



Potentials (and challenges) for green jobs and greening of TVET

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Agenda

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Policies: gap between
green agendas and
human resource
policies

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Drivers and
challenges in green
transition

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Labour market potentials
in two key sectors
(energy, circular
economy)

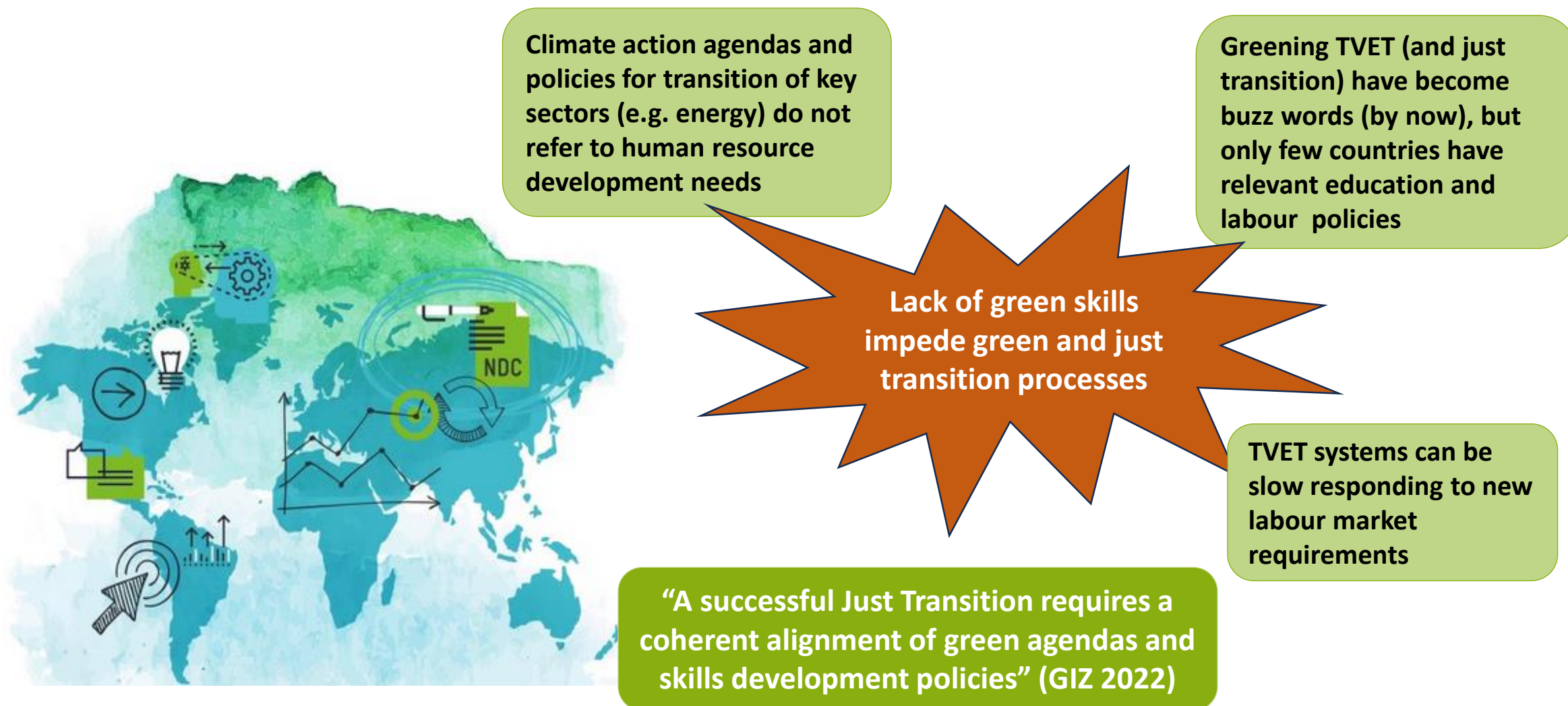
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Greening TVET

5

Examples for promoting
green skills and jobs from
Ghana and Serbia

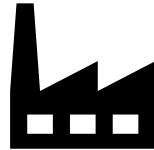
Missing link between climate action agendas and human resource development policies



Drivers and challenges in the Green Transition

“The private sector needs investment, incentives, sanctions and support to develop a demand for Green Skills”

Private Sector



Weak motivation of companies (small to large) to invest in green technologies and costly environmental protection measures

Conditions (in private sector) for international value chains

Public and private investment in green technologies (e.g. through climate funds)

Government

Incentives and Regulations (e.g. tax incentives)



Effective Sanctions (e.g. on pollutive behaviour)



Support (e.g. market information, credit lines)



Agriculture:

- Organic + regenerative
- CE practices in agriculture (organic waste etc.)



Energy:

- Solar systems
- Wind Energy
- Biomass
- Energy efficiency



Circular Economy:

- Solid waste (reuse, recycling)
- CE practices in manufacturing industry
- Environmentally responsible recycling (e.g. E-waste)



Sectors with Relevance for Green Transition

Environmental professions:

- Water and waste water
- Environmental restoration (watersheds, river systems, forests, etc.)
- Waste management



Green (physical) infrastructure + construction:

- Greening of construction value chains
- Energy efficiency in construction
- Climate resilient infrastructure



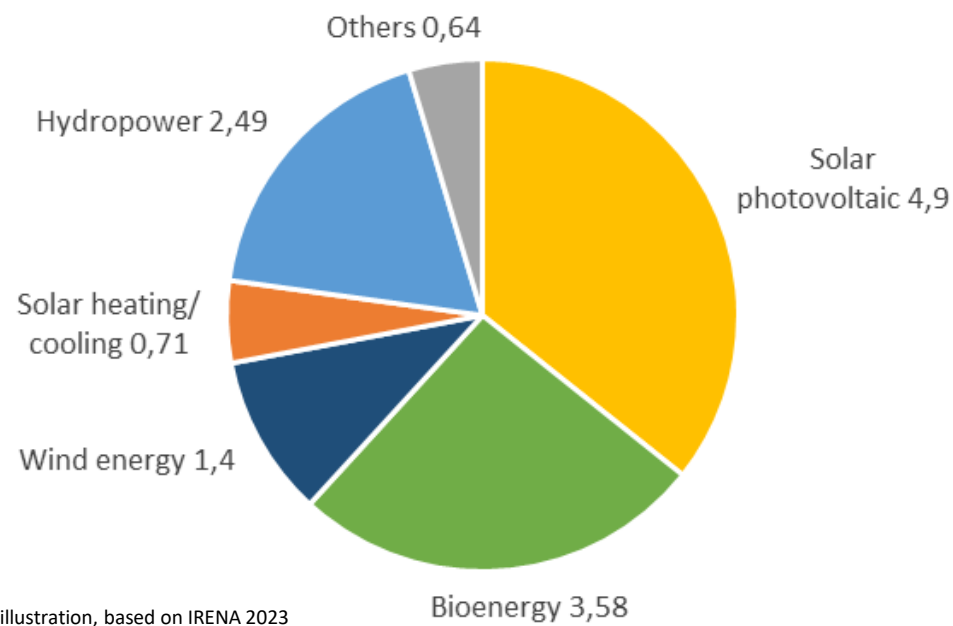
Sustainable mobility:

- Automotive supply industry moving towards e-mobility
- E-Vehicle maintenance
- E-mobility infrastructure
- Energy efficient public transport



The transition to a renewable energy sector can create many jobs...

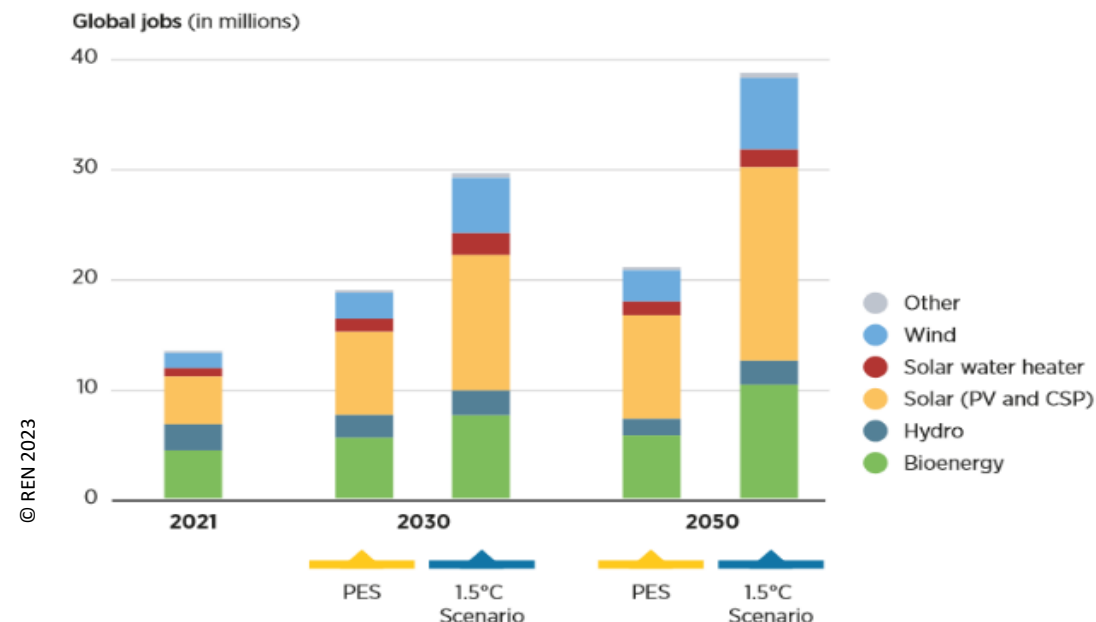
Distribution of employment in RE [in mio.], 2022



Current total global employment in RE sector: 13.7 Mio. (6.3 Mio new jobs since 2012)

- Two-thirds of all jobs in Asia, mainly in China (41%)
- Europe: 1.9 Mio. (14%), no figures for SEE
- Africa: estimated 300.000 – 400.000 jobs in installation and maintenance (IRENA, IEA)

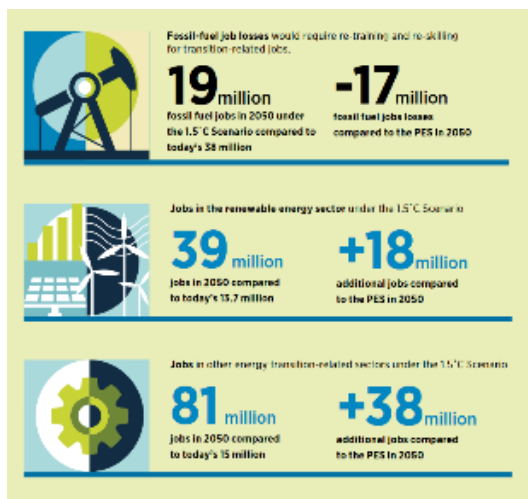
Global Jobs in Renewable Energy, by technology, in the 1.5°C Scenario and PES, 2030 and 2050



Estimation for employment prospects in RE sector:

- African countries very positive: 4.8 Mio. short-term jobs and 370,000 medium- to long-term new jobs by 2030 (PwC, 2021)
- South East Europe: no reliable new data (50.000 new jobs until 2050 (IRENA 2019))

...but employment effects need to be differentiated



Uneven distribution across...



Skill-levels



Geography



Gender

Employment effects differ along the value chain



Employment effects depend on integration of country into **global value chains** (own production or import) and can be **permanent or temporal** (construction and operation):

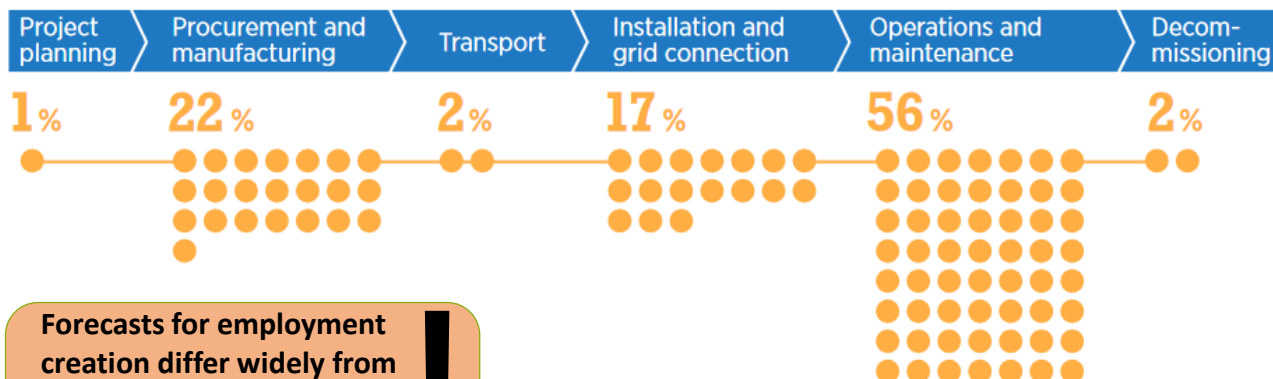
- Most jobs for PV **manufacturing** are located in **China (>77%)**
- **Installation** and **operation** of solar PV **provide local jobs** (ca. 17% and 56% of the work load needed to install and run a solar PV) (IRENA, 2023)



Job creation (e.g. solar PV) vs. job destruction (e.g. coal mining)



- **56 Mio. new jobs created** in the RE and related sectors until 2030 (IRENE, optimistic scenario)
- **17 Mio. jobs lost** in fossil fuel sector (e.g. coal or oil)
- Estimated additional **net employment: 39 Mio.** jobs (that need skills upgrading, reskilling, initial training) (IRENA 2023)



Forecasts for employment creation differ widely from institution to institution – **Need to read figures with caution!**

Human resource requirements for development and operation of 50 MW Solar PV (based on 30 years life span) along the value chain (229.055 person-days in total) (IRENA, 2023)

Circular economy: driver for job creation?



What do we understand as a circular economy?

- Broad concept - no uniform definition
- ILO: reuse, repair, recycling and retention of material goods as an alternative to the linear model of extraction, manufacture, use and disposal

Global employment potential for the circular economy

- **Optimistic estimates:** „over 18 Mio green jobs can be created by circular economy practices till 2030 (ILO) (modelling based on ambitious political & economic scenarios)
- **Conservative scenarios:** 6 – 8 Mio jobs globally till 2030) (OECD)



Drivers for job creation in the circular economy

- **Policies, regulations and incentives** that aim at reducing the use of primary materials and promote reuse/ recycling
- Increase of prices or non-availability of **primary materials**
- **Innovations** in processing technologies and IT
- **Sustainability policies** in companies

Example Ruanda:

- ▶ Ban of single use plastics since 2008
- ▶ National Circular Economy Action Plan
- ▶ Tax exemptions for companies that invest in eco-friendly alternatives to single use plastics
- ▶ Growing private sector – but no figures on job creation

Jobs and skill levels in the circular economy

Positions requiring higher technical education:

- Processing technology engineers
- Environmental engineers...



Skilled worker level (TVET relevant):

- Operators of recycling facilities
- Managers of waste collection fleets
- Bio-chemical lab technicians
- Maintenance personnel
(industrial mechanics, mechatronic technicians...)



Lower skill jobs (mostly trained on job):

- Waste collectors
- Waste separators
- Machine operators

Picture Sources: World Bank, Clean Earth Africa, TAZ

Change of occupational-specific skill requirements

Requirements and developments differ across skill levels: **most important changes take place at high and medium skill levels**



Skills requirements for **highly qualified workers** (engineers/technicians) **change most**



Medium-skilled: Skill requirements across most occupations are changing (**green + digital**) but rarely as new occupations



Work tasks at **lower skill levels** change less. Workers primarily need environmental awareness and offers to advance qualification (if jobs are eliminated due to automatisation)

Skill areas	Implications for TVET
Occupation-specific knowledge and skills <i>teaching up to date green tech know-how</i>	• Curriculum modernization • Partnerships with companies leading the transformation (“dual training”) • New training equipment • Training of teachers
Transversal skills – <i>enhancing ability of learners to cope with complexity of work</i>	• Project-based learning to acquire transversal skills in interaction/group work • Stimulation of complex coordination tasks using digital learning methods
Digital skills – <i>learners to be prepared for the digitalization of the world of work</i>	• Digital literacy of teaching staff and learners • Think green & digital skills together • Use occupation-specific software applications for learning

The role of TVET in the process of Green and Just Transition

Keep pace of the rapidly changing world of work: Identifying the skills gaps and future skills needed for green and digital transition

Modernizing technical & vocational education for **building the future workforce for green & digital transition**

Providing upskilling programmes for new technologies and work tasks

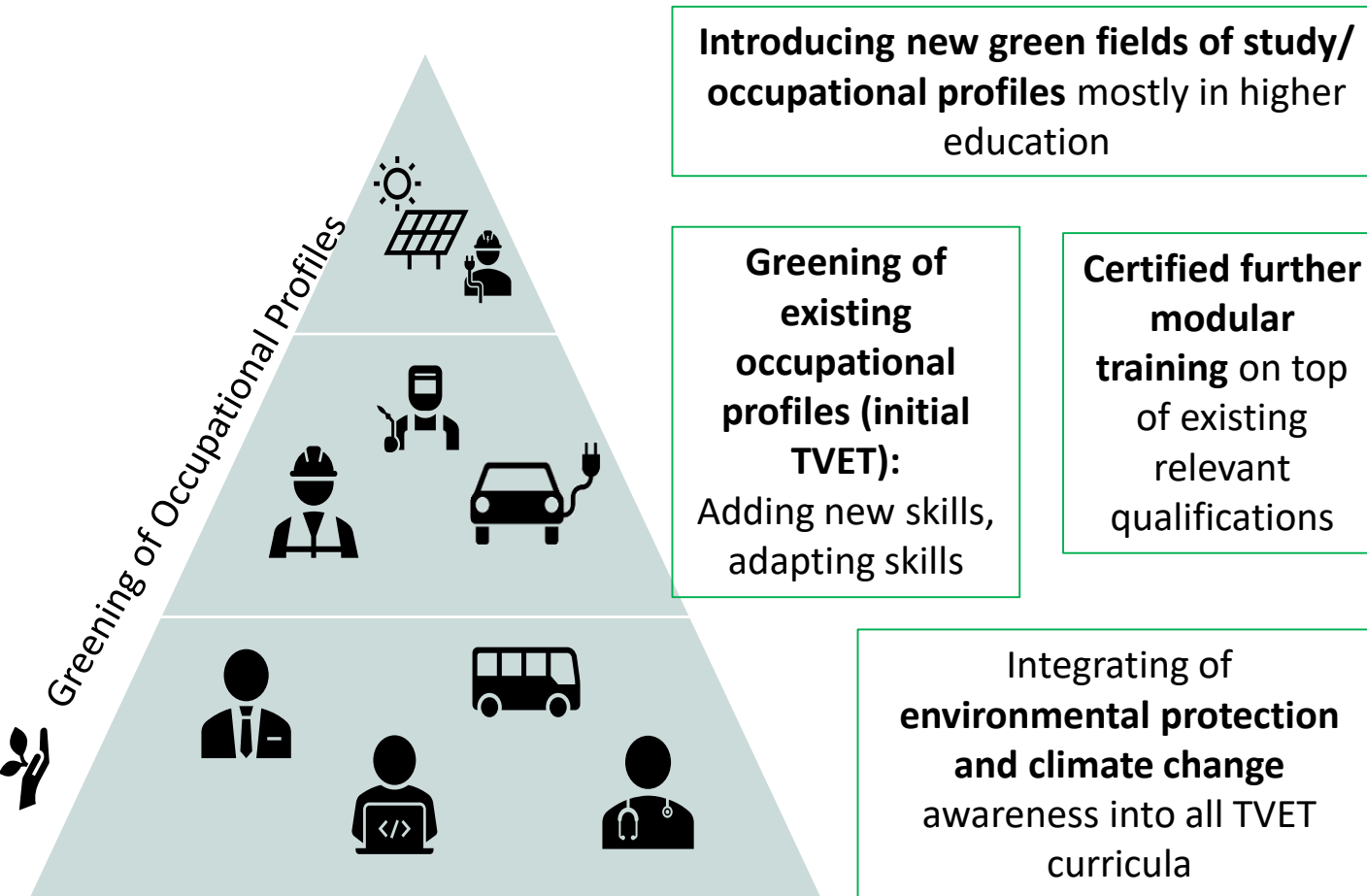
TVET for sustainable development: Build awareness for environment and climate change among young people

Just Transition: Contribute to **employment-oriented re-training programmes** for workers in declining industries (in linkage with active labour market **measures**)



Include all groups in society equally

'Greening' of TVET Systems



Alignment of TVET policy with **sustainability and digitalisation** policies

Greening to be part of the continuous **TVET modernization** process

Interlinkage of TVET with other forms of education to **ensure mutual permeability**

Appropriate **training of TVET personnel** to draw on the potential of role models and change agents

Greening TVET institutions to play a function as role models

Greening to be part of holistic TVET reform

Experiences from greening TVET

Project designs:

- ▶ Few TVET projects (so far) have an explicit focus on “greening” TVET systems but rather address greening as a component
- ▶ Number of projects in “green sectors” (specifically energy) growing that have a skills development/TVET component
- ▶ Green skills addressed in combination with promotion or business development in green sectors
- ▶ Projects addressing greening through both higher technical education and TVET (and the links in between)

Some lessons learned:

- ▶ Awareness for greening education and TVET is growing
- ▶ If education/ TVET policies do not address greening, prospects for “mainstreaming” of environmental education and green skills in TVET programmes are rather weak
- ▶ Progress made esp. in introducing green skills esp. for renewable energy (PV systems) but employment potential fluctuates and depends on transition of energy sector
- ▶ Awareness of industry organisations on greening is often low, except for associations in the green industry itself

Case from Ghana: Skills and job creation in the circular economy/ recycling

„Agricentric Ventures“: Turning organic waste into fertiliser (Social Enterprise in Kumasi Ghana)

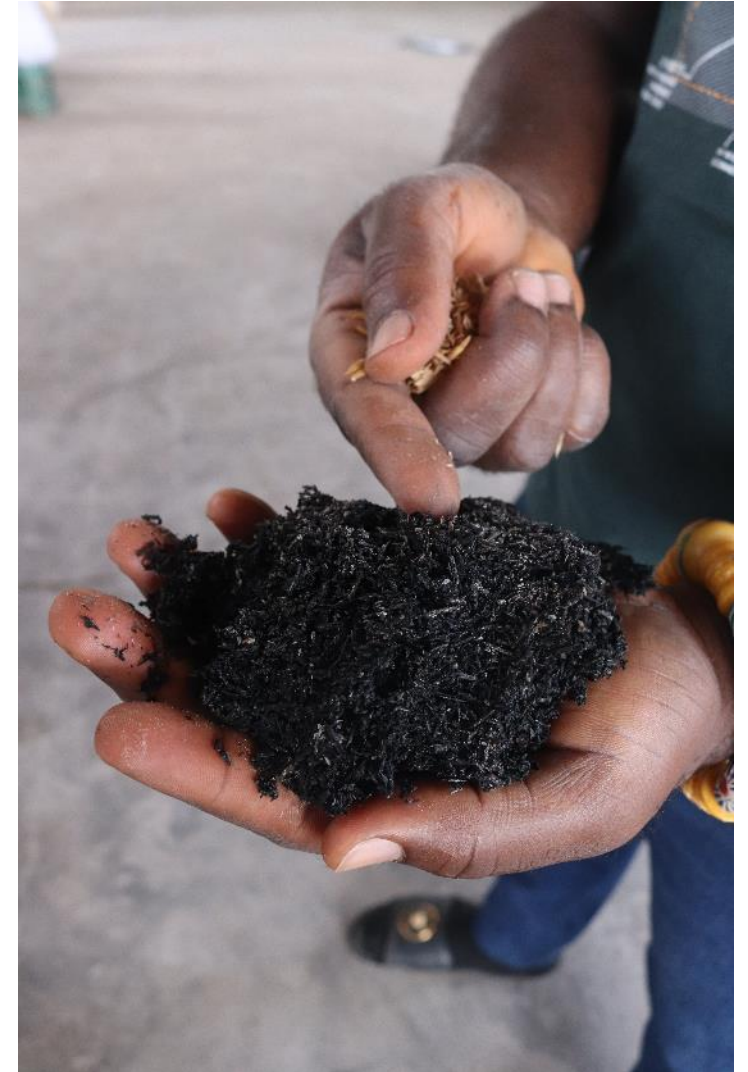
- Organic waste is collected on market days and from food processors
- Waste is being processed into solid and liquid fertilizer (2 weeks processing time)
- Manual processing: jobs created for local community (approx. 30 employees, mostly women)
- Fertiliser marketed to farmers in Central Ghana and beyond



Success factors:

- ▶ Determined (social) entrepreneurship
- ▶ Processing technology developed with local know-how
- ▶ Technological support of local University
- ▶ External business mentoring by SEED network and Innovation Hub
- ▶ Use of simple hand-operated machinery locally produced
- ▶ Clients (farmers) need to be „convinced“ and trained to use the new product

[AgriCentric Ventures from Ghana](#) | [seed.uno](#)



Fertilised pellets produced from rice husks
Picture: Tobias Lange, 2024

Case from Ghana: Skills and job creation in the circular economy/ recycling

Recycling and Upcycling – Cases from Ghana (Trashy Bags [Trashy Bags Africa](#) | [Upcycled Bags](#) and local business recycling hard plastics)

- **Upcycling:** Waste (plastic and fabric) used for manufacturing of upcycled fashion products (example: Trashy Bags)
- **Recycling:** plastic waste processed into granulate for manufacturing of industrial goods
- **Employment intensive** supply and value chain (from waste collectors, separators to workers in processing, production and sales)



Critical factors :

- ▶ Weak awareness in population and disinformation about environmental effects (of plastic)
- ▶ Limited access to venture capital for setting up the business
- ▶ Unstable supply chains
- ▶ Recycling: Influential market actors determine sales prices of recycled products (e.g. Chinese/ Indian owned industries)
- ▶ Upcycling: Low acceptance for uncycled products in local middle class population
- ▶ Jobs created often not decent (health hazards, low income)



Picture top: Display at sales shop Trashy Bags, Accra;

Picture bottom: Recycling Company Buotobom, Ghana (source: Tobias Lange, 2024)

Case from Serbia „Prospects for Young People in Rural Areas in Serbia“ (GIZ)

Green Skills + Jobs in Agriculture:

- **Skills upgrading** (and business development) of bee-keepers as a means to maintain biodiversity
- “Rural Zoomers”: enabling students in agricultural VET schools to explore new **environmentally friendly business ideas** for their family farms
- **Linking** local organic food producers with tourism businesses for local sourcing



Skills + Jobs in Rural Tourism:

- “Rural Zoomers”: Students of tourism VET schools develop **business ideas** for rural tourism
- Rural households enabled to **access finance** for investment into agro-tourism
- Culinary tourism (training and mentoring) based on **local (organic) food products**
- Supporting local **eco tourism** initiatives (hiking, cycling, canoeing...) in selected regions