



TECHNICAL EDUCATION AND SKILLS
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GREEN SKILLS FOR GREEN JOBS 2.0:

*Expanding Green TVET
Infrastructure for the
Skilled Workforce*



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I. EXECUTIVE SUMMARY

- The COVID-19 pandemic caused a severe economic recession, leading Southeast Asia to pursue a green recovery approach to protect against future pandemics and address climate change and biodiversity loss.
- The Philippine government has recognized the importance of green jobs and skills to promote long-term growth while preserving ecosystems and minimizing waste and pollution. As the Philippines works to transition to a green economy, one of the key legislations passed is Republic Act (RA) 10771 or the Green Jobs Act of 2016. Supplementing the existing laws on environmental sustainability, the Green Jobs Act focuses on the promotion of green jobs in the country, along with the inter-agency approach to combine efforts in creating a low carbon footprint, more resourceful and more disaster resilient nation.
- The Philippines is taking initiatives to transition towards a green economy to achieve a low carbon footprint and become a more resourceful and disaster-resilient nation. The Sustainable Development Goals (SDGs) and the Philippine Development Plan (PDP) 2023-2028 are the main policies guiding this transition. The PDP 2023-2028 highlights the need to ensure that employability is aligned with the current and future labor market requirements. The National Green Jobs Human Resource Development (NGJ-HRD) Plan 2020-2030 is designed to enable and sustain the creation of green jobs, promote social justice and worker welfare, and serve as a reference for stakeholders in building and maintaining human resources, anticipating green skills, and mitigating risks. The Human Resource Development Plan Strategic Framework and the Philippine Green Public Procurement Roadmap are also policies that support the transition towards a green economy.
- The transition to a green economy not only helps protect the environment but also creates new industries and jobs. The International Labour Organization estimates that the green economy will create 24 million jobs worldwide by 2030. The fastest-growing green jobs are in fields like ecosystem management, environmental policy, and sustainable procurement, and there is a high demand for green skills in sectors like energy, mining, healthcare, agriculture, transportation, construction, and manufacturing.
- TESDA has developed the Greening TVET Framework and issued Labor Market Intelligence Reports to promote green jobs and competencies in the workforce. As of date, there are a total of eighty-nine (89) Training Regulations with green components (please see TESDA Initiatives) that are being used to enable the trainees understand its importance and be able to adopt the green practices.

II. BACKGROUND

The COVID-19 pandemic precipitated one of the worst economic fall out since the Great Depression of the 1930s (Groningen Growth and Development Centre, 2020). The pandemic has had a huge effect on the economy, leading to the most serious recession in nearly a century, with lasting effects for individuals, companies, and governments. (OECD, 2020). According to the Asian Development Bank (ADB), It's essential for Southeast Asia, particularly the five focus countries (Cambodia, Indonesia, Myanmar, the Philippines, and Thailand) to pursue a green recovery from the COVID-19 pandemic. This approach is vital for protection against any future pandemics as there is an increasing connection between human health and the environment, as well as to lessen the harmful effects of climate change and biodiversity loss in the region. It also has potential to fetch considerable economic stimulus and is essential to bolster long-term competitiveness.

Figure 1: Groningen Growth and Development Centre, Maddison Project Database 2020



Source: Groningen Growth and Development Centre. (2020). Maddison Project Database 2020.

The ASEAN has highlighted environmental sustainability as a crucial part of their post-pandemic economic recovery process with their Comprehensive Recovery Framework (CRF) (ASEAN Secretariat 2020). The ASEAN CRF and its Implementation Plan aim to address ASEAN's immediate and long-term needs through the stages of COVID-19 pandemic. The Framework is implemented through a 3Rs phased approach, **reopening**, **recovery**, and **resilience** ensuring a successful transition to the 'new normal' and promoting resilience in the medium and long term.

The Philippine concept of the green jobs and green skills is very general and applicable to any employment position and Technical-Vocational Education And Training (TVET) sectors that preserves ecosystems and biodiversity, minimizes energy consumption by using high-efficiency methods, decarbonizes the economy, and

decreases or completely prevents the production of all types of waste and pollution. (Section 4(c) Republic Act 10771). Such recovery is defined as creating more opportunities in reskilling and upskilling, jobs, income, and growth, and at the same time actions to create medium and long-term goals in sustaining the environment.

The Technical Education and Skills Development Authority (TESDA) acknowledged the strategic importance of greening the TVET System in the Philippines. One of these is the development of the Philippines' Greening TVET Framework, which adheres to the UNESCO-UNEVOC whole-of-institution approach and the ILO policy guidelines on Just Transition to Environmentally Sustainable Economies and Societies for All.

Moreover, as part of developing and analyzing labor market information, TESDA already issued two Labor Market Intelligence Reports (LMIR) intended to promote and discuss the concept of green and circular economy. In 2018, the LMIR entitled “Green Skills for Green Jobs: Preparing the Filipino Workforce for the Green Economy”, discussed the concepts of green economy, green jobs/skills, plans and initiatives of industries to shift into green, the concept of green jobs in industries and their relevant skills and requirements, and their corresponding implications to TVET.

Additionally in 2022, the LMIR entitled “TVET for the Circular Economy: Preparing the Workforce for the Circularity of Industries”, discussed the circular economy concept, how they are applied in selected industries, including the policies and programs on addressing the problems of climate change, the greening of skills, and the relevant skills requirements for a circular economy. TESDA intends to address the green skills requirements to promote green jobs in order to help the Philippines establish a safe and healthy post-pandemic economy.

With all these research initiatives, TESDA is geared towards increasing the awareness on green industry developments and promoting of green jobs and competencies to contribute to the country’s post pandemic recovery

TESDA has also initiated efforts in implementing the greening of the TVET sector through the inclusion of green policies and competency components to the training regulations; there are a total of eighty-nine (89) Training Regulations that have green competency components.

III. GREEN SKILLS

The term "green skills" refers to a combination of technical knowledge and abilities that enable professionals to employ green technologies and processes efficiently (i.e., resource-efficient technologies or processes that decrease waste and minimize the

environmental impact of human action), as well as transversal knowledge, values, and attitudes that support them in making environmentally friendly decisions in their work and personal lives. These general green competencies are already being incorporated into training systems across the world. (ETF, 2022). Similarly, UNIDO defines green skills as the information, talents, beliefs, and attitudes required to live in, create, and support a resource-efficient society. (United Nations Industrial Development Organization (UNIDO 2022)

The **Green General Skill** index further elaborates the four group of work tasks that are crucial to green occupations :

1. **Engineering and technical skills:** green engineers and technicians will help us design renewable energy sources, low-emission and electric vehicles, eco-buildings, energy-saving research, and development programs, and maintain solar panels, and hydraulic and wind turbines.
2. **Science skills:** The future of the green economy will rely on workers with a strong science background, for example, environmental scientists, biologists, hydrologists, and biochemists will all play significant roles. These skills are particularly in great demand at each level of the value chain and monitor, manage, and protect natural resources such as land and vital water supplies.
3. **Operation management skills:** Understanding of how to support green initiatives and an integrated vision of the business through life-cycle management and collaboration with external players, such as customers. For instance, these abilities are crucial for sustainability experts, climate change analysts, and sustainability officers.
4. **Monitoring skills:** Workers who can develop, run, and monitor a wide range of systems will be in high demand in the future of the green economy. They'll have to evaluate systems against key performance indicators and figure out how to optimize and improve system operations. They'll require macroeconomic knowledge to include sustainability in long-term infrastructure initiatives.

In addition to these skills, a variety of soft skills¹ are seen as increasingly crucial, not just for green skills, but also for "future skills," including those required for the Fourth

¹ The term *soft skills* refers to interpersonal or 'people' skills. Examples include: behaving with respect (verbally and non-verbally) towards colleagues, being a good listener and being helpful. Soft skills are complemented by hard skills, which are related to job content and are acquired by formal education, apprenticeships and internships, on-the-job training etc.

Industrial Revolution (4IR). Particularly important are abilities linked to creative thinking, flexibility, resilience, and even empathy.

IV. RELEVANT POLICIES

The Philippines continues to initiate policies and programs to transition towards a green economy, so that the country can achieve a low carbon footprint, and be a more resourceful and more disaster resilient nation. Below is the list of relevant policies that helps the country's transition to a greener environment:

1. Sustainable Development Goals (SDGs)

SDG Number 8 is on the promotion of sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. The SDG Target 8.4 or "Improve progressively through 2030 global resource efficiency in consumption and production, and endeavour to decouple economic growth from environmental degradation in accordance with the 10-year framework of programmes on sustainable consumption and production" provides the detail on the importance of the green jobs in response to improving efficient use of global resources.

2. Philippine Development Plan (PDP) 2023-2028

The Philippine Development Plan (PDP) 2023-2028 outlines the national policy to improve human resource quality and ensure that the current and future workforce can adapt to changing labor market needs.

The Plan noted in **Chapter 4: Increasing income-earning Ability**, that to enhance the income-earning capacity of Filipinos, it is important to ensure their employability is well-aligned with the current and upcoming labor market requirements. In one part of this chapter it is mentioned that the government shall focus on the implementation of the Green Jobs Human Resource Development Plan and generating databases on green jobs that intensify the mainstreaming of the green competencies in TVET and education programs. TESDA is one of the government agencies that will be part of an Inter-Agency Council for Jobs and Investments to be created that focuses on developing employment opportunities, recovery, job creation in specific industries and emerging sectors, such as but not limited to construction, tourism, agriculture, information technology and business process management, and manufacturing. (PDP 2023-2028)

The objectives to achieve this is through increasing employability, expanding access to employment opportunities, and establishing shared labor market governance. One of the Legislative Agenda of TESDA to achieve this goal is to revise the National

Apprenticeship Program; Enterprise-Based Education and Training Employment Act through harmonizing the existing EBT modalities and increase the access to both workplace and classroom-based training programs being implemented in businesses. In addition, make adjustments to apprenticeship programs to make them more attractive to both employers and aspiring apprentices, thus boosting their skillset growth. This will help to employ more young people. (PDP 2023-2028) The Table below shows the TESDA indicator and annual plan targets in helping to increase the Income-earning Ability:

Table 1: Legislative Agenda of TESDA in PDP 2023-2028

INDICATOR	BASELINE	ANNUAL PLAN TARGETS						MEANS OF VERIFICATION	RESPONSIBLE AGENCY/ INTER-AGENCY BODY
		2023	2024	2025	2026	2026	2028		
Technical Education and Skills Development Authority (TESDA) certification rate in priority sectors (%) increased	92 (2021)	92	92.5	93	93.5	94	94.5	TESDA Data	TESDA
Number of training regulations, curricula, and courses with green core competencies ^c increased	81 (2021)	89	98	108	119	131	144	TESDA	TESDA

Source: Philippine Development Plan 2023-2028

In **Chapter 15: Accelerate Climate Action and Strengthen Disaster Resilience**, by 2028, the Philippines will be more resilient to the impacts of natural disasters and climate change. Policies that promote low-carbon development while creating jobs will be implemented, as well as rehabilitating and protecting natural resources and will also promote and develop a green and blue economy to maximize livelihoods, create employment opportunities, and improve social health. It is also mentioned in this chapter the Philippine Action Plan for Sustainable Consumption and Production (PAP4SCP) that will be operationalized. “This Action Plan follows a comprehensive framework covering policy, research and development (R&D), innovation, and technology, infrastructure investments, and information and education to enjoin consumers and producers to adopt sustainable strategies and practices. In addition, natural assets will be harnessed to stimulate demand for green goods, services, and technologies in order to support green jobs and generate income for resource-dependent communities.” (Chapter 15, PDP 2023-2028).

3. National Green Jobs Human Resource Development (NGJ-HRD) Plan 2020-2030

The NGJ-HRD Plan is designed to enable and sustain the transition to a green economy and the creation of green jobs, as well as to promote social justice and worker welfare. The plan provides comprehensive guidance for the development and maintenance of green employment and serves as a reference for stakeholders in building and maintaining human resources, anticipating green skills, and mitigating risks. The NGJ-HRD Plan can utilize the Human Resource Development Plan Strategic Framework to support its objectives and provide guidance for generating and maintaining green employment.

The Human Resource Development Plan Strategic Framework

The Human Resource Development Plan Strategic Framework can aid in recognizing skills, proficiency levels, and voids in areas that require environmental education and skill development for the transition towards a greener economy. It can also help identify labor supply and demand changes that can convert current jobs into green jobs.

Moreover, the NGJ-HRD Plan will focus on several sectors, including agriculture, fishery, forestry, manufacturing (electronics and automotive), transportation, tourism, solid and wastewater management, energy, construction, and brown economies (mining, quarrying, and chemicals). This demonstrates the importance of aligning education, skill development, and training with the workforce of the green and greener sectors to achieve the objectives of the NGJ-HRD Plan.

4. The Philippine Green Public Procurement Roadmap

Green Public Procurement (GPP) is a policy adopted by numerous governments which prioritizes sustainable consumption and production. As such, GPP contributes to sustainable development, meeting human development goals while sustaining the natural systems that provide us with resources and ecosystem services. It's a market-based approach: Governments can regulate, incentivize, inform and guide market players.

The GPP approach adopted by the Philippines preserves existing principles and procedures while incorporating green practices. The innovation lies in the quality of demands specified, i.e., including environmentally relevant technical specifications as replacements or additions to current requirements that don't affect the basic functionality of procured items.

The roadmap for GPP outlines it as a transparent, accountable, efficient, equitable, economical and effective way to procure goods. Open competitive bidding identifies the most cost-efficient and responsive bid in line with specifications that include green criteria. Discriminatory criteria like labels or suppliers' requirements distorting the competition are forbidden. The speed and scope of green purchasing will depend on local circumstances and market readiness as well as their impact on local suppliers.

5. Republic Act 11697 or EVIDA

Republic Act No. 11697 otherwise known as the “Electric Vehicle Industry Development Act (EVIDA)”. The Evida Act of 2022 aims to “ensure the country’s energy security and independence by reducing reliance on imported fuel for the transportation sector; provide an enabling environment for the development of electric vehicles (EVs) including options for micro mobility as an attractive and feasible mode of transportation to reduce dependence on fossil fuels; promote and support innovation in clean, sustainable, and efficient energy to accelerate social progress and human development by encouraging public and private use of low emission and other alternative energy technologies; protect the health and well-being of the people from the hazards of pollution and the greenhouse effect”.

The Act also aims to “promote inclusive and sustainable industrialization while recognizing the role of the private sector in order to support the transition to new technologies, generate jobs, spur small and medium enterprise growth, attract investments, grow globally competitive and innovative industries, and upgrade the country’s participation in regional and global value chains, consistent with the Philippine Development Plan and the country’s international obligations under the United Nations Sustainable Development Agenda”.

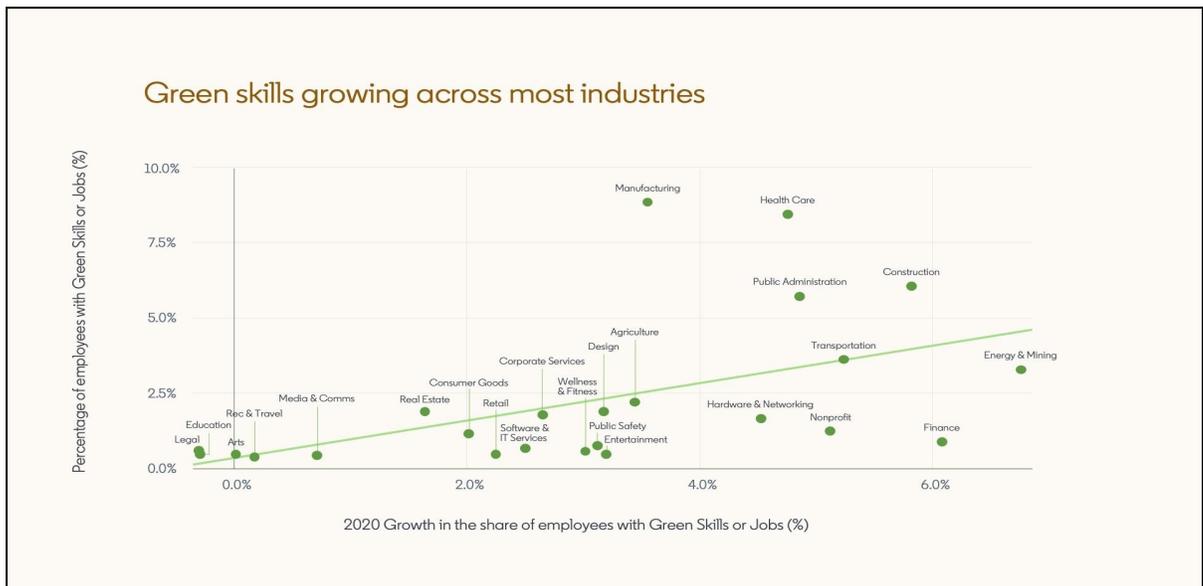
The Act specifies “**Comprehensive Roadmap for the Electric Vehicle Industry (CREVI)**”, a national development plan where it will accelerate the development, commercialization, and utilization of EVs in the country with the following four (4) components:

1. EVs and Charging stations competent;
2. Manufacturing component;
3. Research and Development; and
4. Human Resource Development.

V. EMPLOYMENT OPPORTUNITIES

According to the World Bank, the transition of economic activities to “green” will not only help protect the environment but also provide opportunities to create new industries, as well as new and improved jobs. The International Labour Organization also supports the same idea, as it estimates the creation of 24 million jobs worldwide by the green economy in 2030. In a World Economic Forum article, Kimbrough (2021) points out that “some of the fastest-growing green jobs are in fields like ecosystem management, environmental policy and sustainable procurement” (Kimbrough, 2021). The jobs that are increasing in demand for green skills are “in sectors like energy and mining”, while there are a high number of jobs requiring green skills in “healthcare, agriculture, transportation, construction and manufacturing” (Kimbrough, 2021).

Figure 2: Green skills growing across most industries.



Source: World Economic Forum (2021)

The World Wildlife Fund for Nature or WWF provides estimates of the job creation potential of the green economy. The WWF estimates the creation of 20,100,000 to 38,900,000 new jobs globally through a US\$ 500 million stimulus.

Table 2: Number of Jobs created

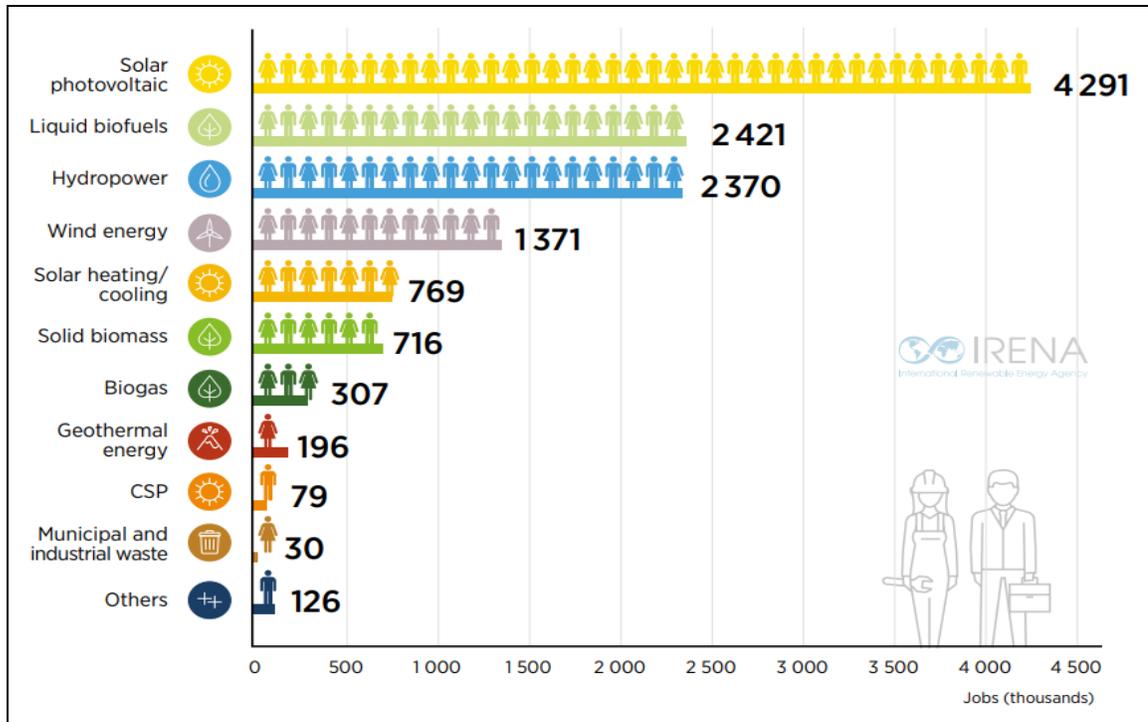
	Model outputs (population-led scenario)	Model outputs (GDP-led scenario)
# of jobs created (rounded to millions)	38,900,000	20,100,000

Jobs by sector	Sustainable agriculture / food 11,300,000 Sustainable fisheries 8,500,000 Sustainable forestry 9,100,000 Circular economy 6,900,000 Sustainable infrastructure 3,100,000	Sustainable agriculture / food 5,900,000 Sustainable fisheries 4,400,000 Sustainable forestry 4,700,000 Circular economy 3,500,000 Sustainable infrastructure 1,600,000
Jobs by region	East Asia & Pacific 12,500,000 Europe & Central Asia 2,700,000 Latin America & Caribbean 3,600,000 Middle East & North Africa 2,300,000 North America 300,000 South Asia 10,900,000 Sub-Saharan Africa 6,500,000	East Asia & Pacific 9,500,000 Europe & Central Asia 2,800,000 Latin America & Caribbean 2,700,000 Middle East & North Africa 900,000 North America 1,400,000 South Asia 1,900,000 Sub-Saharan Africa 900,000

Source: WWF (2021)

Demand for, and consumption of, renewable energy has grown steadily in Asia and the Pacific, as well as worldwide. (R Maclean, S Jagannathan, B Panth, 2018). The International Renewable Energy Agency (IRENA) estimates global employment in solar photovoltaic (PV), wind, hydropower, liquid biofuels and other technologies in Figure 3.

Figure 3: Global renewable energy employment, by technology, 2021



Source: Renewable energy and jobs: Annual review 2022 by IRENA

The American Solar Energy Society (ASES) also created three scenarios predicting the growth of the US renewable energy industry up to the year 2030. The three scenarios, labelled advanced, moderate and base, predicted the creation of 7,328,000, 2,846,000 and 1,305,000 jobs respectively. In Australia, over 1,200 people were permanently employed in the operation and maintenance of clean energy facilities, which also support over 7,300 indirect jobs. The high employment potential of renewable energy is not restricted to high-income countries and emerging economies but also applies to all developing countries (O Strietska-Illina, C Hofmann, MD Haro, S Jeon, 2012).

The demand for green skills is supported further by the results of TESDA's Skills Need Anticipation: Workplace Skills and Satisfaction (SNA:WSS) Surveys. From the construction sector last 2020, the top emerging skills that have an impact on the adoption of digitization and green technologies in the workplace are on Green Construction, Building Information Modeling (BIM), and Process Automation (TESDA, 2020). For the IT-BPM sector in the same year, the report identified the green emerging skills as the result of the survey per sub sector. The emerging jobs requiring green skills are Building Performance Analysis; Occupational Health and Safety Officer; Sustainability Analysis; Environmental Analysis Conservation Management; Infrastructure Specialist (Contact Center and BPO as sub sector), Energy Management Compliance and Regulatory (Information Technology Outsourcing), and Sustainability Officer (Global In-House Center) (TESDA, 2020). For the WSS Survey in the Logistics sector in 2021, the

identified green skills are Industrial Waste Handling Specialist, Pollution Control Officer, Sustainability Manager and Waste Disposal Professional (TESDA, 2021).

VI. GREEN SKILLS FOR ENVIRONMENTAL AND SUSTAINABLE DEVELOPMENT

Due to the shift in “greener” roles, the ILO said that employers are more focused on green skills, “partly due to the high demand and the relatively low supply of talent.” The lack of skills for green jobs could hinder the government's efforts towards achieving environmental goals and green growth. To bridge this skills gap, the government needs to collaborate with industries and employers to invest in skills upgrading. Companies should adopt a sustainable development perspective and provide their managers with training to effectively utilize the newly acquired skills of their staff/workers. (R Maclean, S Jagannathan, B Panth, 2018).

The COVID-19 crisis has highlighted the importance of providing inclusive and high-quality education for everyone, which should facilitate lifelong learning. It is crucial to consider the varying access to technology and study resources for students, especially during emergencies like pandemics. As more people shift towards environmentally-focused jobs, illustrated in Figure 4, young individuals will require knowledge, skills, and competencies related to sustainability and eco-friendliness. (United Nations Environment Programme, 2021).

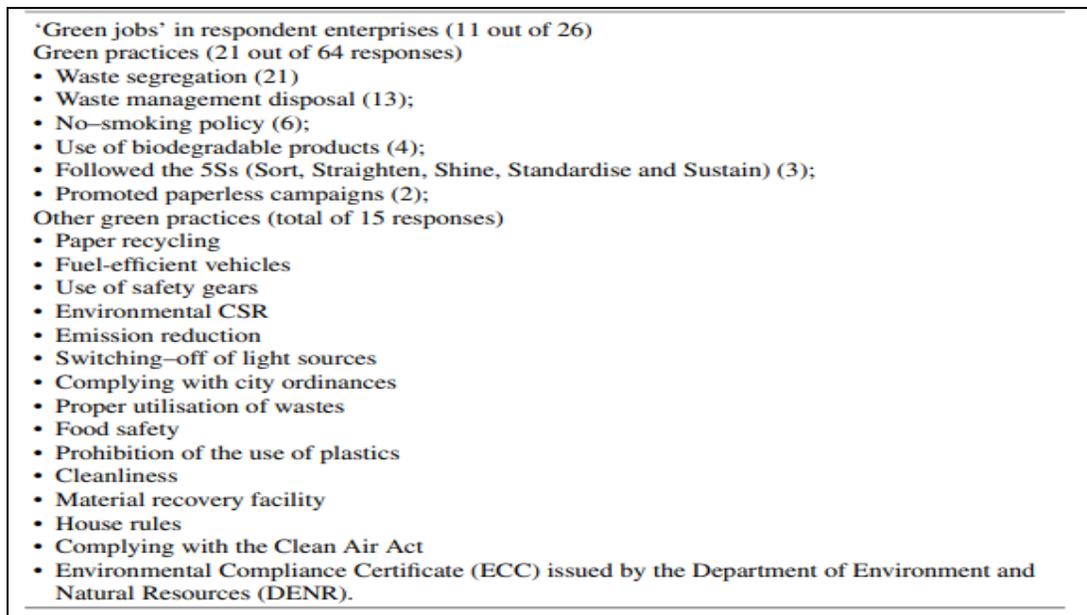
Figure 4: Skills needed for future green jobs.



Source: Source: GEO-6 for Youth. UNEP, Nairobi

The Green General Skills Index described (see Section II) the four group of work tasks that are critical to green occupations to understand issues in shifting greener economy. In the study of Talavera (2022), he identifies and recognizes the knowledge, skills, and competencies to convert and maintain green enterprises, and the advantages and issues associated with using 'green' practices in enterprises and gauges how aware micro, small, and medium-sized enterprises (MSMEs) are of relevant green skills requirements in the Philippines. In Figure 5 shows that these enterprises had 'green practices' such as waste segregation, waste management disposal, No-smoking policy, use of biodegradable products, followed 5s, and promoted paperless campaigns and many more. These practices may be adopted by other enterprises and agencies to support in promoting green practices.

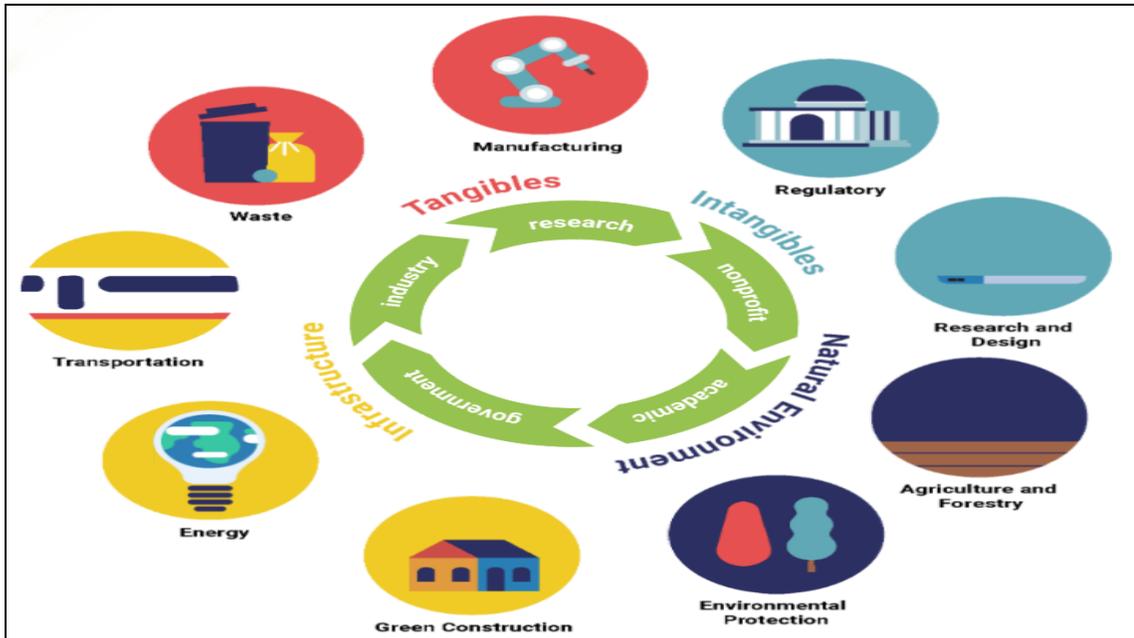
Figure 5: The green practices in targeted enterprises



Source: *Philippines. Recognising Green Skills for Environmental and Sustainable Development in Four Selected Industries*, Talavera 2022

The growing importance of sustainable development and the shift to a low-carbon economy are increasing the pace of change in labour markets and skill needs. (O Strietska-Illina, C Hofmann, MD Haro, S Jeon, 2012). The figure 6 shows how certain skills can be transferred across different fields and how jobs can be made greener. The outer ring represents nine traditional career paths, and each wedge within it shows example jobs in each path. The five inner circles represent different job sectors. The green parts of the figure are grouped into four categories: infrastructure, tangible, intangible, and nature. (United Nations Environment Programme, 2021)

Figure 6: Green Careers Pathways



Source: GEO-6 for Youth. UNEP, Nairobi

Table 3: Example Jobs/Skills in each Green Career Pathways

Green Career Pathways	Example Jobs/Skills
Waste	Sanitation Scientist Waste Reduction Zero Waste Analyst Materials Collector Water Footprint Manager Materials Scientist Landfill Miner Physician Recycler Hazardous Material Removal
Manufacturing	Raw Material Sourcing Product Design Engineer: Biochemical; Biopolymer; Systems; Manufacturing; Nanotechnology; Robotic Chemists/Biopolymer Engineer Industrial Designer Electrician Traceability Manager Green Market Analyst
Regulatory	Elected Official Foregin Affairs Officer

Green Career Pathways	Example Jobs/Skills
	Environmental Protection Lobbyist Science Advisor Sustainable Consumption Analyst Economist Regulatory Affairs Manager Soil and Water Conservation Virtual Health Support Environmental Underwriter
Research and Design	Graphic designer Sculptor Communications Specialist Novelist Screenwriter Sustainable Marketing Data Science: Computer; Cloud Architect; Systems Software Developer Commercial and Industrial Designer Geographic Information Systems Hydrologist Wholesale and Retail Buyer Logistics Analyst Cloud Architect Risk Management Specialist Supply Chain Manager Scientist: Atmospheric; Computer; Materials Engineering: Aerospace, Biochemical, Chemical, Civil, Electrical, Energy; Industrial
Agriculture and Forestry	Geochemist Scientists: In-vitro; Soil Organic Farmers Agro-ecological Farming Geneticist Water Quality Technician Ranch Manager and Organic Farmers Urban Grower Agroforester Geologist Hydrologist Engineer: Agricultural; Chemical; Civil; Geological; Mechanical; Mining
Environmental Protection	Storytellers: Professor; Teacher; Informal educator Lawyer: Environmental; Human Rights; Land Use Sustainability-aware Educators Forester Journalist; Reporter

Green Career Pathways	Example Jobs/Skills
	Conservation Biologist; Ecologist; Zoologist Environmental Economist Fish and Game Warden Forest Conservation Professional Smart Travel Coordinator Industrial Ecologist Scientist: Atmospheric; Geospatial
Green Construction	Urban and Regional Planner Entrepreneur Landscape Architect Green Design Architect Building Inspector Alloy and Metal Worker Energy Efficiency Builder Biomaterial Scientist Wind Turbine Fabricator Living Roof and Wall Gardener Green Engineering: Electrical; Mechanical
Energy	Renewable Energy Generation and Installation Energy and Carbon Capture Storage Energy Auditor, Broker and Trader Biofuel and Geothermal Production Technician: Biomass Plant; Solar Cell; Wind Turbine Engineer: Biomass; Geothermal; Solar; Wind Wave Energy Producer Smart Grid Operator Energy Efficiency Analyst Landfill Gas Collector
Transportation	Green Engineering: Aerospace; Automotive; Locomotive Fuel Cell Engineer Logistics Analyst Advanced Transportation Planner Clean Car Engineer and Mechanic

Source: GEO-6 for Youth. UNEP, Nairobi

Technical and vocational education and training (TVET) in green career pathways offer a wide variety of opportunities for individuals who are passionate about creating a sustainable future (UNESCO-UNEVOC, 2018). Waste reduction and management is a significant aspect of green careers, including waste reduction experts, materials collectors, and hazardous material removal specialists. Engineers in fields such as biochemical, biopolymer, and nanotechnology are crucial in developing sustainable manufacturing processes. Communications and marketing professionals also have a role to play in promoting green initiatives through roles such as graphic designers,

screenwriters, and sustainable marketing specialists. Hydrologists, geologists, and water quality technicians help ensure access to clean water, while forestry and conservation experts work to preserve natural habitats. Green careers also encompass urban and regional planners, green construction professionals, and sustainable transportation planners. With a range of fields to explore, individuals interested in science, technology, engineering, art, or policy can find a green career pathway that aligns with their interests and values, making a meaningful contribution towards a sustainable future.

Reasons for not having ‘green’ jobs with ‘green’ practices

According to the ECOP and ILO (2012), there were various disadvantages associated with this, such as being restrictive in terms of the permitted practices, the potential to reduce profits, job loss, high start-up costs to begin with and risk of business closures. Aside from finances, lack of awareness and expertise on climate change, environmental issues and green jobs in the Philippines is a challenge too. In addition, financial and technical support is necessary to transition towards green initiatives or implement environmentally-friendly practices, Talavera (2022). Further, some organizations don't have green jobs or practices due to subcontracting in waste management and automotive where a lot of jobs are outsourced, lack of money for expensive equipment in automotive and PVC manufacturing sectors, and city ordinances prohibiting materials such as plastics which was mentioned by enterprises in catering.

VII. TESDA INITIATIVES

The TESDA Green Technology Center (GTC) of the National Institute for Technical Education and Skills Development (NITESD) has published a journal that shows the best practices of the Technical Vocational Institutions (TVIs) in greening the TVET System (Green TVET Journal, Vol. 1, 2020).

a. The Green TVET Framework

In March 2018, TESDA and ILO hosted the first Green TVET Forum and Strategic Planning on Greening the TVET System, the event aimed to facilitate the green transition of the Philippine technical vocational education and TVET System. TESDA has adopted the UNESCO-UNEVOC whole-of-nation approach and with the alignment to ILO Just Transition towards Environmentally Sustainable Economies and Societies for All, from this TESDA established the Philippines’ Greening TVET Framework Figure 8.

Figure 7: Philippine Green TVET Framework



Source: TESDA NITESD-GTC

The Green TVET Framework consists with the following components:

1. Green Jobs/Skills
2. Green Policies
3. Green Competency Standards/Training Regulations
4. Green Institutional Culture
5. Green Community

b. Greening TVET System

In August 2018, the TESDA issued a TESDA circular No. 058, series of 2018. The circular aims to promote economic, social, environmental, and political strategies towards sustainable development to support the implementation of the Philippine Green Jobs Act through training and retraining of workers in jobs that are sustainable and decent; to establish common understanding and appreciation of laws, policies and concepts of greening the TVET system; to integrate environmental sustainability in the Training Regulations, competency standards and curricula applying research philosophies; to guide employees, trainees, and other WET clients and partners to implement sustainability practices within TVET institutions and/or offices; to partner with "green" enterprises in implementing sustainability practices in the TVET sector; and to support in ensuring a just transition towards a greening economy and society through skills development. (TESDA Circular No. 058, s. 2018)

Moreover, the TESDA Women Center conduct a forum with the theme of TESDA Women's Center Stakeholders' Forum: Green TVET for a Sustainable Future," last 2022, the forum provided a platform for discussion regarding green jobs or skills needed by the industry, understanding renewable energy, and to learn and adopt the green practices of major industries (TESDA Website). Furthermore, greening the whole TVET requires a constant updating to adapt to the needs of the industry. The Green TVET Framework would help all institutions to gradually transition to green institutions. Greening of the TVET System aims to re-skill and upskill the learners with green competencies and to support the country's transition to a greener economy by identifying and producing green opportunities and green jobs.

c. Skills Needs Anticipation: Workplace Skills Satisfaction (SNA:WSS)

In 2020 TESDA published "Skills Need Anticipation: Workplace Skills and Satisfaction (SNA:WSS) Surveys for IT-BPM and Construction Sector", the report identified the top emerging skills that have an impact on the adoption of digitization and green technologies in the workplace are on Green Construction, Building Information Modeling (BIM), and Process Automation in the construction. For the IT-BPM sector the identified the emerging jobs requiring green skills are Building Performance Analysis; Occupational Health and Safety Officer; Sustainability Analysis; Environmental Analysis Conservation Management; Infrastructure Specialist (Contact Center and BPO as sub sector), Energy Management Compliance and Regulatory (Information Technology Outsourcing), and Sustainability Officer (Global In-House Center).

Moreover, in 2021 TESDA also published SNA:WSS in Logistics sector, the identified green skills are Industrial Waste Handling Specialist, Pollution Control Officer, Sustainability Manager and Waste Disposal Professional.

d. Training Regulations With Green Competency Components

As part of the transitioning towards a green economy, TESDA has developed eighty-nine (89) Training Regulations (TRs) with green competency components. TESDA continues to integrate green skills into the basic competency to ensure its application in the industry.

The majority of TRs are industry-driven in the sense that they are requested by the industries themselves. These TRs are developed together with experts within the industry. Other than partnership with industries, TRs are also developed in collaboration with other government organizations.

The list of training regulations that has green competency components are as follows:

Table 4: Training Regulation with green competency components

SECTOR	QUALIFICATION TITLE
<i>Agriculture Forestry and Fishery</i>	Agricultural Machinery Servicing (4-Wheel Tractor) NC III
	Aquaculture (Grow-out Operation) NC II
	Aquaculture (Hatchery Operation) NC II
	Aquaculture (Tilapia Culture) NC II
	Bamboo Processing (Engineered Bamboo) NC II
	Beekeeping NC II
	Biogas Plant Installation NC III
	Pressurized Irrigation System Installation and Maintenance NC II
	Rubber Production NC II
<i>Automotive and Land Transportation</i>	Automotive Body Repairing NC II
	Automotive Painting NC II
	Automotive Servicing (Chassis Repair) NC II
	Automotive Servicing (Electrical Repair) NC II
	Automotive Servicing (Engine Repair) NC II
	Speed Limitation Device Servicing NC II
<i>Construction</i>	Carpentry NC II
	Carpentry NC III
	Heavy Equipment Operation (Crawler Crane) NC III
	Heavy Equipment Operation (Forklift) NC II
	Heavy Equipment Operation (Hydraulic Excavator) NC II
	Heavy Equipment Operation (Overhead and Gantry Crane) NC III
	Heavy Equipment Operation (Rigid On-Highway Dump Truck) NC II
	Heavy Equipment Operation (Rough Terrain Crane)

SECTOR	QUALIFICATION TITLE
	NC III
	Heavy Equipment Operation (Tower Crane) NC III
	Heavy Equipment Operation (Truck Mounted Crane) NC III
	Masonry NC I
	Masonry NC II
	Masonry NC III
	Pipefitting (Metallic) NC II
	Scaffolding Works NC II (Supported Type Scaffold)
	Tile Setting NC II
Creative Sector	Audio Production Services NC I
	Film and Video Post Production NC III
	Handloom Weaving (Upright) NC II
	Lighting for Live Performances NC II
Electrical & Electronics	Mobile Phones and Handheld Gadgets Servicing NC III
Heating, Ventilation, Airconditioning and Refrigeration	Commercial Air-conditioning Installation and Servicing NC III
	Commercial Refrigeration Installation and Servicing NC III
	Land-Based Transport Mobile Air-conditioning (MAC) NC II
	RAC Servicing (DomRAC) NC II
Human Health / Health Care	Assistive Rehabilitation Technology Services (Orthotics) NC II
	Assistive Rehabilitation Technology Services (Prosthetics) NC II
	Assistive Rehabilitation Technology Services (Wheelchair) NC II
	Barangay Health Services NC II
	Caregiving (Clients with Special Needs) NC II

SECTOR	QUALIFICATION TITLE
	Caregiving (Elderly) NC II
	Caregiving (Grade Schooler to Adolescent) NC II
	Caregiving (Newborn to Pre-Schooler) NC II
	Community Nutrition Services NC II
	Contact Tracing NC II
	Dental Hygiene Level IV
	Emergency Medical Services NC III
<i>Information and Communication Technology</i>	Programming (Java) NC III
<i>Logistics</i>	Multimodal Transport Operations and Logistics (Seafreight Import) Services NC II
	Multimodal Transport Operations and Logistics (Seafreight Import) Services NC III
	Multimodal Transport Operations and Logistics (Seafreight Import) Services NC IV
	Warehousing Services NC III
	Warehousing Services NC IV
<i>Metals and Engineering</i>	5-Axis CNC Machine Operation NC III
	CNC Electric Discharge Machine (EDM) Wire Cut Operation NC III
	Die Designing NC IV
	Electric Discharge Machine (EDM) Sinking Operation NC II
	Machining NC I
	Manual Metal Arc Welding (MMAW) NC I
	Manual Metal Arc Welding (MMAW) NC II
	Manual Metal Arc Welding (MMAW) NC III
	Manual Metal Arc Welding (MMAW) NC IV
	Mold Designing NC IV
Mold Making NC III	

SECTOR	QUALIFICATION TITLE
Processed Food & Beverages	Food Processing NC I
Social, Community Development and Other Services	Barbering NC II
	Beauty Care (Nail Care) Services NC II
	Beauty Care (Nail Enhancement Technology) Services NC III
	Beauty Care (Skin Care) Services NC II
	Domestic Work NC II
	Hairdressing NC II
	Hairdressing NC III
	Microinsurance Services (Mutual Benefit) NC II
	Public Employment Services NC IV
	Real Estate Services NC II
Tourism (Hotel and Restaurant)	Food Production (Professional Cookery) NC III
	Food Production (Professional Cookery) NC IV
	Front Office Services NC III
	Front Office Services NC IV
	Housekeeping NC III
	Housekeeping NC IV
	Tour Guiding Services NC III
	Tour Packaging (FIT AD HOC DOMESTIC) Services NC II
	Travel Services NC II

Source: TESDA Qualification and Standard Office (QSO)

In addition, TESDA has developed competency standard (CS) on **Pure Battery Propelled Electric Vehicle Servicing Level II**, to cater to the servicing of 2-wheeled, 3-wheeled and 4-wheeled pure battery electric vehicles. Graduates of this program will be able to gain skills in performing periodic maintenance based on the manufacturing specifications and troubleshooting and repairing electronic parts and components in accordance with the user and maintenance manual.

e. TVET Capacity

The following TVET Capacity is all data on the qualifications based on With Training Regulation (WTR) and has green competencies.

Table 5 shows the accomplishment of the greened training regulation as of December 2022. Based on the table, the Manual Metal Arc Welding (MMAW) NC II has the most number of enrolled beneficiaries among all the qualifications with a total of 25,453. On the other hand the Domestic Work NC II has the highest number of assessed with a total of 102,855 and has a corresponding 94,201 competent trainees.

However, some of the qualifications still do not have enrollees, graduates, assessed and certified as of 2022.

Table 5: Total Number of Enrolled, Graduates, Assessed and Certified by Qualification with green competencies, As of December 2022

Sector	Qualification Title	Enrolled	Graduates	Assessed	Certified
Agriculture Forestry and Fishery	Agricultural Machinery Servicing (4-Wheel Tractor) NC III	0	0	0	0
	Aquaculture (Grow-out Operation) NC II	0	0	0	0
	Aquaculture (Hatchery Operation) NC II	0	0	0	0
	Aquaculture (Tilapia Culture) NC II	0	0	0	0
	Bamboo Processing (Engineered Bamboo) NC II	0	0	0	0
	Beekeeping NC II	0	0	0	0
	Biogas Plant Installation NC III	0	0	0	0
	Pressurized Irrigation System Installation and Maintenance NC II	0	0	0	0
	Rubber Production NC II	163	187	445	414
Agriculture Forestry and Fishery, Sub-total		163	187	445	414
Automotive and Land Transportation	Automotive Body Repairing NC II	83	82	39	30
	Automotive Painting NC II	0	0	0	0
	Automotive Servicing (Chassis Repair) NC II	0	0	560	544
	Automotive Servicing (Electrical Repair) NC II	44	0	517	491
	Automotive Servicing (Engine Repair) NC II	20	2	1,618	1,602
	Speed Limitation Device Servicing NC II	0	0	0	0
Automotive and Land Transportation, Sub-total		147	84	2,734	2,667

Sector	Qualification Title	Enrolled	Graduates	Assessed	Certified
Construction	Carpentry NC II	8,859	9,776	11,977	11,462
	Carpentry NC III	26	48	134	128
	Heavy Equipment Operation (Crawler Crane) NC III	0	25	20	20
	Heavy Equipment Operation (Forklift) NC II	1,794	1,959	11,266	10,736
	Heavy Equipment Operation (Hydraulic Excavator) NC II	3,683	4,133	7,095	6,851
	Heavy Equipment Operation (Overhead and Gantry Crane) NC III	0	0	62	62
	Heavy Equipment Operation (Rigid On-Highway Dump Truck) NC II	509	854	3,277	3,013
	Heavy Equipment Operation (Rough Terrain Crane) NC III	0	20	144	113
	Heavy Equipment Operation (Tower Crane) NC III	25	24	27	27
	Heavy Equipment Operation (Truck Mounted Crane) NC III	69	0	282	233
	Masonry NC I	5,142	5,189	4,674	4,600
	Masonry NC II	5,727	6,054	7,968	7,618
	Masonry NC III	0	0	61	52
	Pipefitting (Metallic) NC II	397	483	1,773	1,672
	Scaffolding Works NC II (Supported Type Scaffold)	1,102	1,190	8,051	7,747
	Tile Setting NC II	6,219	6,702	5,410	5,297
	Construction , Sub-total		33,552	36,457	62,221
Creative Sector	Audio Production Services NC I	0	0	0	0
	Film and Video Postproduction NC III	0	0	0	0
	Handloom Weaving (Upright) NC II	0	0	32	32
	Lighting for Live Performances NC II	0	0	0	0
Creative Sector , Sub-total		0	0	32	32
Electrical & Electronics	Mobile Phones and Handheld Gadgets Servicing NC III	0	0	0	0
Electrical & Electronics , Sub-total		0	0	0	0
Heating, Ventilation, Airconditioning and Refrigeration	Commercial Air-conditioning Installation and Servicing NC III	15	15	38	38
	Commercial Refrigeration Installation and Servicing NC III	0	0	0	0
	Land-Based Transport Mobile Air-conditioning (MAC) NC II	0	0	0	0
	RAC Servicing (DomRAC) NC II	1,863	1,760	4,929	4,502
Heating, Ventilation, Airconditioning and Refrigeration , Sub-total		1,878	1,775	4,967	4,540

Sector	Qualification Title	Enrolled	Graduates	Assessed	Certified
Human Health / Health Care	Assistive Rehabilitation Technology Services (Orthotics) NC II	0	0	0	0
	Assistive Rehabilitation Technology Services (Prosthetics) NC II	0	0	0	0
	Assistive Rehabilitation Technology Services (Wheelchair) NC II	0	0	0	0
	Barangay Health Services NC II	1,147	1,370	1,664	1,595
	Caregiving (Clients with Special Needs) NC II	0	0	0	0
	Caregiving (Elderly) NC II	0	0	292	194
	Caregiving (Grade Schooler to Adolescent) NC II	0	0	0	0
	Caregiving (Newborn to Pre-Schooler) NC II	0	0	36	33
	Community Nutrition Services NC II	0	0	0	0
	Contact Tracing NC II	7,650	8,611	0	0
	Dental Hygiene Level IV	0	0	0	0
	Emergency Medical Services NC III	0	37	114	107
	Human Health / Health Care , Sub-total		8,797	10,018	2,106
Information and Communication Technology	Programming (Java) NC III	1,477	1,675	0	0
Information and Communication Technology , Sub-total		1,477	1,675	0	0
Logistics	Multimodal Transport Operations and Logistics (Seafreight Import) Services NC II	0	0	0	0
	Multimodal Transport Operations and Logistics (Seafreight Import) Services NC III	0	0	0	0
	Multimodal Transport Operations and Logistics (Seafreight Import) Services NC IV	0	0	0	0
	Warehousing Services NC III	0	0	0	0
	Warehousing Services NC IV	0	0	0	0
Logistics , Sub-total		0	0	0	0
Metals and Engineering	5-Axis CNC Machine Operation NC III	0	0	0	0
	CNC Electric Discharge Machine (EDM) Wire Cut Operation NC III	0	0	0	0
	Die Designing NC IV	0	0	0	0
	Electric Discharge Machine (EDM) Sinking Operation NC II	0	0	0	0
	Machining NC I	103	104	149	148
	Manual Metal Arc Welding (MMAW) NC I	22,957	26,820	28,034	26,588
	Manual Metal Arc Welding (MMAW) NC II	25,453	30,315	42,289	39,896
	Manual Metal Arc Welding (MMAW) NC III	785	1,059	1,150	1,120
	Manual Metal Arc Welding (MMAW) NC IV	0	0	49	41
	Mold Designing NC IV	0	0	0	0
Mold Making NC III	0	0	0	0	
Metals and Engineering , Sub-total		49,298	58,298	71,671	67,793

Sector	Qualification Title	Enrolled	Graduates	Assessed	Certified
Processed Food & Beverages	Food Processing NC I	0	0	70	58
Processed Food & Beverages , Sub-total		0	0	70	58
Social, Community Development and Other Services	Barbering NC II	16	12	14	11
	Beauty Care (Nail Care) Services NC II	1,955	1,931	1,921	1,898
	Beauty Care (Nail Enhancement Technology) Services NC III	0	0	0	0
	Beauty Care (Skin Care) Services NC II	0	0	17	17
	Domestic Work NC II	6,571	6,825	102,855	94,201
	Hairdressing NC II	640	816	1,966	1,883
	Hairdressing NC III	0	0	9	4
	Microinsurance Services (Mutual Benefit) NC II	0	0	0	0
	Public Employment Services NC IV	0	0	41	41
	Real Estate Services NC II	0	0	28	26
Social, Community Development and Other Services , Sub-total		9,182	9,584	106,851	98,081
Tourism (Hotel and Restaurant)	Food Production (Professional Cookery) NC III	0	0	0	0
	Food Production (Professional Cookery) NC IV	0	0	0	0
	Front Office Services NC III	0	0	49	7
	Front Office Services NC IV	0	0	4	2
	Housekeeping NC III	282	392	1,591	1,436
	Housekeeping NC IV	0	0	26	20
	Tour Guiding Services NC III	0	5	117	115
	Tour Packaging (FIT AD HOC DOMESTIC) Services NC II	0	0	0	0
	Travel Services NC II	0	5	185	180
Tourism (Hotel and Restaurant) , Sub-total		282	402	1,972	1,760
Total		104,776	118,480	253,069	236,905

Source: TESDA Information and Communication Technology Office (ICTO) and Certification Office (CO)

f. Updates on the TESDA Green Technology Center Programs

The TESDA Green Technology Center (GTC) has various partnerships to further promote green activities and steps for Greening the TVET System and to further develop TESDA Trainers so that they will cascade it to their respective institutions. Table 6 shows the updates on some of the programs of TESDA GTC.

Table 6: TESDA GTC-NITESD Programs update

Programs	Updates
<p>Global Partnership for improving Food Cold Chain in the Philippines</p>	<p>In 2022, the Cold Chain Innovation (CCI) Hub inaugurated the Global Partnership for improving the Food Cold Chain in the Philippines at the TESDA Complex. The building will serve as a venue for global partnership among the public and private sectors including the technology providers to promote the best available low-carbon and energy efficient design technologies and practices.</p> <p>Furthermore, in the same year, GTC conducted a stakeholders workshop on the System Operation Optimization Recommendation for the Philippines Commercial Food Retail Sector. This project aims to identify, develop and stimulate the development of low-carbon, energy-efficient refrigeration innovation technologies.</p> <p>For 2023, There is a target to develop Competency Standards for Industrial Refrigeration. Prioritization process being handled by the Planning Office.</p>
<p>Solid Waste Management Training Program for a World Without Waste (SWMTP-WWW)</p>	<p>The Program accomplishment as of 2022 listed as follows:</p> <ul style="list-style-type: none"> ● The Memorandum of Agreement signing during the Green TVET Forum conducted last April of 2022; ● The Establishment of the National Project Management Team (NPMT); ● Development of the Competency-Based Curriculum ● Memorandum of Agreement (MOA) signing between TESDA Regional Office, LGU of Angono, Rizal, and Coca-cola Philippines; ● Work and Financial Plan; and ● Pilot Implementation of the SWMT-WWW training at the LGU of Angono, Rizal <p>For 2023, the program which was piloted in Angono will be extended to ten (10) other LGUs, the list still being finalized.</p> <p>The MOA will be renewed this year and will also include DILG and DENR to ensure the project’s continuity and sustainability.</p> <p>Another, is the industry consultation conducted for the solid waste management sector as part of the request for</p>

	<p>prioritization for the development of a Training Regulation for solid waste management. Below are the agreements/way forward during the conduct of the said consultation:</p> <ul style="list-style-type: none"> ● Provide support to build the infrastructure needed to implement the following existing Training Regulations: <ul style="list-style-type: none"> ○ Garbage Collection NC I ○ Sanitary Landfill Operations NC II ○ Sanitary Landfill Operations NC III ● The standards/curriculum may also be reviewed in reference to the Extended Producer Responsibility (EPR Law) ● Additional responses from the LGU ● Reprocessing of the LGU requirements ● Report development and dissemination (includes the memo endorsement to QSO for CS development) ● Recommendation to include the waste management in the labor employment plan of DOLE ● Share equivalent Training Regulations to review whether there is a need for a separate program or the existing standards suffice
Trainers Development	
<p>Workshop on Greening TVET and Skills Development in the Philippines or the Implementation of Green TVET Toolkit</p>	<p>The Green Technology Center conducted a training program on the development of Green Competency Standards, Green Curriculum, and Professional Development for Teachers. The training program was facilitated with the cooperation of the International Labour Organization (ILO) and attended by TESDA Trainers from various industries which are Tourism, Construction, Electronics industries, TESDA Technical Staffs from the QSO, CTADD, and NTTA as well. The objective of this program is to provide guidance on designing competency standards for greener jobs; developing and implementing green curricula; adapting training delivery and assessments to support greener learning; building a greener campus; and greening the professional development of teachers and in-company trainers.</p>
<p>Conduct of the CCI Hub Technology and Technical Learning Sessions</p>	<p>The CCI-Hub conducted its Technical Learning Sessions (TLS) at the TESDA Complex which were attended by local and international speakers to feature the new innovations and technologies that are applicable to the Food Cold Chain. The topics covered during the TLS are the following:</p> <ul style="list-style-type: none"> ● CO2 for Food retail Sector;

	<ul style="list-style-type: none"> ● CO2 for Cold Storage and Food Processing; ● CO2 Evaporator Case Study; ● R290 Waterloop System for Food Retail; ● Basesys Heat Converter; and ● HC Solutions Refrigeration <p>The total number of participants both virtual and face to face across all regions were 75 on day 1, 42 on day 2, and 47 on day 3.</p>
<p>Training of Trainers on the Safe Operation and Maintenance of Ammonia-based Industrial Refrigeration Systems</p>	<p>In October 2022, CCI Hub conducted a five day training of trainers that was participated with 31 key industry stakeholders, TESDA and Technical-Vocational Institutions. This training helps to enhance the knowledge and skills of TESDA Trainers in HVAC-R specifically in safe operation and maintenance of ammonia-based industrial refrigeration systems and immerse the trainers in the real world application of natural refrigerants.</p> <p>Engr. Cesar Luis Lim of Kilojoule Consultants International Co. was the resource person for this training. The total participants for this training is 14 trainers from TTIs, and 13 participants from RAC Industry Partners.</p>
<p>Training of Trainers on the Installation and Maintenance of Aquaponics System</p>	<p>The TESDA NITESD-GTC, as the green skills hub of TESDA conducts Training of Trainers (ToT). This serves as an avenue to learn new technologies, products and green practices where selected trainers/representatives were capacitated to enable them to disseminate the technology and learning with their areas.</p> <p>The GTC conducted training on the Installation and Maintenance of Aquaponics with a total of nineteen (19) nominated trainers from different Regional Offices. The training was facilitated by the Bureau of Fisheries and Aquatic Resources (BFAR) in Navotas. The participants were grouped for a simultaneous conduct of the training and hand-on activities with the BFAR staff and technician assisting the Resource Person throughout the workshop. Each of the participants are required to submit their respective action plans and are encouraged to share updates on their project implementation through the GTC facebook page.</p>

Source: GTC Year-End Report, 2022 and updates from 2023 implementation

g. Best Green Practices in the Greening the TVET System

The TESDA Green Technology Center (GTC) has guided the implementation of the various programs of the TESDA Technology Institutions (TTIs) and was later recognized as the best practice in the Greening the TVET System listed in Table 7.

Table 7: Green Practices in the Greening the TVET System

TITLE	TESDA Technology Institutions	BEST PRACTICES
Solar Powered Aquaponics Farming System	Provincial Training Center - Davao	This project is using Solar-powered panels to pump the water supply into the grow beds and it also helps save cost on electricity. PTC-Davao is also utilizing the fish waste to provide nutrients to the plants.
Go Natural: Development of Cleaner and Disinfectant from Cucumber Tree (Averrhoa Bilimbi)	Isabela School of Arts and Trades	Production of a safe cleaning chemical, which is at the same time cost-effective and eco-friendly.
Biogas Digester: Converting Animal Manure to Chemical Energy and Organic Fertilizer	Quezon National Agricultural School	The Biogas Digester helped in minimizing the biological wastes found in the farm, subsequently diminishing the high demand for wood used for cooking that may also be associated with the massive deforestation issues.
Urban Vermiculture	Quezon City Lingkod Bayan Skills Development Center	Converting market waste and other biodegradable wastes into a nutrient-rich black soil for sustainable agriculture
Greening ASSAT: A Model	Agusan Del Sur School of	In 2018, ASSAT installed a

<p>for Sustainable TVET</p>	<p>Arts and Trades (ASSAT)</p>	<p>solar-powered perimeter fence lightning system and solar-powered irrigation system to reduce its monthly electricity consumption. This project was made by the learners of this institution as part of their training on the photovoltaic system designing and installation.</p> <p>ASSAT also established a Diversified Mini-Organic Demonstration Farm and Communal Garden and also implemented the waste management and disposal system.</p> <p>ASSAT already integrated green skills and competencies in their curriculum.</p>
<p>Practicing Sustainability in the Community through Installation of PV System</p>	<p>Regional Training Center - Tuguegarao City</p>	<p>With the influence of ASSAT, RTC- Tuguegarao City inspired by the solar-powered the implementation of installing PV Systems into the community. Based on the result of the implementation, it can sustain 8 hours of continuous operation during the day time and when the battery is fully charged it can operate overnight.</p>
<p>Eco-bricks: LGPC Green TVET Initiative towards Circular Economy</p>	<p>Leon Ganson Polytechnic College</p>	<p>LGPC established a mini organic farm using eco-bricks to reduce the plastic waste. In eight (8) months of collection of plastic waste, LGPC collected a total of 3.7 tons or 2,220 eco-bricks.</p>

<p>TESDA-PSAT: Navigating the futuristic 21st Century by establishing a Green Institutional Culture</p>	<p>Pangasinan School of Arts and Trades</p>	<p>TESDA PSAT established a Material Recovery Facility which serves as a gateway to instilling a deep sense of awareness and engagement among the employees, trainers, trainees of TESDA PSAT. This facility was constructed by its Shielded Metal Arc Welding (SMAW) NC II graduates. PSAT also installed an organic composting area within the facility. They already switched to LED bulbs.</p>
<p>RNIT Tourism Agri-Farm Site: Road to Self-Sufficiency Leading to Self-Sustainability</p>	<p>Romblon National Institute of Technology</p>	<p>TESDA RNIT has established a three (3) hectares of mini-organic farm from a former wasteland. RNIT has been a green institution as their facilities were surrounded by bearing trees like mango trees, Cashew, Cacao, Dalandan, Calamansi. In their mini-organic farm they use recycled plastic bottles and there were Papayas, Banana and Malunggay.</p> <p>The RNIT also established a greenhouse where they planted crops and served as a venue to train their trainees in the production of organic fertilizers called “vermicast”</p>

Source: *Green TVET Journal Volume 2*

VIII. WAY FORWARD

The green economy is becoming more significant in order to be able to mitigate the impact of environmental degradation and climate change. The Philippines has committed to international goals (i.e. SDG 8), as reflected in the country's national policies and laws. Skills development will be critical in order for the Philippine industries and workers to be able to capitalize on the opportunities brought about by the green transition.

The following are recommendations for TESDA:

- Continue to learn about how the economy and the labor market is being restructured due to the transition to greener practices, in order to align TVET programs so that graduates and certified workers are equipped with green skills, and provide skilled workers especially in industries and businesses that are already adopting green practices. Engagement with the industries and stakeholders for the advocacy and promotion of green jobs and green skills.
- In relation to the identified Green General Skills Index, TESDA has to re-evaluation whether the following group of works that are crucial to green occupations are the considered in the inclusion of the green competencies in the TR: 1) **Engineering and technical skills**, 2) **Science skills**, 3) **Operation management skills**, 4) **Monitoring skills**
- Existing Training Regulations should be re-evaluated. There are already 89 Training Regulations that has incorporated the green competencies (i.e., Agricultural Machinery Servicing (4-Wheel Tractor) NC II, Automotive Body Repairing NC II, Carpentry NC II, Audio Production Services NC I, and etc.) and there are still 226 TRs remaining that have not yet incorporated green competencies².
 - TESDA must analyze whether the existing TRs have to include the Green General Skills index as this is the reference in the global analysis.
 - TESDA should consider green component on supplies and equipment that are being used during the development and review of TR to ensure the application of green skills; Likewise, green skills should be captured in the development of assessment tool.
 - TESDA must also ensure all training programs are aligned with the green requirements that are very specific to the sector.

² There are 315 promulgated TESDA Training Regulations as of 30 March 2023.

- Based on the conducted studies, the application of the green skills can be in a different form of delivery. With this, TESDA has to determine methodologies that will best work in the conduct of green competencies.
- Trainers capacity to ensure that embedded green competencies are being taught during the conduct of the trainer, should be ensured. The National TVET Trainers Academy can consider assessing trainers capacity in delivery this competencies and provide the corresponding training as necessary.
- Partnership and Linkages
 - TESDA must maintain partnerships and linkages with the government agencies and other industry partners to develop more interventions relevant to greening the TVET System, including the implementation of the Green Jobs Act.
- TESDA Green Technology Center (GTC)
 - TESDA GTC must sustain its efforts in leading the greening of TVET in its performance of its mandate and functions. Further, GTC may consider working with various private companies in the implementation of the program, as the conduct of green related programs is considered by the companies as expensive.

Scholarship assistance for this program should likewise be explored to support the companies. One of the possible pathways is the inclusion of these competencies in the Selected Training Program for implementation under the Tulog Trabaho Program.

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