GREEN SKILLS FOR GREEN JOBS

PREPARING THE FILIPINO WORKFORCE FOR THE GREEN ECONOMY

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I.   Executive Summary

- The Philippines is seeing some green transformation in its economy as a means to fulfill its commitments in achieving sustainable development. This "green shift" is likely to provide green jobs: those which help reduce negative environmental impacts, and are decent, where "jobs meet longstanding demands and goals of the labor movement, i.e., adequate wages, safe working conditions, and worker rights, including the right to organize labor unions". Green skills are becoming in demand across occupations and industries, as a result of the greening of the economy. However, the greening of the economy will also see scenarios where employment will be substituted, certain jobs will be transformed, and some jobs may be eliminated.

- There are several policies that drive the Philippines' transition to green economy such as the United Nations SDGs and the Paris Agreement, PDP 2017-2022 and the Philippine Green Jobs Act. As the Philippines transition to the greening of the economy, it needs to ensure that this transition is a just transition, where decent work is created and social justice, rights and social protection is ensured for all.

- The greening economy shows promising numbers. While the conventional subsector is still projected to be larger than the green subsector in terms of Gross Value Added and employment demand, the green subsector's Compound Average Growth Rate is higher than the conventional subsector's.

- TESDA has led the way in implementing the greening of the TVET sector through the greening of training regulations as well as in the various programs and initiatives of its Green Technology Center. Currently, a total of 20 training regulations have "green" competency components.

- A number of issues have been raised on greening TVET but TESDA should initiate programs and activities that will help address the issues. TESDA is also recommended to undergo "greening" as an institution, in order to better appreciate, understand, and implement Education for Sustainable Development within TVET. UNESCO-UNEVOC's "whole-of-institution" approach in the greening of TVET Institutions may be considered by TESDA. Sustainable development should be at the core in how TESDA performs its mandate and functions as the authority not only in TVET but in greening TVET.

II.   Background

The concept of green economy sprung from the need to address a host of environmental problems and to achieve sustainable development. Among the environmental problems that the world is facing are climate change, global warming, deforestation and pollution. Achieving sustainable development means the need to balance economic growth, social inclusion and environmental protection in order to build an inclusive and resilient future for the people and the planet.

The Philippines is a signatory to various international commitments and has enacted various laws that promote environmental protection and preservation and the achievement of sustainable development. It recognizes that a "green shift" in the economy is a step towards fulfilling its commitments. The green economic transformation allows the creation of jobs that are "green (help restore the environment), decent (promote dignity, security, equity and stability at work), and sustainable (long term)." Findings from a study commissioned by the International Labour Organization (ILO) point that a green restructuring of the Philippine economy is likely to provide additional employment towards green jobs. This is an opportunity that the Philippines can exploit due to the availability of young labor force. However, this opportunity can be capitalized through "the alignment of education, skills development, and training with the labour requirements of green and greener industries." This indicates the need for the education system in the country to address skills requirements for the green economy. Basic education, higher education and technical-vocational education and training (TVET) should also be aligned with these requirements in order to better prepare the current and future workforce in the greening of the Philippine economy. Crucial to this preparation is educating for sustainable development, for "without education and skills, there can be no sustainable development" (Majumdar, 2018).

This paper aims to discuss the following ideas and concepts:

    a. green economy, green jobs, green skills, and education for sustainable development
    b. drivers for the greening of economy and the creation of green jobs and their corresponding implications
    c. plans and initiatives for the greening of selected industries
    d. green jobs in selected industries and their corresponding relevant skills requirements; and
    e. implications to TVET.

III.   Definition of Terms

    a. Green Economy

    The Philippine Green Jobs Act defines Green Economy as "one which is low-carbon and resource-efficient, and results in the generation of green jobs and in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities", while the United Nations Environment Programme (UNEP) has defined the green economy as "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." (UNEP 2011). Another definition for green economy offered by the Green Economy Coalition (a group of NGOs, trade union groups and others doing grassroots work on a

green economy) succinctly defines green economy as "a resilient economy that provides a better quality of life for all within the ecological limits of the planet." From the definitions it can be deduced that economic activities result to a better quality of life, however these activities result to some environmental impact or risk. Both definitions say that economic activities that lead to better quality of life should be within the bounds of ecology as resources are limited, and that the environmental impact or risk should be minimized, if not totally eradicated. Based on these definitions, it can also be inferred that the green economy aims to achieve sustainable development, or as defined in the Bruntland Report "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

b. Green Jobs

Green Jobs as defined by the International Labour Organization (ILO) is two-fold:

1. It is the provision of direct employment in economic sectors and activities that helps reduce their negative environmental impacts, thus ultimately arriving at levels that are sustainable. This includes but is not limited to jobs that work towards protecting ecosystems and biodiversity, reducing energy, materials and water consumption, de-carbonizing the economy and minimizing all forms of waste and pollution.

2. It also needs to be decent, where "jobs meet longstanding demands and goals of the labor movement, i.e., adequate wages, safe working conditions, and worker rights, including the right to organize labor unions". For those jobs that can be considered as green but not necessarily decent, such as "jobs in materials recycling plants where workers are not paid the minimum wage and do not enjoy any freedom to organize" cannot be called a green job.

Thus, green jobs are decent jobs in any economic sector that "improve energy and resource efficiency, limit greenhouse gas emissions, minimize waste and pollution, protect and restore ecosystems, and support adaptation to the effects of climate change", and at the same time, "rights at work, equal opportunity, productive and gainful employment, social protection, social dialogue, gender equality and non-discrimination" are practiced and promoted.

Green jobs are found and promoted through the greening of processes, products and services, as well as ecosystem management. Some examples are:

Table 1 Examples of Green Jobs

Process	Products and Services	Ecosystem Management
• **Reducing energy and resource intensity** • **Eco-efficiency** • **Reducing and recycling waste**	• Organic agricultural products (certified) • Green textiles (green labelling) • Eco-tourism (certified) • Green construction (certified) • Green financing	• Ecosystem support • Natural resource management

c.   Green Skills

Green Skills, or skills for sustainability, is defined as "the technical skills, knowledge, values and attitudes needed in the workforce to develop and support sustainable social, economic and environmental outcomes in business, industry and the community." (iVET, 2011). Similarly, CEDEFOP defines green skills as "the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society" (CEDEFOP, 2012).

CEDEFOP further states that the demand for green skills is driven by a range of factors, including public policies and targets, and are defined by three main trends:
– Across occupations and industries, greening requires upgrading skills and adjusting qualification requirements;
– New or emerging economic activities create new or renewed occupations and related qualifications and skills profiles; and
– Structural changes create a need to realign sectors that will decline as a result of the greening of the economy and retrain workers accordingly.

d.   Education for Sustainable Development

UNESCO reports that Education for Sustainable Development (ESD) was conceptualized because education has been seen as a way to address the growing environmental challenges. The adoption of the SDGs strengthens the role of education to further promote ESD. Through ESD, it is hoped that learners will gain knowledge, skills, attitudes and values to help them promote and contribute to sustainable development. ESD is to be addressed in learning content and outcomes, pedagogy and the learning environment, which hopes to result to societal transformation. Each of the aspects are defined by UNESCO in the succeeding paragraph.

i. *Learning content*: Integrating critical issues, such as climate change, biodiversity, disaster risk reduction (DRR), and sustainable consumption and production (SCP), into the curriculum.

ii. *Learning outcomes*: Stimulating learning and promoting core competencies, such as critical and systemic thinking, collaborative decision-making, and taking responsibility for present and future generations.

iii. *Pedagogy and learning environments*: Designing teaching and learning in an interactive, learner-centered way that enables exploratory, action oriented and transformative learning. Rethinking learning environments
   1. physical as well as virtual and online
   2. to inspire learners to act for sustainability.

iv. *Societal transformation*: Empowering learners of any age, in any education setting, to transform themselves and the society they live in.

   1. Enabling a transition to greener economies and societies.
      a. Equipping learners with skills for 'green jobs'.
      b. Motivating people to adopt sustainable lifestyles.
   2. Empowering people to be 'global citizens' who engage and assume active roles, both locally and globally, to face and to resolve global challenges and ultimately to become proactive contributors to creating a more just, peaceful, tolerant, inclusive, secure and sustainable world.

IV. Drivers for the Greening of the Philippine Economy

   a. Relevant Policies

      i. United Nations SDGs and the Paris Agreement

         The SDGs articulates a universal sustainable agenda where ending poverty and hunger, and achieving prosperity should be anchored on having a healthy environment, sustainable consumption and production, proper management of natural resources and mitigating climate change impacts. The Paris Agreement articulates the effort to limit global temperature rise to "below 2°C and to strive for 1.5°C, as well as "lowering greenhouse gas emissions in (CO_2 equivalent) by seventy per cent in 2030 relative to the country's business as usual scenario in 2000-2030".

         The Philippines' commitment to the Paris Agreement is its Intended Nationally Determined Contributions (INDCs), which states that it intends to "reduce Green House Gas Emissions (CO2e) of about 70% by 2030 from its business as usual (BAU) scenario", and where reductions "will come from energy, transport, waste, forestry and industry sectors". Moreover, due to

vulnerability to the impacts of climate change, the Philippines is committed to ensure that "adaptation and disaster risk reduction are mainstreamed and integrated into the country's plans and programs". However, the Philippines has established that its INDC commitment is "based on current available data, will be updated as more data become available, and is also conditional on the agreement to be reached by Parties".

The ILO reports that addressing climate change will result to opportunities for decent work and social inclusion through the provision of new jobs, particularly for firms that promote green products and services. If climate change is not addressed, this will lead to damage to business assets, which will in turn result to job losses, as well as impact productivity and occupational health and safety.

ii.   PDP 2017-2022

The Philippines have the policy framework to support the promotion of green jobs in the country.

The Philippine Development Plan (PDP) 2017-2022 states that the national policy to increase economic opportunities in the industry & services sector includes the provision of incentives to green manufacturing to encourage the shift toward energy efficiency and to fully implement the Green Jobs Act, blue economy, innovation, among others. (PDP 9-7:112) The Plan noted the need to prepare the faculty, facilities and the curriculum for a green economy and this implies the need to allocate resources for these emerging needs. (PDP 10-8:124) Related to this is the provision to invest in human capital development based on the transformation of jobs, facilities, processes and future skills requirements. (PDP 9-8:113).

iii.   Green Jobs Act of 2016

The Philippine Green Jobs Act states that "the State shall identify needed skills, develop training programs, and train and certify workers for jobs in a range of industries that produce goods and render services for the benefit of the environment, conserve natural resources for the future generation, and ensure the sustainable development of the country and its transition into a green economy".

The Act specifies that a "National Green Jobs Human Resource Development (HRD) Plan" where it will enable and sustain the transition into a green economy and the generation of green jobs. The Department of Labor and Employment (DOLE) takes the lead in the development of the National Green Jobs HRD Plan, as well as the maintenance of database of green careers, professions and skills, list of emerging business enterprises, which generate and sustain green jobs.

The following are the sectors where the green jobs HRD plan will be focused:

- Agriculture, Fishery, Forestry
- Manufacturing (Electronics and Automotive)
- Transportation
- Tourism
- Solid and Waste Water Management
- Energy
- Construction
- Brown Economies (Mining, Quarrying and Chemicals)

The DOLE will also conduct a Green Sector Mapping- Human Resource and Decent Work Profiling which will determine the following:
- decent work parameters
- demand for green skills
- green skills supply (professionals and skilled workers)
- job scenarios (up to 2022)
  - jobs to be displaced
  - new jobs to be created
  - jobs to transform
- decent work challenges
- green higher education programs
- green technical-vocational training programs
- institutional support needed (financing, skills training, information and database, advocacy and communication)

The education agencies' roles in the implementation of the Philippine Green Jobs Act are of great importance in preparing the workforce to acquire green skills in order to be able to perform the green jobs. TESDA's role in particular is focused on the "formulation of the necessary training regulations for the implementation of skills training, program registration and assessment and certification in support of the requirements for skilled manpower of the green economy."

iv. Greening the Philippine Roadmaps

The Philippine government has made efforts in greening the economy. One of the examples is through a project of the Department of Trade and Industry (DTI), in partnership with the German government, to green the Philippine manufacturing industry roadmap. DTI and its Board of Investments (BOI) acknowledge the strategic importance of a green modernization of the industry. Thus, initiatives have been made to elaborate a strategic approach on how Green Economic Development can be comprehensively addressed within the overall Industry Road Map Process and become integrated into selected sectoral road maps for the following industries: 1) automotive and auto parts, 2) pulp and paper, 3) plastic, 4) housing, 5) furniture and 6) copper.

The report entitled "Greening the Philippine Manufacturing Industry Roadmap" presented several targets on greening the roadmaps as well as the accomplishments and plans as of August 2015.

v. Implications

A transition to a green economy is anticipated to have the following impacts:

1. Additional jobs will be CREATED
   Manufacturing of green technologies, green equipment, green services

   2. Employment will be SUBSTITUTED
   Shift from fossil fuels to Renewable Energy and Energy Efficiency, automobiles to mass transit, waste disposal to recycling, primary metals production to secondary production

   3. Jobs may be ELIMINATED
   Packaging materials are discouraged or banned and production is discontinued, extractive sectors

   4. Existing jobs will be TRANSFORMED
   Skills sets, work methods and profiles of plumbers, electricians, metal workers, and construction workers greened

The ILO reports that a resource-intensive development model of the past will lead to rising costs, loss of productivity and disruption of economic activity: productivity levels would lower by 2.4% in 2030 and 7.2% by 2050, while a greener economy and more sustainable enterprises will create 15-60 million potential additional jobs globally over the next two decades.

At least half of the global workforce, the equivalent of 1.5 billion people, will be affected by the transition to a greener economy. 8 key sectors are expected to play a central role: agriculture, forestry, fishing, energy, resource-intensive manufacturing, recycling, building and transport. Among the opportunities and challenges on the transition to green economy are as follows:

Opportunities	Challenges
• **Net gains in total employment from realizing the potential to create significant numbers of additional decent jobs through investments into environmentally sustainable production and consumption and management of natural resources;** • **Improvements in job quality and incomes on a large scale from more productive processes, as well as greener products and services in sectors like agriculture, construction, recycling and tourism;** • **Social inclusion through improved access to affordable, environmentally sustainable energy and payments for environmental services, for instance, which are of particular relevance to women and residents in rural areas**	• Economic restructuring, resulting in the displacement of workers and possible job losses and job creation attributable to the greening of enterprises and workplaces; • Need for enterprises, workplaces and communities to adapt to climate change to avoid loss of assets and livelihoods and involuntary migration; and • Adverse effects on the incomes of poor households from higher energy and commodity prices

As the Philippines transition to the greening of the economy, it needs to ensure that this transition is a just transition. "Just transition means that the burden of change that benefits everyone will not be placed disproportionately on a few. A just transition for all implies that responses to climate change and environmental sustainability should maximize opportunities for decent work creation and ensure social justice, rights and social protection for all leaving no one behind" (ILO, 2016).

The greening of the economy has seen some positive impact. Promotion of Green Economic Development Project (ProGED), a project supported by the German Development, where 544 micro, small, and medium enterprises (MSMEs) in 30 provinces have been assisted to make their business more environment-friendly and climate-smart while increasing their competitiveness. An internal survey of the respondents showed results that 94 percent of the MSMEs experienced decrease in production costs, increased sales, developed green or innovative markets, accessed new green markets, and other benefits such as contributing and promoting a healthy environment, with little to no cost in terms of adoption of "greening strategies". This makes a good case for enterprises to go green while advancing job quality, productivity and social inclusion.

However, the GIZ reports that there are greening initiatives, especially in the developing countries, which are constrained due to lack of funds. The financial sector plays a critical role in supporting these greening initiatives. It is a must that banks and other financial institutions consider the impacts of their financing decisions on the environment through the inclusion of environmental aspects in their credit screenings. For enterprises that apply for financing, there should be initiatives to make business operations low-carbon, resource-efficient and disaster resilient.

The United Nations Framework Convention on Climate Change has outlined the operating mechanism for the Green Climate Fund (GCF). A total of USD 10.3 Billion is available that can be used for climate change mitigation efforts through investment in low-emission and climate resilient development. The DENR is the nationally designated authority to manage this fund for the Philippines.

V.   Anticipated Green Jobs and Skills

Table 2 Gross Value Added by Sector

Gross Value Added (Trillion PhP in 2000 prices) by Sector: Philippines, 2016-2030

	Conventional Sub-Sector				Green Sub-Sector				All Sub-Sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Agriculture	0.8	0.9	1.0	1.1	a	a	a	0.1	0.8	0.9	1.1	1.2
Industry	2.0	2.6	3.4	4.3	0.6	0.7	1.0	1.4	2.6	3.3	4.4	5.7
Services	3.6	4.6	6.0	7.5	1.1	1.4	1.9	2.3	4.7	6.1	7.9	9.8
Total	6.4	8.1	10.4	12.9	1.7	2.1	2.9	3.8	8.1	10.3	13.4	16.7

Source: Abrigo, M. (2018) Greening the Philippine Employment Projection Model Baseline Results

Abrigo (2018) anticipates that for the Philippines, its Gross Domestic Product (GDP) will grow by 5.3% on the average, and the contribution of the green sub-sector is estimated at an average Gross Value Added (GVA) of PhP 2.6 Trillion between 2016 and 2030. The conventional subsector will still be larger than the green subsector with an average of PhP 9.5 Trillion GVA between 2016 and 2030. However, the Compound Average Growth Rate (CAGR) for the green subsector is at 22% against the conventional subsector's 19%.

The Services sector has the highest GVA between 2016 and 2030 for both the conventional and the green subsectors with an average of 5.4 and 1.7 trillion, respectively. However, the Industry sector has the highest CAGR for both the conventional and green subsectors at 21% and 24%, correspondingly.

Table 3 Employment Demand by Sector

Employment Demand (Millions) by Sector: Philippines, 2016-2030

	Conventional Sub-Sector				Green Sub-Sector				All Sub-Sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Agriculture	9.9	9.2	8.5	8.1	1.3	1.1	1.0	0.9	11.2	10.3	9.5	9.0
Industry	5.7	6.4	7.4	8.6	1.6	2.0	2.5	3.2	7.3	8.4	10.0	11.7
Services	18.2	21.6	25.5	28.8	4.3	4.9	5.7	6.3	22.5	26.5	31.2	35.1
Total	33.8	37.1	41.4	45.5	7.1	8.0	9.2	10.4	41.0	45.2	50.7	55.8

Source: Abrigo, M. (2018) Greening the Philippine Employment Projection Model Baseline Results

The report further states that the employment demand between 2016 and 2030 will grow by 2.2% annually on the average. Employment demand will still be dominated by the conventional subsector, comprising more than 20% of total labor market. Employment demand between 2016 and 2030 in the conventional subsector has an average of 39.5 million is still larger than the green subsector with an average employment demand of 8.7 million. However, labor demand in the green subsector will grow 2.7%, slightly higher than the 2.1% growth for the conventional subsector.

Table 4 Agriculture Sector GVA and Employment, 2016-2030

Agriculture Sector 2016-2030

	Conventional Sub-Sector				Green Sub-Sector				All Sub-Sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Gross Value Added (Trillion PhP in 2000 prices)												
Crop Production	0.4	0.5	0.6	0.7	a	a	a	a	0.5	0.5	0.6	0.7
Animal Production	0.2	0.3	0.3	0.3	a	a	a	a	0.3	0.3	0.3	0.3
Forestry	…	…	…	…	a	a	a	a	0.0	0.0	0.0	0.0
Fishing	0.1	0.1	0.1	0.1	a	a	a	a	0.1	0.1	0.1	0.1
Employment (Millions)												
Crop Production	4.6	4.2	3.8	3.6	0.5	0.5	0.4	0.4	5.1	4.7	4.3	4.0
Animal Production	4.2	3.8	3.5	3.3	0.5	0.4	0.4	0.3	4.7	4.2	3.8	3.6
Forestry					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Fishing	1.1	1.1	1.2	1.2	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3

Source: Abrigo, M. (2018) Greening the Philippine Employment Projection Model Baseline Results
a – less than 0.05 trillion

Abrigo estimates that the labor demand in the agricultural sector will decline despite the growth in GVA. The average employment between 2016 and 2030 in agriculture's green subsector will be at 1 million, still much less than the average employment in its conventional subsector at 8.9 million.

Table 5 Industry Sector GVA and Employment, 2016-2030

	Conventional Sub-Sector				Green Sub-Sector				All Sub-Sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Gross Value Added (Trillion PhP in 2000 prices)												
Mining	0.1	0.1	0.1	0.1	a	a	a	a	0.1	0.1	0.1	0.1
Manufacturing	1.4	1.7	2.2	2.7	0.3	0.4	0.5	0.6	1.7	2.1	2.7	3.3
Utilities	0.2	0.3	0.3	0.4	a	a	a	a	0.3	0.3	0.4	0.4
Construction	0.4	0.5	0.8	1.1	0.2	0.4	0.5	0.7	0.6	0.9	1.3	1.8

Employment (Millions)												
Mining	0.2	0.1	0.1	0.1	b	b	b	b	0.2	0.1	0.1	0.1
Manufacturing	3.0	3.1	3.3	3.5	0.4	0.4	0.4	0.5	3.4	3.5	3.8	4.0
Utilities	0.1	0.1	0.1	0.1	b	b	b	b	0.2	0.2	0.2	0.2
Construction	2.3	3.0	3.9	4.9	1.2	1.5	2.1	2.7	3.5	4.5	6.0	7.5

Source: Abrigo, M. (2018) Greening the Philippine Employment Projection Model Baseline Results
a – less than 0.05 trillion; b – less than 0.05 million

In the conventional subsector, the GVA in Manufacturing has the highest estimated average of PhP 2 trillion between 2016 and 2030. However, the green subsector has Construction with the highest GVA at an estimated average of PhP 370 billion. The Construction sector also has the highest estimated CAGR in both the conventional and green subsectors at 29% and 37%, respectively.

As to employment demand, construction has the highest estimated average for both the conventional sector at 3.53 million, and green subsector at 1.88 million. Employment demand in the construction sector is slightly higher for the green subsector with an estimated CAGR of 21% against the CAGR for the conventional subsector at 21%.

Table 6 Services Sector GVA and Employment, 2016-2030

Services Sector 2016-2030

	Conventional Sub-Sector				Green Sub-Sector				All Sub-Sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Gross Value Added (Trillion PhP in 2000 prices)												
Wholesale and Retail Trade	1.2	1.5	2.0	2.4	0.3	0.4	0.5	0.7	1.5	1.9	2.5	3.1
Transportation and Storage	0.2	0.3	0.3	0.4	0.1	0.1	0.1	0.1	0.3	0.4	0.5	0.5
Hotels and Restaurants	0.1	0.2	0.2	0.3	a	a	a	a	0.2	0.2	0.3	0.3
Services, N.E.C.	2.0	2.6	3.5	4.4	0.7	0.9	1.2	1.5	2.7	3.6	4.7	5.9
Employment (Millions)												
Wholesale and Retail Trade	7.0	8.3	9.8	11.1	1.1	1.4	1.6	1.8	8.1	9.6	11.4	13.0
Transportation and Storage	1.7	1.8	1.9	2.1	1.4	1.5	1.6	1.7	3.1	3.3	3.6	3.8
Hotels and Restaurants	0.1	0.1	0.1	0.1	b	b	b	b	0.2	0.2	0.2	0.2
Services, N.E.C.	2.3	3.0	3.9	4.9	1.2	1.5	2.1	2.7	3.5	4.5	6.0	7.5

Source: Abrigo, M. (2018) Greening the Philippine Employment Projection Model Baseline Results
a – less than 0.05 trillion; b – less than 0.05 million

The GVA between 2016 and 2030 for Services has the highest average for both the conventional and green subsectors at PhP 3.13 trillion and PhP 1.08 trillion, respectively. Services also has the highest average estimated employment numbers and CAGR in the green subsector at 1.88 million and 22%, correspondingly. Wholesale and Retail Trade has the highest GVA CAGR for the green subsector at 48%.

In its Green Jobs Mapping Study in 2014, the ILO reports the following estimates on the number of jobs in key sectors and priority key areas:

Table 7 Green Jobs Mapping Study Results

INDUSTRY	Total Number of Jobs	Formal Sector	Informal Sector	Decent Work	Environment-related	GREEN JOBS
Agriculture	11.8 million	1,065,411	8,414,469	NA	NA	14,160 to 118,000
Construction	1.9 million	NA	NA	950,000	211,090	211,090
Services	5.2 million	NA	NA	NA	NA	NA
Tourism	3.69 million	NA	NA	NA	31,760	NA
Transport	2,321,890			840,000 to 1,160,945	163,439	163,439
Solid Waste & Waste Water Management	NA	5,591	10,105	NA	NA	NA
Energy	NA	NA	NA	44,790	14,604	14,604
Forestry	NA	NA	NA	35,125	45,940	35,125
Fisheries	226,195	NA	NA	113,096	113,096	113,096
Manufacturing	3,086,853	NA	NA	828,247	NA	NA

Source: Green Jobs Mapping Study in the Philippines, ILO

Based on this table, most of the green jobs are available in the Construction, Transport, and in the Agriculture and Fisheries Sector.

VI.   Greening TVET

An approach to the greening of TVET may follow the ones recommended by UNESCO-UNEVOC: A "whole-of-institution" approach in the greening of TVET Institutions:

a. *Greening the Campus* – This is about managing the campus by reducing its carbon footprint through the deployment of proper resources and adoption of sustainability principle.

b. *Greening the Curriculum and Training* – This is about integrating sustainability into the existing curriculum and training by embedding environment-related contents and green skills.

c. *Greening Research* – This is about promoting and applying sustainability in research philosophies, content, ethos and standards. It is also about seeking to know where sustainability practices are applied and solutions are developed.

d. *Greening the Community and Workplace* – This is about co-developing and implementing the institution's sustainability plans and programs together with enterprises and communities, where shared goals can be pursued, and sustainable practices and lifestyles become the norm.

e. *Greening Institutional Culture* – This is where sustainable development could be an integral part of all the strategies and plans of an institution, the benefits are demonstrated by the stakeholders, and are evident in a range of institutional outcomes.

VII.   TESDA Initiatives

a. Greening the Curriculum and Training

TESDA has made strides along the Greening the Curriculum and Training aspect. At present, these are the Qualifications with "green" competency components:

Sector	Qualifications Title	Green Competency Component
Construction	PV Systems Design NC III PV Systems Installation NC II PV Systems Servicing NC III	Cover the design, installation, and servicing requirements for solar-power systems.
Heating, Ventilation, Airconditioning (HVAC) & Refrigeration	RAC-PACU/CRE Servicing NC II RAC-PACU/CRE Servicing NC III RAC (Window AC/Domestic Refrigeration Servicing) NC I RAC (Window AC/Domestic Refrigeration Servicing) NC II Ice Plant Refrigeration Servicing NC III Transport RAC Servicing NC II	Include the requirements under the Montreal Protocol for shifting to ozone-friendly refrigerants; the recent revision included the revised RAC Code of Provotice and the use of low GWP substances as required by the Kyoto Protocol and the UN Climate Change Framework.
Agriculture and Fishery	Pest Management (Vegetables) NC II	Promotes integrated pest management techniques relying on Agro-Ecosystems Analysis (AESA).
	Landscape Installation and Maintenance (Softscape) NC II	Includes competency on the utilization, collection, and dispensation of organic wastes in landscaping work.
	Bamboo Production NC II	Consists of competencies to operate bamboo nursery, establish and maintain bamboo farm, conduct bamboo clump rehabilitation, and conduct harvesting and post-harvesting operations.
	Organic Agriculture Production NC II	Involves the production of organic farm products such as chicken and vegetables including production of organic supplements such as fertilizers, concoctions and extracts.
Automotive and Land Transportation	Automotive Servicing NC I	Include environmental conservation procedures (3 Rs) and knowledge and skills requirements on maintaining vehicle systems in good running condition and efficiency.
	Automotive Servicing NC II	
	Automotive Servicing NC III	Includes servicing of engines using LPG as alternative fuel.
	Automotive Servicing NC IV	Includes servicing of emission control system in accordance with the IRR of the Philippine Clean Air Act of 1999
Utilities	Garbage Collection NC I	• Means to professionalize occupations to become decent with adherence to occupational health and safety principles
	Sanitary Landfill Operations NC II	

Sector	Qualifications Title	Green Competency Component
	Sanitary Landfill Operations NC III	• Include knowledge, skills and attitudes required for garbage collection in accordance to RA 9003 • Cover competencies involved in direct dumping/disposal of incoming wastes at sanitary landfills

In addition, there are 33 out of 246 TRs being greened, and these are on Pest Management, Photovoltaic Technician, Hydrophonics, Vertical Gardening, Carbon Emissions Technician and Seaweed Farming.

As of now, there are only 20 TRs with green competencies, a mere 7.5% of all the TRs in TESDA.

Table 8 Qualifications with Green Competencies, Enrolled, Graduates, Assessed and Certified, 2016 and 2017

Sector	Qualifications Title	2017					2016				
		E	G	A	C	Certification Rate	E	G	A	C	Certification Rate
Construction	PV Systems Design NC III										
	PV Systems Installation NC II	429	387	219	208	94.98%	42	57	170	146	85.88%
	PV Systems Servicing NC III	24	21	41	41	100.00%			3	3	100.00%
HVAC and Refrigeration	RAC-PACU/CRE Servicing NC II	1	1								
	RAC-PACU/CRE Servicing NC III	747	617	726	622	85.67%	295	313	952	861	90.44%
	RAC (Window AC/Domestic Refrigeration) Servicing NC I	35	26				282	212	70	70	100.00%
	RAC (Window AC/Domestic Refrigeration Servicing) NC II	4,209	2,899	6,415	5,775	90.02%	4,764	4,225	7,874	7,133	90.59%
	Ice Plant Refrigeration Servicing NC III	2	5								
	Transport RAC Servicing NC II	110	68	102	102	100.00%	18	18	232	224	96.55%
Agriculture and Fishery	Pest Management (Vegetables) NC II	56	145	250	223	89.20%	504	474	495	493	99.60%
	Landscape Installation and Maintenance (Softscape) NC II	68	45	136	136	100.00%	152	122	136	131	96.32%
	Bamboo Production NC II										
	Organic Agriculture Production NC II	7,373	5,765	13,595	12,824	94.33%	1627	1334	4078	3893	95.46%
Automotive and Land Transportation	Automotive Servicing NC I	20,070	14,969	32,052	29,624	92.42%	18,887	17,262	31,202	28,260	90.57%
	Automotive Servicing NC II	20,538	15,386	28,928	26,460	91.47%	20,255	19,212	25,212	22,338	88.60%
	Automotive Servicing NC III	1163	1038	541	498	92.05%	945	895	550	471	85.64%
	Automotive Servicing NC IV	1,228	1,223	518	447	86.29%	1,077	962	51	51	100.00%
Utilities	Garbage Collection NC I										
	Sanitary Landfill Operations NC II										
	Sanitary Landfill Operations NC III										

The table shows that the qualifications cover the construction, services, agriculture, automotive and land transport, and waste management sectors.

Based on this table, Automotive Servicing NC II has the highest number of enrolled and graduates in 2016 and 2017. On the other hand, it is the Automotive Servicing NC I has the highest number of assessed and certified for both aforementioned years.

The RAC (Window AC/Domestic Refrigeration Servicing) NC II showed big reductions in its enrollment, graduates, assessed and certified from 2016 to 2017. Enrollment decreased by 555 and graduates decreased by 1,326 for this qualification. Those who have undergone assessment decreased by 1,459, and those who are certified decreased by 1,358.

It would be good to note that Organic Agriculture Production NC II has the greatest increases in the number of enrollees, graduates, assessed and certified from 2016 to 2017. Enrollment increased by 5,746 while graduates increased by 4,431. Those who have undergone assessment increased by 9,517, while those certified increased by 8,931.

Certification rates in the Transport RAC Servicing NC II and Landscape Installation and Maintenance (Softscape) NC II reached 100% in 2017 from their 2016 certification rates of 96.55% and 96.32%, respectively. However, certification rate in the Automotive Servicing NC IV decreased from 100% in 2016 to 86.29% in 2017.

PV Systems Design NC III, Bamboo Production NC II, Garbage Collection NC I, and Sanitary Landfill Operations NC II and NC III still do not have enrollees, graduates, assessed and certified for 2016 and 2017.

The number of graduates and certified is still quite low relative to the estimated employment demand in the green subsectors, particularly for construction, services, agriculture, transport and waste management.

b. TESDA GTC

The TESDA Green Technology Center (GTC) has offered various green skills training courses catering to the needs for emerging green jobs where green technology is integrated with technical-vocational curriculum. It has also been involved in the greening of TRs as well as in the training of trainers on green technologies and environment-related competencies such as renewable energy, efficient energy use and management, water and wastewater treatment, waste management recovery and recycling and environmental consultancy and green ICT.

The GTC has conducted several activities in the areas of trainers' training, assessment and certification; training induction program; seminars and technical learning sessions, exhibits, researches and extension programs together with various international and local partners. As of January 2018, the Green Tech Center has engaged 87 institutions/ organizations/ companies as partners and network of supporters to the vision of Green TVET. There are 22 government agencies and 65 private entities, supporting a total of 94 different technology areas and 57 advocacy areas.

The GTC continues to implement training programs on Photovoltaic System Installation NC II, Photovoltaic System Servicing NC III, Landscaping, Hydroponics, Vertical Gardening and E – Vehicle Servicing.

c. NTESDP 2017-2022

The National Technical Education and Skills Development Plan (NTESDP) 2017-2022 articulates the recognition of TVET's role in supporting government's policy on protecting and caring for the environment. It also articulates the challenges in meeting the demands of greening industries, as well as the training of workers on green skills. One of the objectives of the NTESDP is to develop and implement programs intended for green jobs, which will be pursued through the following:

   i. Developing new TRs or amend/review existing TRs that are needed for green jobs and sustainable development,
   ii. Capability building of trainers and administrators to implement green skills programs, and
   iii. Linking up with local and international agencies in the design, implementation and monitoring of green skills programs.

d. Green TVET Forum and Strategic Planning

   i. Industry/Sectoral Consultations

   During the Green TVET Forum last March 2018, opportunities and challenges have been identified by the participants in greening selected trade/industry sectors. These sectors are 1) Transport and Automotive, 2) Energy, 3) Manufacturing, Chemicals, and Plastics (i.e. HVAC), 4) Agri-Forestry and Fisheries, 5) Construction, 6) Metals and Engineering (including Mining), 7) Solid Waste and Waste-Water Management, and 8) Tourism.

Industry/Sector	Opportunities	Challenges
Transport and Automotive	- Presence of energy-saving and electronic vehicles (EV) - Information on transportation issues - Willingness of drivers and commuters for green transition	- Lack of promotion/ education for end-users - Cost of EVs - Outdated training programs on automotive - Lack of involvement of marginalized sectors - Lack of government permits for vehicles to operate - Lack of government subsidy for the transition
Energy	- Cheaper cost of Renewable Energy (RE) - Integration of concepts of sustainable	- Conflicting laws (i.e. Ancestral Domain Act of 1997, EPIRA, RE Act) - Financing for RE - Resistance from power companies

Industry/Sector	Opportunities	Challenges
	development, RE and Energy Efficiency into the basic, tech-voc and higher education curricula • Energy policies already in place • Existing training programs on solar energy by TESDA	• Changes in job demands • Making sure that each household will have its own power supply, to be incentivized by government • Displacement of workers • Absence of required skills • Inaccessibility to credit facilities • Expensive transition to cleaner options • Non-compliance of employers with environmental laws
Manufacturing, Chemicals and Plastics (i.e. HVAC)	• Multi-level partnerships with local and international organizations for funding, technology transfer, capacity building • Income generation from penalties • Existing regulations on eco-labelling • Third party auditing • Technology Transfer • Presence of training and skills development opportunities	• General lack of data on the effects of pollutants • Enforcement of existing policies • Lack of political will • Lack of monitoring and evaluation mechanisms • Lack of technically proficient inspectors and assessors • Poor working conditions • High cost of tools and equipment • Source of funding
Agri-Forestry and Fisheries		• Making the Local Chief Executives (LCEs) as green champions • Impact of using organic products on productivity • Non-observance of law • Lack of relevant technology • Constraints on material to be used for fishing boats (wood vs fiberglass) • Why companies need to implement greening • Cost for training and accreditation • Political support • Lack of training for farmers and fisherfolks

Industry/Sector	Opportunities	Challenges
		• Information dissemination • Provision of grants, incentives • Need to harmonize training programs
Construction	• Availability of scholarships • Presence of green laws • Increased demand for skilled workers • Existing assessment and certifying partners • Increase employment	• Green Building Code compliance is just an option • Lack of implementation/ enforcement of existing laws • Lack of awareness from legislators • Lack of promotional campaigns • Unwilling to be trained in construction due to low minimum wage • Lack of skilled manpower and experts • Absence of data collection methods on the skills needs of workers
Metals and Engineering (including Mining)	• Presence of a model of Green architecture • Green jobs can create new jobs and work opportunities	• Government is more focused on economic prosperity, not considering sometimes the need for environmental protection and decency of work • Institutional and employee commitment to comply with green principles
Solid Waste and Wastewater Management	• Small-scale opportunities for recycling and recovering less toxic materials • Confidence of overseas buyers • Training and skills development	• Political will • Monitoring of implemented programs • Enforcement of existing laws • Lack of training • Lack of technical proficiency of accreditors • Insufficient number of recycling facilities • Quality and competency of workers • Financial support for enterprises • Changing mindset of workers and employers • Adopting automation
Tourism	• Preservation of local culture	• Full implementation or enforcement of laws,

Industry/Sector	Opportunities	Challenges
	• Promotion of local products and technologies • Development of farm tourism, community-based tourism and cultural tourism • LGU tourism plans • Inclusion of greening concepts in the K-12 curriculum • Availability of training and skills upgrading programs	policies and ordinances, i.e. green standards • Involvement of local communities in greening interventions • Convergent and streamlined initiatives of the government • Training support for tour guides and other workers in the green tourism sector • Empowerment or involvement of local people in developing tourism efforts • Sustaining operations, programs • Mandatory registration and compliance of enterprises • Creating awareness and appreciation among workers

e.   Strategic Planning

i.   Issues and Challenges for TVET

During the Green TVET Strategic Planning last March 2018, the TESDA Board Members, Executive Directors, Regional and Provincial Directors have put forward the following issues and challenges in greening TVET:

- Lack of awareness of laws, policies, and concepts of greening of TVET as a whole
- Need to establish a common understanding or appreciation of what green TVET is
- Inability to anticipate green skills
- Need to benchmark on green practices
- Absence of a green champion or ambassador
- Need for consultants/experts on greening the TRs, curricula and learning materials
- Lack of consultation with partners on how to green TVET
- Need for procurement of equipment, tools, supplies and materials for greening
- Current knowledge, values and behaviors of TESDA personnel on greening are questionable
- No dedicated fund/financing for green initiatives
- Green initiatives have no indicators and are not in the Work and Financial Plan (WFP)/Office Performance Commitment and Review (OPCR)

- Lack of capability in training, research and development among TESDA personnel
- No information and education materials and advocacy programs in place
- Inadequate or limited adopters of green technology and absence of industry standards
- Lack of cooperation among stakeholders
- No mechanism for rewards and incentives
- Unclear policy directions and guidelines/operational plans to address lack of awareness
- Lack of monitoring and evaluation framework for greening TVET

ii. Action Plans

In the Green TVET Strategic Planning, TESDA has adopted an Organizational Framework for Greening TVET, a modified version of UNESCO-UNEVOC's approach, as illustrated:

This organizational framework consists of five components, namely green jobs/ skills, policies, competency standards/ training regulations, culture, and community. TESDA, at the middle, is the enabler, promoter, manager, and regulator of all these components to realize its dream of having a green TVET system in the country. Participants of the strategic planning have initially identified objectives and strategic options for each of the components:

Component	Objectives	Strategies
Green Jobs/ Skills	• To identify and prioritize the green jobs that are needed to be adopted. (There can be three priority sectors for greening: construction, agriculture, and manufacturing.) • To anticipate the skills from which green jobs will be generated	• Participating in social dialogues with industry partners and other stakeholders • Building the internal capacity of TESDA in identifying the green jobs and anticipating the skills needed for such green jobs • Revising the existing TRs in order to insert the green skills in the performance criteria and to assess green awareness and skills of trainees during competency assessment
Green Policies	• To create a conducive and enabling environment for green TVET • To push for the reduction of carbon footprint, increase of green products, and increase of stakeholder investments in TVET	• Ensuring that the process is industry-led in the formulation of green TVET Policies • Reducing the possibility of red tape • Training trainers and personnel • Totally adhering (100% target) to the international standards/ agreements • Reducing carbon footprints by ___ % by 2022 • Producing organic products by ___ % by 2022 • Replicating the available strengths and opportunities
Green Competency Standards/ Training Regulations	• To "green" the 267 TRs (100% target) by 2022 • To "green" the TRs for new qualifications starting 2018 • To develop new TRs for green jobs based on prioritization of skills/	• Linkaging with industry associations/ NGOs in promoting green technologies • Consulting with different sectoral industries and key stakeholders • Establishing incentive mechanisms (i.e. scholarship vouchers, subsidies, green

Component	Objectives	Strategies
	qualifications and Skills Needs Assessment	"Kabalikat Awards") for TVIs and industry partners in implementing green training and workplace practices • Developing and piloting more TRs, CATs and CBC for green jobs and Qualifications • Mainstreaming/ integrating "green" components in the review and updating of TRs, CATs, and CBC by revising the TR framework to include green concepts and principles in the Basic Competencies and Curriculum Design, developing "green" standards/ criteria evaluation instruments, and prescribing "green" facilities, equipment, tools, supplies, and materials in Section 3 of TRs • Providing capacity building programs for organic and external partners • Creating a "Green" Industry Board or Council • Conducting research and labor market surveys (i.e. LMIR)
Green Culture	• To internalize the value of green culture in the organization • To instill the values of greening TVET among the TVET stakeholders	• Incorporating green culture in the VMO, core values, and corporate plan • Integrating greening in the Quality Management System (QMS) • Including greening activities in the organizational and individual commitments

Component	Objectives	Strategies
		as specified in the OPCR and IPCR • Role modelling the use of green technologies • Creating awareness and advocacy on green TVET • Establishing a model (like GTC) in the regions and provinces • Formulating a policy for the adoption of green TVET in COROPOTIs
Green Community	• To establish a green TTI campus and TESDA workplace	• Benchmarking best practices on waste management • Strengthening social marketing and advocacy to address lack of awareness • Capability building for the community • Linkaging with LGUs and other stakeholders to support the program • Adhering strictly to policies in greening
	• To provide support mechanisms for greening the communities	• Assigning a "green champion" • Adopting a pilot community for the green programs • Providing rewards/awards/incentives • Collaborating and coordinating with key stakeholders • Implementing TR updates and offerings • Implementing green actions and practices resulting in waste management, etc.

VIII.   Way Forward

A green shift for the Philippine economy is important in addressing environmental problems and in achieving sustainable development. This shift requires not only the establishment of green sector but also means greening of all industries/sectors. This green shift entails a restructuring of the economy and the labor market. A successful and thoroughgoing shift means more and better jobs through the creation by the greening processes of green/greener and decent jobs.

The role of TVET is critical in this shift in order to ensure that the future and even the current workforce are equipped with green skills to be able to take on the green jobs. TESDA needs to ensure that its training programs are aligned with the greening requirements of the sectors. TESDA needs to develop more TRs on green jobs and update existing TRs to include green skills, especially for the industries/sectors that have high GVA and are key employment generators, such as Construction, Manufacturing, Tourism, Energy, Transport and Automotive, Agri-Forestry and Fisheries, Metals and Engineering and Solid Waste and Waste-Water Management. A system to institutionalize green skills anticipation and development of labor market information on green jobs and skills are steps towards the alignment. There are data and information that have been provided in terms of GVA and employment but these are still quite broad and will necessitate further consultation in order to determine more specific jobs and skills requirements for the green subsector.

Entrepreneurship skills for MSMEs where environment-friendly and climate-smart business practices are incorporated should also be given focus as green practices can increase their competitiveness.

TESDA should also continue to advocate the green agenda and green skills development, as well as strengthen its linkages with industries, government agencies and other relevant stakeholders in order that it will be able to fulfill its role in the promotion of the Green Jobs Act. It should also initiate programs and activities that will help address the issues on providing skilled workers for the green subsector. TESDA may consider facilitating the convergence among government agencies, private sector including employers and workers' groups and non-government organizations among others in the provision of trainings as there are different agencies/institutions addressing the concerns of specific sector/s.

TESDA is recommended to undergo "greening" as an institution, in order to harmonize steps in enabling all stakeholders – leadership, teachers, learners and administration to jointly develop a vision and plan to implement ESD in the whole of agency. While TESDA has taken steps in greening the curriculum and training, it still needs to do more, following the organizational framework for greening TVET. UNESCO-UNEVOC's "whole-of-institution" approach has already been adopted by TESDA in its strategic planning for greening TVET. All efforts to meet the identified objectives and strategic options in greening its policies, skills, TRs, institutional culture, and workplace/community should be monitored.

Sustainable development should be at the core in how TESDA performs its mandate and functions as the authority not only in TVET but in greening TVET.

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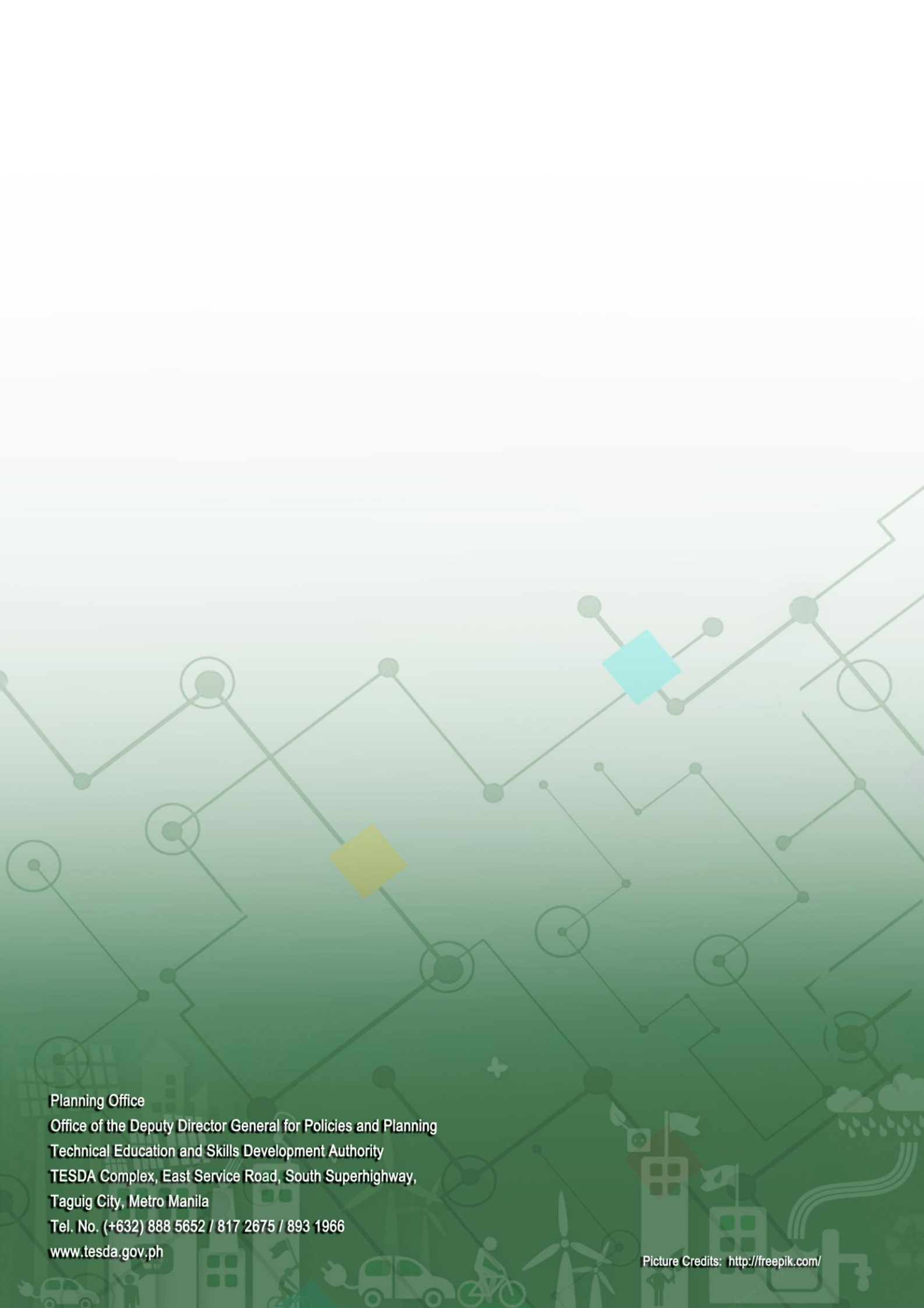
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