009.023374

10. **Leminen S.** Coordination and Participation in Living Lab Networks. *Technol Innov Manag Rev.* Published online 2013:10.

11. **Skills for a greener future: a global view.** Published December 12, 2019. Accessed November 10, 2022. http://www.ilo.org/skills/pubs/WCMS_732214/lang--en/index.htm

12. **Mari Nishimura, Debra Rowe.** Global Guidance for Education on Green Jobs: Connecting Higher Education and Green Opportunities for Planetary Health. *UN Environ Programme.* Published online 2021. https://wedocs.unep.org/20.500.11822/35070

13. **Klaus-Dieter Mertineit.** TVET for a Green Economy. Published online 2013.

14. **International Labour Office.** *Small and Medium-Sized Enterprises and Decent and Productive Employment Creation.;* 2015.

15. **CEDEFOP.** *Handbook of ICT Practices for Guidance and Career Development.* CEDEFOP; 2018. doi:10.2801/368695

16. **IRENA.** *Renewable Energy: A Gender Perspective.;* 2019. www.irena.org

17. **GREEN JOBS FOR WOMEN IN AFRICA.** UN Women – Africa. Accessed November 9, 2022. https://africa.unwomen.org/en/digital-library/publications/2021/11/un-wowen-green-jobs-policy-briefs-and-reports-en-fr

18. **Georgeta Vidican Auktor.** LKDF: Green Industrial Skills for a Sustainable Future. Published online 2020.

19. **International Labor Organization.** Gender Equality and Green Jobs. Published online 2015. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_360572.pdf

20. **The Peoples' Climate Vote | United Nations Development Programme.** UNDP. Accessed November 2, 2022. https://www.undp.org/publications/peoples-climate-vote

21. **Ingaruca, Melissa.** Elevating Meaningful Youth Engagement for Climate Action. Published online March 2022. https://www.undp.org/sites/g/files/zskgke326/files/2022-05/UNDP-Elevating-Meaningful-Youth-Engagement-for-Climate-Action-2.pdf

22. **CIF News | Climate Investment Funds.** Accessed November 2, 2022. https://www.cif.org/news/cif-says-yes-new-youth-engagement-strategy

23. **Red Cross and Red Crescent.** Red Cross Red Crescent Strategy On Youth-Led Climate Action. Published online 2021. https://www.climatecentre.org/wp-content/uploads/RCRC-Strategy-on-Youth-led-Climate-Action-EN.pdf

24. **United Nations.** Outcome document of the United Nations Conference on Sustainable Development. Published online 2016. https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf

25. **Joint Research Centre (European Commission), Nauwelaers C, Harding R, Perianez-Forte I, Arregui E, Haegeman KH.** *Towards Green Transition in EU Regions: Smart Specialisation for Transformative Innovation.* Publications Office of the European Union; 2022. Accessed November 2, 2022. https://data.europa.eu/doi/10.2760/14696

26. **Woolford, J and Boden, M. Higher** Education for Smart Specialisation, A Handbook. Published 2021. Accessed November 2, 2022. https://s3platform.jrc.ec.europa.eu/en/w/higher-education-for-smart-specialisation-a-handbook-1

27. **Nebojsa Nakicenovic, Caroline Zimm, Monika Matusiak, Katerina Ciampi Stancova.** Smart Specialisation, Sustainable Development Goals and environmental commons. Conceptual framework in the context of EU policy. *Publ Off Eur Union.* Published online 2021. 10.2760/766406, JRC126651

28. **Becker R.** Joint programmes from A to Z. *Sticht Nuffic.* Published online 2020:89.

29. **Felix P., Johanna L., Laura W.** An Inclusive Circular Economy: Priorities for Developing Countries. *Chatham House.* Published online 2019. https://www.chathamhouse.org/2019/05/inclusive-circular-economy/2-challenges-scaling-circular-economy-developing-countries

30. **World Economic Forum.** Five Big Bets for the Circular Economy in Africa. Published online 2021. https://www.aceaafrica.org/resources

31. **Brown E G., Haigh L., Schröder A., Bozkurt Ö., Bachus K.** Closing the skills gap: Vocational education & training for the circular economy. *Circ Econ.* Published online 2021.
https://www.circle-economy.com/resources/closing-the-skills-gap-vocational-education-and-training-for-the-circular-economy

32. **International Renewable Energy Agency, Abu Dhabi (IRENA).** Global Energy Transformation: A roadmap to 2050. Published online 2018. www.irena.org/publications

33. **International Energy Agency.** World Energy Employment. Published online 2022.
http://www.iea.org/reports/world-energy-employment

34. **International Energy Agency.** Net Zero by 2050: A Roadmap for the Global Energy Sector. Published online 2021.
https://www.iea.org/reports/net-zero-by-2050

35. **International Renewable Energy Agency, Abu Dhabi (IRENA).** IRENA Infographics. https://www.irena.org/Education#infographics

36. **International Energy Agency.** Skills Development and Inclusivity for Clean Energy Transitions. Published online 2022.
https://www.iea.org/reports/skills-development-and-inclusivity-for-clean-energy-transitions

37. **International Renewable Energy Agency, Abu Dhabi (IRENA).** Skill Building for the Energy Transition. Published online 2021.
https://irena.org/-/media/Files/IRENA/Agency/Events/2020/Jun/IRENA-Insights/Skill-Building/IRENAinsights_Skills_final.%20pdf?la=en&hash=F34A1F96D2E9677972E7771BB174EF8F662C3DBF

38. **UNESCO-UNEVOC.** Skills development for renewable energy and energy effient jobs. Discussion paper on solar energy. Published online 2020. https://unevoc.unesco.org/i/697

39. **International Labor Organization.** Skills for a greener future. Challenges and enabling factors to achieve a just transition. Published online 2019. https://www.ilo.org/wcmsp5/groups/public/--ed_emp/documents/publication/wcms_731957.pdf

40. **Cheba K, Bąk I, Szopik-Depczyńska K, Ioppolo G.** Directions of green transformation of the European Union countries. *Ecol Indic.* 2022;136:108601. doi:10.1016/j.ecolind.2022.108601

41. **Green transition.** Accessed November 2, 2022. https://reform-support.ec.europa.eu/what-we-do/green-transition_en

42. **The Macroeconomics of a Green Transformation: The Role of Green Investment | Heinrich Böll Stiftung | Brussels office - European Union.** Heinrich-Böll-Stiftung. Accessed November 2, 2022. https://eu.boell.org/en/macroeconomics-green-transformation

43. **Transforming our world: the 2030 Agenda for Sustainable Development | Department of Economic and Social Affairs.** Accessed November 2, 2022. https://sdgs.un.org/2030agenda

44. **"Building forward better: Reaffirming the Sustainable Recovery Pledge and taking stock of commitments."** OHCHR. Accessed November 2, 2022.
https://www.ohchr.org/en/2022/01/building-forward-better-reaffirming-sustainable-recovery-pledge-and-taking-stock

45. **Education for sustainable development: a roadmap - UNESCO Digital Library.** Accessed November 2, 2022. https://unesdoc.unesco.org/ark:/48223/pf0000374802.locale=en

46. **Environment UN.** Green Economy. UNEP – UN Environment Programme. Published January 23, 2018. Accessed November 2, 2022. http://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/green-economy

47. **UNEP.** Green economy. UNEP – UN Environment Programme. Accessed November 3, 2022. http://www.unep.org/explore-topics/green-economy

48. **What is a green job?** Published online April 13, 2016. Accessed November 2, 2022. http://www.ilo.org/global/topics/green-jobs/news/WCMS_220248/lang--en/index.htm

49. **giz.** Green Recovery. Accessed November 2, 2022. https://www.giz.de/en/ourservices/99580.html

50. **Green recovery.** Accessed November 2, 2022. https://www.imf.org/en/Topics/climate-change/green-recovery

51. **Frequently Asked Questions on just transition.** Published October 22, 2021. Accessed November 2, 2022. http://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang--en/index.htm

52. **What is ENoLL? European Network of Living Labs.** Published July 13, 2017. Accessed November 28, 2022. https://enoll.org/about-us/

53. **Jeon OSI, CH, MDH S.** *Skills for Green Jobs: A Global View.;* 2011. Accessed November 2, 2022. http://www.ilo.org/global/publications/ilo-bookstore/order-online/books/WCMS_159585/lang--en/index.htm

54. **Etzkowitz H.** The Triple Helix of University – Industry – Government. *Proc 51-St EOQ Congr.* Published online 2007:18.

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