



International
Labour
Organization

Skills for Green Jobs in Ghana





Skills for Green Jobs in **Ghana**

Copyright © International Labour Organization 2018
First published 2018

Publications of the International Labour Office enjoy copyright under Protocol 2 of the Universal Copyright Convention. Nevertheless, short excerpts from them may be reproduced without authorization, on condition that the source is indicated. For rights of reproduction or translation, application should be made to ILO Publications (Rights and Licensing), International Labour Office, CH-1211 Geneva 22, Switzerland, or by email: rights@ilo.org. The International Labour Office welcomes such applications.

Libraries, institutions and other users registered with a reproduction rights organization may make copies in accordance with the licences issued to them for this purpose. Visit www.ifro.org to find the reproduction rights organization in your country.

Skills for Green Jobs in Ghana

ISBN 978-92-2-030926-1 (web pdf)

The designations employed in ILO publications, which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the International Labour Office concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers.

The responsibility for opinions expressed in signed articles, studies and other contributions rests solely with their authors, and publication does not constitute an endorsement by the International Labour Office of the opinions expressed in them.

Reference to names of firms and commercial products and processes does not imply their endorsement by the International Labour Office, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

Information on ILO publications and digital products can be found at: www.ilo.org/publns.

Table of Contents

Abbreviations and Acronyms	4
Abstract	5
1. Introduction	6
1.1 Background	6
1.2 Objectives and Methodology	7
1.3 Structure of the Report	7
2. Structure of the Economy and Employment	8
2.1 Changing Structure of the Ghanaian Economy	8
2.2 Structure and Quality of Employment.....	9
3. Key policies and regulations	11
3.1 The Response Strategy and Policy Priorities for the Green Economy	11
3.3 Priority Sectors for Green Economy.....	12
3.4 Occupations for Green Jobs in Ghana	14
4. Skills development measures for the green economy	15
4.1 Introduction	15
4.2 The Ghanaian Skills Development Framework	15
4.2.1 System of Education in Ghana	15
4.3.2 Education and Skills of the Labour Force	16
4.3.2 Problem of Skills gap	18
4.3.3 Skills development for the green economy	18
4.3 Anticipation and Provision of Skills	20
4.4 Gender Implications of the Green Economy	21
5. Analysis of case studies	23
6. Conclusions and recommendations	26

List of Tables

Table 1: Structure of the Ghanaian Economy	8
Table 2: Structure of Employment by Economic Sector	9
Table 3: Quantity and Quality of Employment	10
Table 4: Climate Change Priority Areas and Focus Areas	12
Table 5: Number of Accredited Tertiary Institutions in Ghana as at January 2018	16

List of Figures

Figure 1: Number of people in High Skilled occupations	14
Figure 2: Educational attainment of the Labour Force 2000-2015 (%)	17
Figure 3: Distribution of the educated labour force by programme (%) in 2015	17
Figure 4: Graduate output from Public universities by major program	18
Figure 5: Graduate Output of Polytechnic by major programs 2010-2015	19
Figure 6: Labour Supply–Demand Gap by Skills, 2006–2013	19

Abbreviations and Acronyms

ACET	African Center for Economic Transformation
ALP	Adaptation Learning Program
CC-DARE	Climate Change Adaptation and Development Programme Initiative ()
CCES	Climate Change Education in Schools Programme
CCGELS	Climate Change and Green Economy Learning Strategy
CHP	Climate Health Project
CO₂	Carbon Dioxide
CO₂e	Carbon dioxide emissions
COTVET	Council for Technical and Vocational Education Training
CWIQ	Core Welfare Indicators Questionnaire
EPA	Environmental Protection Agency
FASDEP	Food and Agricultural Sector Development Plan
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Green House Gases
GLSS	Ghana Living Standards Survey
GSS	Ghana Statistical Service
GTNA	Ghana Technology Needs Assessment
HND	Higher National Diploma
ICT	Information Communication Technology
ILO	International Labour Organisation
INDC	Intended Nationally Determines Contribution
IPAC	Insurance Products for Adaptation to Climate Change
ISIC	International Standard Classification of Occupation
JHS	Junior High School
KNUST	Kwame Nkrumah University of Science and Technology
LPG	Liquefy Petroleum Gas
MOFA	Ministry of Food and agriculture
MRV	Measurement, Reporting, and Verification
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
NCCSAP	Netherlands Climate Change Studies Assistance Programme ()
NCTE	National Council for Tertiary Education
NDCs	Nationally Determined Contributions
NQF	National Qualification Framework
REDD+	Reducing Emissions from Deforestation and Forest Degradation Plus
SHS	Senior High School
STEM	Science Technology Engineering and Mathematics
TVET	Technical and Vocational Education Training (TVET)

Abstract

This report examines the current issues of skills for greening Ghana's economy. The country's commitment to greening economic activities is enshrined in policy documents in the areas of energy, forestry and climate change in general. However, the policies seem to be scattered and not well enough harmonized to make them more focused and effective in driving change in the greening direction. In addition, anticipation of skills requirements in line with a shift into green activities and jobs is quite weak. Currently there is a significant skills gap, particularly among high skilled-semi-skilled and vocational/technical skills and this has implications for hampering the green economy agenda. Training in STEM, which is critical for speedy transition into green activities in energy, forestry, agriculture, manufacturing and so forth, is quite limited. It is recommended that a comprehensive and cohesive approach to developing green skills is adopted at all levels of the education system through a review of the current education and skills training framework in line with the country's greening aspirations. The study identifies three sectors – energy, forestry and agriculture - for driving the green agenda and anticipating skills needs well in advance. Incorporating this need into the education and skills curriculum from the basic level will be a major factor in overcoming this potential skills challenge.

Acknowledgment

This study was conducted by William Baah-Boateng, as a part of set of national studies on skills for green jobs conducted in some thirty countries globally. The set of studies is the result of collaboration between the ILO and the European Centre for the Development of Vocational Training (Cedefop). Overall methodological guidance was provided by Olga Strietska-Ilina (ILO Employment Policy Department, Skills and Employability Branch). Coordination of country studies and technical backstopping was provided by a team led by Catherine Saget (ILO Research Department), Tahmina Mahmud (ILO Skills and Employability Branch) and Takaaki Kizu (ILO Research Department). Moustapha Kamal Gueye and Marek Harsdorff (ILO Enterprises Department, Green Jobs Programme)

contributed to the studies' implementation on behalf of the ILO Green Jobs Programme. Alena Zukersteinova and Stelina Chatzichristou from Cedefop's Department for Skills and Labour Market coordinated studies among the participating EU countries. Valuable inputs were provided by the ILO colleagues: Christine Hoffmann, Laura Brewer, Maria Ilca Lima Webster, Alvaro Ramirez Bogantes, Hassan Ndahi, Fernando Vargas Zuñiga, Patrick Daru, Akiko Sakamoto, Mikhail Pouchkin, Gabriel Bordado, Julien Magnat, Kanae Tada, Tendy Gunawan, Bolotbek Orokov, Gwyneth Anne Palmos, Georgina Pascual, Badiane Cheickh and Kishore Kumar Singh. Solveig Boyer (ILO Green Jobs Programme), Massimiliano Leone, Ana Buzdugan (International Training Centre ILO Turin) and Manuela Flamini (Edizioni Retrò s.r.l.) were responsible for editing and design.

1. Introduction

1.1 Background

Ghana attained middle-income status in 2007 when the country's *per capita* income crossed the US\$1,000 mark to reach US\$1,099. This occurred on the back of rapid economic growth varying between 3.7% in 2000 and 6.4% in 2006 (with a 5.1% annual average) and a re-basing of the national accounts in 2006. The country's growth accelerated to a peak of 14.0% in 2011 on commencement of commercial production and export of crude oil. While recognizing the contribution of this rapid growth to job creation and improvements to the livelihoods of the citizenry, the sustainability of the growth is equally important. Apart from the service sector, extractive activities such as mining and crude oil extraction with negative environmental consequences constitute key drivers of Ghana's rapid growth. Low productive agriculture and tree-felling, as well as transportation using smoke-emitting vehicles in the transport sector, account for a considerable part of the country's growth. Deforestation through tree-felling activities, particularly along the bank of major rivers, has been the main contributor to the drying-up of water resources including the Volta lake that feeds the Akosombo hydro-electric dam, along with associated energy supply challenges.

Indeed a plethora of issues have been contributory factors to environmental pollution, degradation and changes in climatic conditions. Notable among these factors are plastics pollution, illegal mining (popularly called *galamsey*), uncontrolled felling of trees for timber, unbridled silting of lakes, domestic spillage of effluents, plastic blockage of sewerage systems, overcrowding in slums, and others. Indeed the country's reported economic growth performance would drop considerably if the environmental consequences of activities behind the growth were taken into account.

Essentially, the need for sustainable

development through the husbandry of the country's scarce resources for the sake of future generations has become a topical issue in recent times. Given the interdependence of world activities, it is obvious that countries' actions have repercussions on other nations. With a potentially buoyant population over the next few decades, nations including Ghana are faced with the obvious reality of managing the pressure on and exploitation of natural resources, which may or may not be exhaustible. It is imperative that Ghana's economic development strategy shifts its focus towards promotion of green economic activities. In their haste to generate sufficient jobs for the growing labour force, countries should be guided by the importance of sustaining the environment for future generations. Considering the negative consequences, particularly climate change, of such environmental actions and inactions by Ghanaians requires an economic strategy for the promotion of green jobs.

It is in this light that a critical skills supply is needed to facilitate the country's adaptation to and mitigation of the impacts of climate change and environmental degradation as well as a gradual transition into a green economy through generation of green jobs. Jobs are considered green if they reduce the impact of negative environmental consequences. For ILO, green jobs entail decent work that improves energy and raw material efficiency, limits greenhouse emissions, minimizes waste and pollution, protects and restores ecosystems, and supports adaptation to the effects of climate change.

Ghana's transition to a green economy and, for that matter, sustainable development implies a shift in economic activities and employment. Some jobs that have negative environmental implications may have to give way to new jobs that are environmentally friendly and essentially entail new and different skills. What are the implications of a shift towards a green economy for the education and skills development

strategies of the country? What are the major sectors of the Ghanaian economy with greening potential and what skills are needed for new jobs and for greening of existing jobs? How prepared are enterprises to adjust to the change towards a green economy?

1.2 Objectives and Methodology

This report examines various skills requirements in selected sectors for the objective of a green economy in Ghana. It analyses (i) whether and how skills response strategies are incorporated into wider 'greening' policies, (ii) programmes and skills needs for new occupations, (iii) new skills for greening existing occupations, (iv) retraining needs in sectors undergoing structural changes as a result of policy implementation, and (v) introduction of greening technologies and practices. Furthermore, it gives examples of current activities in the form of case studies that demonstrate where greening is taking place and analyses skills needs within the framework of the greening economy.

The study adopts a combination of approaches and this includes a desktop review of relevant green economy documents and skills and human capital development in line with the green economy agenda. This was done in conjunction with a quantitative analysis of published education data and labour datasets from the Ghana Statistical Service. The study employs nationally representative household surveys and population censuses for analysing the structure of employment and the educational attainment of the labour force. The study has also employed a method of consultation in the form of interviews and idea-sharing sessions with individuals in the relevant sectors.

1.3 Structure of the Report

The report is structured in six sections beginning with an introduction in Section 1 that captures the background and objectives and methodology employed in the study. This is followed in Section 2 by an overview of the structure of the Ghanaian economy and employment, after which key policies and regulations are outlined in Section 3. Section 4 analyses skills development measures for green economy followed by an analysis of case studies in Section 5. Section 6 concludes the report with policy recommendations.

2. Structure of the Economy and Employment

Ghana's economic growth performance has been quite strong, averaging 6.84% per annum between 2009 and 2016. This remarkable growth performance has been largely driven by exploitation of mineral and other natural resources and fast-expanding service activities such as finance, transport and information communication technology (ICT). The growth rate reached a peak of 14% in 2011 on the back of the commencement of commercial production of oil, making it one of the fastest-growing economies in the world during that year.

2.1 Changing Structure of the Ghanaian Economy

A major characteristic of the Ghanaian economy over the past decade has been a dwindling share of agriculture in favour of services and industry. The contribution of agriculture saw a continuous

decline from 32.9% in 2009 to 19.7% in 2016, representing a 13.2 percentage point drop over a period of eight years. The key subsectors – crops, fishing, livestock, and forestry and logging – saw their contribution to GDP decline over the period. At the same time the share of services in GDP rose by 7.5 percentage points from 47.4% to 54.9%, with improvements in the contributions to GDP of all the key subsectors. The contribution of the industrial sector also appreciated, particularly in 2011 and 2012 when the country began commercial production and export of crude oil. The sector's contribution increased from 19.7% in 2009 to 28.9% in 2012 before declining to 25.3% in 2016 owing to a slowdown in extractive activities. All the subsectors' shares of GDP, with the exception of manufacturing, appreciated over the period, manufacturing's contribution to GDP declining from 7.2% in 2009 to 4.9% in 2016.

Table 1: Structure of the Ghanaian Economy

SECTOR	2009	2010	2011	2012	2013	2014	2015	2016
Agriculture	32.9	30.8	26.0	23.6	23.2	22.4	21.2	19.7
Crops	24.4	22.5	19.6	17.7	18.0	17.5	16.4	15.1
Livestock & Fishing	4.7	4.5	3.6	3.2	2.8	2.5	2.5	2.4
Forestry & Logging	3.8	3.9	2.8	2.7	2.3	2.4	2.4	2.2
Industry	19.7	19.8	26.2	28.9	28.7	27.7	26.2	25.3
Manufacturing	7.2	7.0	7.1	6.0	5.5	5.1	5.1	4.9
Mining, quarrying & oil	2.1	2.4	8.6	9.9	9.7	8.3	5.6	4.4
Construction	9.1	8.8	9.2	11.9	12.4	13.2	14.1	14.4
Electricity	0.5	0.6	0.5	0.5	0.5	0.4	0.9	1.2
Water & Sewerage	0.7	0.9	0.9	0.7	0.7	0.6	0.6	0.5
Service	47.4	49.4	47.7	47.5	48.1	49.9	52.5	54.9
Trade	6.1	6.5	6.0	5.7	6.0	5.9	6.4	6.7
Hotel & Restaurants	6.4	6.2	5.5	5.0	6.0	5.9	6.1	6.2
Transport	10.9	10.9	11.0	11.4	11.6	12.8	13.6	13.9
Other service	24.0	25.8	25.1	25.4	24.5	25.3	26.4	28.2

Source: Computed from National Accounts, Ghana Statistical Service

2.2 Structure and Quality of Employment

The services sector constitutes the main source of employment in Ghana, accounting for 46.0%, followed by agriculture with 35.9%. The industrial sector is the source of livelihoods for the remaining 18.1%. The changing pattern of the structure of employment in Ghana mirrors the changing structure of economic growth. The contribution of the agricultural sector declined from 41.6% to 35.9% between 2010 and 2015 in favour of the services and industrial sectors which improved their contributions to total employment by 3.0 and 2.7 percentage points respectively. In contrast with the dwindling share of agriculture in GDP, manufacturing's share in total employment increased from 10.7% by 2.8 percentage points over five years, making it the main driver of the industrial sector's growing contribution to total employment. The shares of construction, electricity and gas, and water and sewerage in employment have remained virtually the same over five years, with mining shrinking marginally over the period. In the services sector, the shares of the hotel and restaurant trade and of transport in total employment declined, while the contribution

of trade and other sectors to employment improved considerably, which explains the rising share of services in total employment.

The shift in employment from agriculture to services may not reflect a structural and productive transformation of the Ghanaian economy, since the growing service activities mostly occur in the informal sector. This is reflected in the large share of informal sector employment, which was about 86% in 2015 (**Table 3**). The remaining 14% attributable to formal sector employment is dominated by the public sector, which accounts for 7.3%, while the remaining 6.8% is attributable to the private formal sector. The high rate of informality in the Ghanaian labour market raises concerns about the quality of employment in terms of returns to and type of employment. As indicated in Table 3, about two-thirds of working people are engaged in vulnerable employment, defined as people employed in relatively precarious circumstances as indicated by their employment status. It consists of own-account and contributory family work which are less likely to have formal work arrangements, access to benefits or social protection programmes, and are more 'at risk'

Table 2: Structure of Employment by Economic Sector

ECONOMIC SECTOR	2010	2013	2015
Agriculture	41.6	44.7	35.9
Industry	15.4	14.4	18.1
o/w manufacturing	10.7	9.1	13.5
Mining, quarrying and oil	1.1	1.6	0.8
Construction	3.2	3.3	3.4
Electricity & gas	0.2	0.2	0.1
Water & sanitation	0.2	0.2	0.3
Service	43.0	40.9	46.0
Trade	18.9	19.5	20.8
Hotel & Restaurants	5.4	3.9	4.4
Transport	3.6	3.8	2.7
Other	15.1	13.7	18.1

Source: Computed from Population Censuses, GLSS, & Labour Force Survey. GSS

Table 3: Quantity and Quality of Employment

ECONOMIC SECTOR	2010	2013	2015
Institutional Sector			
Public	6.4	5.9	7.3
Private	7.4	6.1	6.8
Informal	86.2	88.0	85.9
Type of Employment			
Wage employment	18.2	20.2	22.5
Self-employment			
with employees	4.9	6.2	5.1
without employees	55.9	46.4	59.5
Other	21.0	27.5	14.2
Quality of Employment			
Productive employment	23.1	26.3	25.3
Vulnerable employment	67.5	68.7	68.7

Source: Computed from Population Censuses, GLSS, & Labour Force Survey. GSS

from economic cycles.¹ Gainful or productive employment, accounting in 2015 for 25.3% of jobs, suggests a high deficit of decent work in the country. The low income associated with vulnerable employment implies high working poverty in such jobs compared to productive and gainful jobs.

The dominance of low-quality employment in Ghana has implications for high-level greening

of the economy. Indeed, the low-productive farming practices with the use of machetes and hoes involve the use of large tracts of land for a given output with adverse effects on the country's forest cover. High informality in the mining sector (i.e. 73.4%) and illegal mining activities pose a major threat to the environment due to the low technology used in such activities. The highly informal transport sector made up of low-skilled drivers and auto-mechanics driving and repairing carbon-emitting commercial vehicles has implications for climate change.

¹ International Labour Organisation (2009).

3. Key policies and regulations

3.1 The Response Strategy and Policy Priorities for the Green Economy

The world has experienced structural changes in the labour market before. However, changes in the climate will have an enormous impact on employment and the labour market in general, especially in developing countries. Even though the largest share of Greenhouse Gases (GHG) affecting the climate emanates from developed countries and countries in transition, it is the developing world that will be the hardest hit – that is areas already poor and financially too weak to handle the measures needed to tackle climate change effects.

Ghana is endowed with abundant natural and mineral resources including forests, freshwater, minerals and biodiversity. In spite of the fact that such resources constitute major sources of foreign exchange earnings, their exploitation poses a danger to the environment and to the survival of future generations. Mining activities, particularly illegal mining operations, account for quite significant degradation of the country's forests. The forest resources have suffered from rapid degradation and deforestation largely as a result of human activities such as a high incidence of bushfires, illegal mining and logging activities, and charcoal burning. Ghana's water resources have come under heavy threat of pollution from domestic, agricultural, and industrial activities. The combined effect of these challenges on the environment and the climate endangers future generations.

The impact of climate change and variability cuts across various sectors and thus requires a multi-sectoral approach. Nonetheless it is however gratifying to note that since 2010 Ghana has undertaken several initiatives towards developing comprehensive programmes as part of processes leading to enhanced national adaptation to climate change.

The 2013 National Climate Change Policy (NCCP) of Ghana focuses on ensuring a climate-resilient and climate-compatible economy while achieving sustainable development through equitable low-carbon economic growth. This is to be achieved through effective adaptation and mitigation. These measures focus on energy and infrastructure; natural resources management; agriculture and food security; and disaster preparedness and response. There are also social development measures which seek to achieve a coherent equitable and integrated society.

Ghana has identified five priority areas within which there are ten focus or programme areas. The table below identifies the various priority and focus areas.

The following is a catalogue of some policy interventions:

Youth in Green Ghana Module

The focus of the module is to engage youth in undertaking horticultural activities with the aim of beautifying cities and keeping them green. The Youth in Green Module is an offshoot of the Ministry of Local Government and Rural Development with the key rationale of initiating plans and actions that create sustainable jobs, capacity building for youth and exploring development opportunities for youth. With an initial workforce of 250 workers, the project is expected to employ about 2,000 youth once the roll-out is in full flight.

Climate Change and Green Economy Learning Strategy (CCGELS)

Launched on 28 October 2016, the key rationale for this intervention is to promote climate change education, awareness and learning in Ghana. It has among its mandate capacity-building to promote awareness of the implementation of Ghana's Intended Nationally Determined Contribution (INDC) under the Paris Agreement. It is thus seen as a complementary

Table 4: Climate Change Priority Areas and Focus Areas

PRIORITY AREA	FOCUS AREAS
Agriculture and Food Security	Develop climate-resilient agriculture and food security systems
Disaster Preparedness and Response	- Build climate-resilient infrastructure - Increase resilience of vulnerable communities to climate-related risks
National Resource Management	- Increase carbon sinks - Improve management and resilience of terrestrial, aquatic and marine ecosystems
Equitable Social Development	- Address impacts of climate change on human health - Minimise impacts of climate change on access to water and sanitation; - Address gender issues in climate change - Address climate change and migration
Energy, Industrial and Infrastructural Development	Minimise greenhouse gas emissions

Source: National Climate Change Policy, 2013

tool to exiting strategies within the climate change policy framework.

National Climate Change Task Force

This is an initiative set up by the Ministry of Food and Agriculture (MOFA) with a view to reviewing the Food and Agricultural Sector Development Plan (FASDEP II) document through the lens of climate change. This is to help identify the entry points for adaptation actions and also to inform the policy review process to make the next sector policy change responsive. Because of Ghana's over-reliance on agriculture, particularly rain-fed agriculture, it has been considered one of the most vulnerable African countries to suffer from climate change effects, making the need for change-responsive policies essential. It is observed that the dependence on rain-fed agriculture has had serious implications for food security in the country with its attendant rippling effects on the other sectors of the economy.

3.3 Priority Sectors for Green Economy

The 2013 National Climate Change Policy of Ghana targets the protection of vital sectors that are vulnerable to climate change such as

agriculture, forestry and energy. The selection of these sectors was based primarily on their significant contributions to GDP, economic welfare, low carbon development, global competitiveness and other imperatives.

Forestry Sector

The forestry sector is the fourth largest foreign exchange earner behind mining, cocoa and crude oil export. There are formal and informal segments of forestry activities in Ghana. The formal sector activities involve about 200 timber processing mills which employ about 120,000 Ghanaians while informal forestry activities account for some 130,000 illegal chain-saw operators, located mostly in rural areas.² Many rural households in Ghana live on forest products and non-cash forest income. These and other economic activities such as illegal mining and farming continue to exert pressure on the country's forest cover causing deforestation, forest degradation and reduction in the sink capacity of forests for carbon dioxide (CO₂). Available statistics suggests an estimated annual rate of deforestation of 2% or 135,000 hectares (based on a 2010 estimate), thus worsening the capacity of the forests to absorb CO₂.³

² See Ministry of Lands and Natural Resources – MLNR (2012a)

³ Ghana Forest commission (2013)

Skills for Green Jobs in Ghana

The 2012 Ghana Forest and Wildlife Policy seeks to ensure conservation and sustainable development of the nation's forest and wildlife resources for purposes of maintenance of environmental quality and a perpetual flow of benefits to all segments of society. Strategies underpinning the forest and wildlife policy include, but are not limited to:

- ✉ revision of forest reserve management planning procedures for more sustainable approaches, such as development of biodiversity conservation and environmental protection in the high-forest zone;
- ✉ local community participation in the management of forest and wildlife resources, with rights of consultation, access, and benefits;
- ✉ private sector investment in plantation development, focusing on the conversion of the timber industry into a low-volume, high-value industry;

The country is currently implementing the Reducing Emissions from Deforestation and Forest Degradation Plus (REDD+) programme with the potential to create employment opportunities and enhance livelihoods and biodiversity, apart from enhancing the capacity of the forest to absorb more carbon dioxide.

Agriculture

Prior to the re-basing of the national accounts, agriculture was the largest contributor to GDP, accounting for about 40% and in 2015 representing 19.7% of GDP. It is the second largest contributor to foreign exchange earnings through export of cocoa beans and in 2015 accounted for 35.9% of total employment. Various farming practices such as land clearance, use of inorganic fertilizers, and indiscriminate bush burning as a primitive hunting practice have been a major cause of deforestation, greenhouse gas emissions and water pollution. The contribution of agricultural practices to deforestation was estimated to be 50% in 2010 (Ministry of Land and Natural Resources), while annual CO₂ emissions rose by 44% between 1990 and 2006.⁴

⁴ Environmental Protection Agency (EPA) (2011).

Energy sector

Ghana is endowed with a variety of energy sources including hydro, thermal, solar, wind and biomass, which are sources of lubricants of the economy. Wood fuels, mainly in the form of wood and charcoal, make up 75% or more of national energy consumption.⁵ Even though wood fuel as a source of energy has been in decline over the years owing to the rising domestic usage of liquefied petroleum gas (LPG), it is still substantial given the current rate of depletion of forest resources. Available statistics indicates that about 40% of households depend on firewood as their major energy source for cooking, followed by charcoal and gas, accounting for 33.7% and 18.2% respectively.⁶ Wood fuels are obtained mainly from woodland vegetation resources, resulting in the loss of vegetation cover in the country.

There is a growing stock of biomass, which stands at about 322 million metric tonnes with average incremental growth of 12.3 million tonnes annually⁷. Electricity provides an important source of energy for industrial and domestic use. The country's total hydropower generation capacity from the Akosombo, Kpong and Bui dams stands at about 1,600MW, representing about 57% of total electricity production. The remaining 43% is sourced from thermal plants.

Besides hydroelectric and thermal generation, new renewable energy sources such as bioenergy, solar, wind, biogas and so forth remain virtually untapped in Ghana. Only 2.5MW capacity of solar PV has so far been installed in the country, while wind turbine installations are non-existent. Bioenergy in the form of biofuel and biogas, which have been tested, are used by only a few individuals, and have yet to be developed on a large scale.

⁵ Ghana Statistical Service (2012).

⁶ Ghana Statistical Service (2012).

⁷ Ghana Statistical Service (2010).

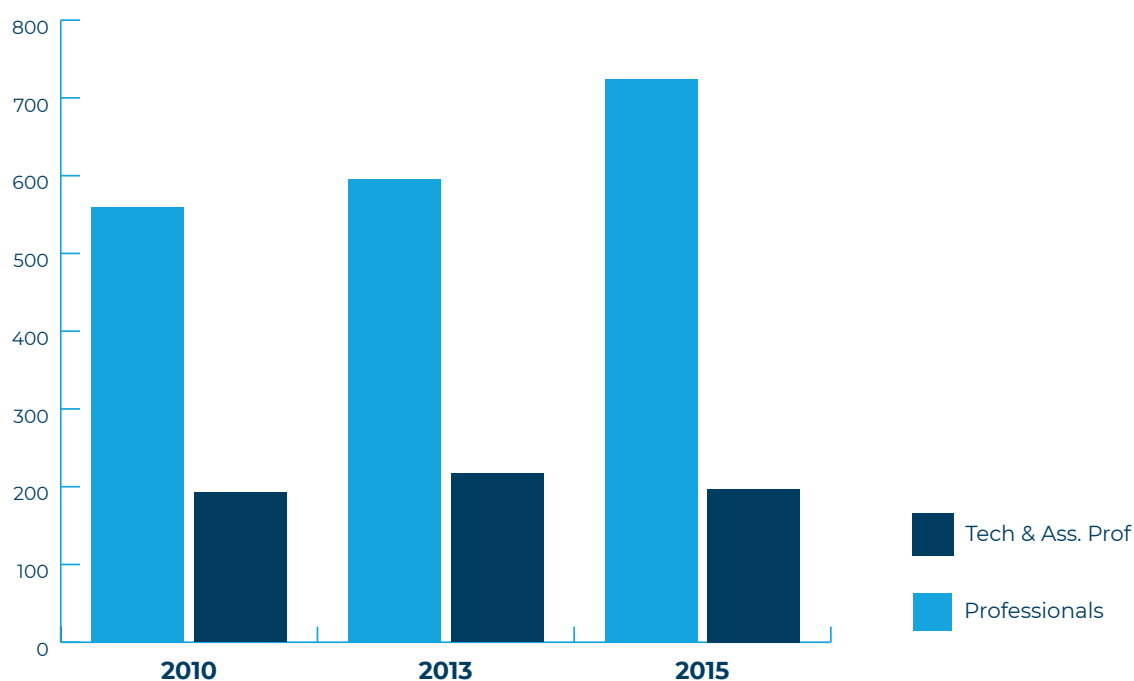
3.4 Occupations for Green Jobs in Ghana

A critical part of skills challenges for the green economy in Ghana is the general lack of skills in many sectors of the economy, particularly a lack of professionals such as engineers, technicians, and technologists. These types of skills are essential in transitioning to a greener economy. There is also a challenge in terms of availability of training and development professionals and human resource professionals who are key to the interface of skills training and greening of the economy. As already pointed out, less than one-fifth of university graduates pursue STEM programmes.

Transition into a green economy requires a shift from low-skilled to high-skilled occupations, particularly engineering, human resource development and training of professionals. As shown in **Figure 1**, staff in professional occupations in 2015 numbered about 724,000 or 7.8% of total employment compared to 560,000, or 5.3% of total employment, in 2010. The number of technicians and associate professionals also stands at about 200,000, or 2.0% of total employment.

Figure 1: Number of people in High Skilled occupations

Number of People engaged in occupation ('000)



Source: Computed from 2010 Population Census, GLSS VI and 2015 Labour Force Survey

4. Skills development measures for the green economy

4.1 Introduction

Skills development is a key factor in improving the employability of individuals, increasing the productivity and competitiveness of enterprises, reducing unemployment, poverty and exclusion, strengthening innovation, and attracting investment. It also facilitates the transition from the informal to the formal economy. Its relevance and importance has been amplified with the increasing pace of globalisation and technological and climate changes. As economies become green, new occupations or jobs emerge and existing jobs become greener. Jobs are considered green if they have a diminishing negative impact on the environment. For ILO green jobs consist of decent work that improves energy and raw materials efficiency, limits greenhouse emissions, minimizes waste and pollution, protects and restores ecosystems, and supports adaptation to the effects of climate change.

A shift towards green economy and generation of greener jobs requires a general response across all levels of skills and systems of education and training. The degree of general responsiveness of the education and training systems to greening-focused economic activities depends on actors and mechanisms to ensure the required changes in skills development. Enterprises have no choice but to respond to changes in skills needs through training and retraining initiatives at firm and industry levels. Countries formulate skills development policies in which to engage all stakeholders, including the following: setting a common vision of the skills system that a country aims to build; facilitating alignment with the national development framework and coherence with other policies; proposing coordinated and planned actions and reforms for improving the outcome and impact of training; clarifying institutional arrangements for the skills system;

anchoring existing good practices; and pledging the political and collective will and level of commitment while clarifying the roles and responsibilities of stakeholders⁸.

4.2 The Ghanaian Skills Development Framework

4.2.1 System of Education in Ghana

Education in Ghana starts at the age of six years and is a 6-3-3-4 structure representing, following two years in kindergarten, six years of primary education, three years of junior high school (JHS), three years of secondary education and two to four years of diploma or bachelor degree study at tertiary level. Secondary education comprises Senior High School (SHS), Technical and Vocational Education Training (TVET), and commercial training institutions. Essentially, TVET education is primarily aimed at providing skills training to enable trainees to become self-employed after training. Students who successfully pass the SHS Certificate examination can also follow courses at the tertiary level, that is in universities, technical polytechnics (the majority of which have now been renamed technical universities), colleges of education, colleges of agriculture or nursing training institutions.

Table 5 presents the number of accredited tertiary institutions in Ghana. As at January 2018, a total of 213 tertiary institutions have been accredited. Most of these accredited tertiary institutions run programmes in humanities, arts, social sciences, business and law with limited emphasis on science, technology, engineering and mathematics. In all, four out of ten public universities were established with a focus on

⁸ International Labour Organisation (2011).

Table 5: Number of Accredited Tertiary Institutions in Ghana as at January 2018

CATEGORY OF INSTITUTION	NUMBER	CATEGORY OF INSTITUTION	NUMBER
Public university	10	Technical university	8
Private tertiary institutions offering degree and HND programmes	81	Private college of education	7
Public degree awarding/professional institutions	7	Public college of education	41
Tutorial college	8	College of agriculture	1
Public polytechnics	2	Private polytechnics	1
Regionally-owned (West African) tertiary institution	1	Public nursing training college	25
Chartered private institutions	4	Private nursing training	11
Distance learning institutions	1	Registered foreign institutions	5
		TOTAL	213

Source: National Accreditation Board, Ghana

training students in science and technology, engineering, energy, natural resources, health and allied sciences. Ironically, the universities with the potential for meeting the skills needs of the green economy at tertiary level are shifting from their core mandate to train more students in humanities.

4.3.2 Education and Skills of the Labour Force

The high level of informality in Ghana is linked to the low level of education and skills of the Ghanaian labour force. As shown in Figure 2, 63% of the Ghanaian labour force in 2015 had either no education or up to basic education only. Access to formal sector jobs largely requires at least secondary school education, suggesting that only 37% of the labour force with secondary or tertiary education is entitled to access formal sector jobs. While acknowledging efforts to improve the education and skills training of the Ghanaian labour force, the improvement seems quite slow.

In 2000 about 48.7% of the labour force had had no education, but this percentage consistently declined to 23.5% in 2015, while those with primary and middle or JHS (i.e. basic) education improved from 34.7% to 49.5% over the same period (see Figure 2). A little over a one-quarter (27.0%) of the labour force had at least had secondary education (secondary 16.7% and

tertiary 10.3%) compared to 16.6% in 2001.

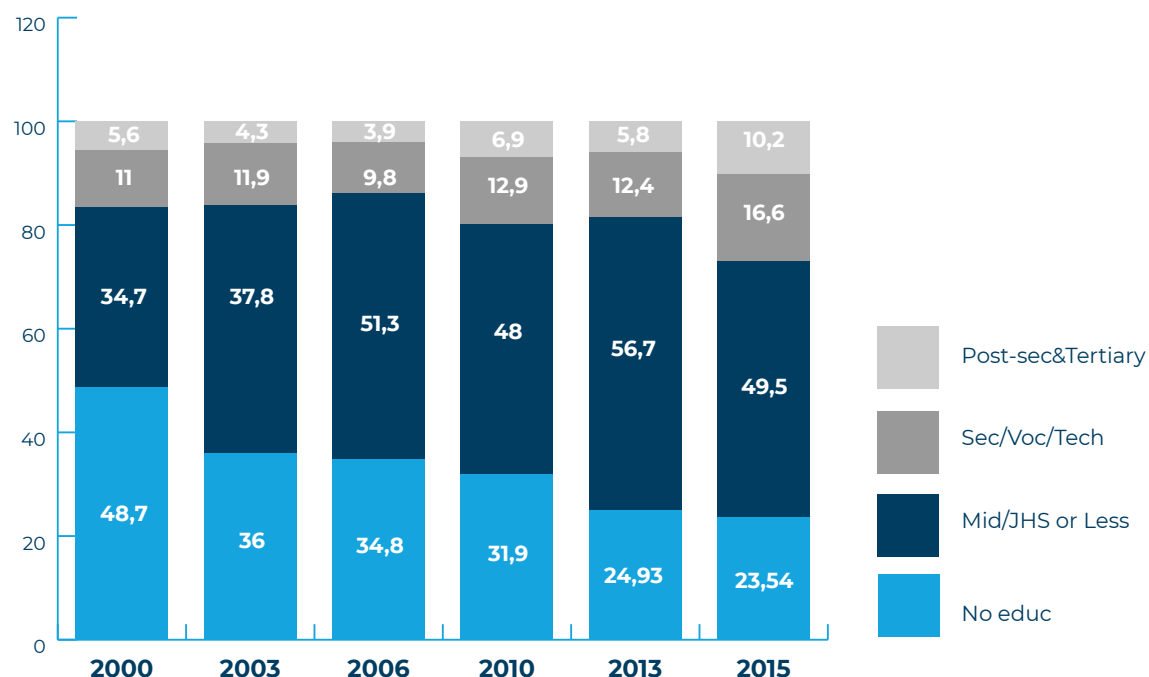
The ability of the current workforce to adapt to the green economy requires skills development through training and retraining of the labour force in science, technology and innovation in line with the shift towards more environmentally-sustainable economic activities. In 2015 about 77.0% of the labour force with at least secondary education pursued programmes in education, humanities and arts, social science, business and law, general programmes and other service-related courses (**Figure 3**). Only 23.0% pursued courses in science, engineering, agriculture and health science.

Essentially the country continues to produce more graduates in humanities as against STEM, which is important for the country's economic transformation. Between 2011 and 2014 the share of graduate output in health science from public universities dropped from 3.4% to 2.8% (**Figure 4**). Similarly, graduate output in applied sciences (including engineering, technology and mathematics) declined from 17.6% to 12.9%, indicating a general decline in the share of graduate output in STEM and health science from 21% to 15.7% in four years. At the same time, graduate output in business, architecture planning, arts and social science as well as education from public university increased from

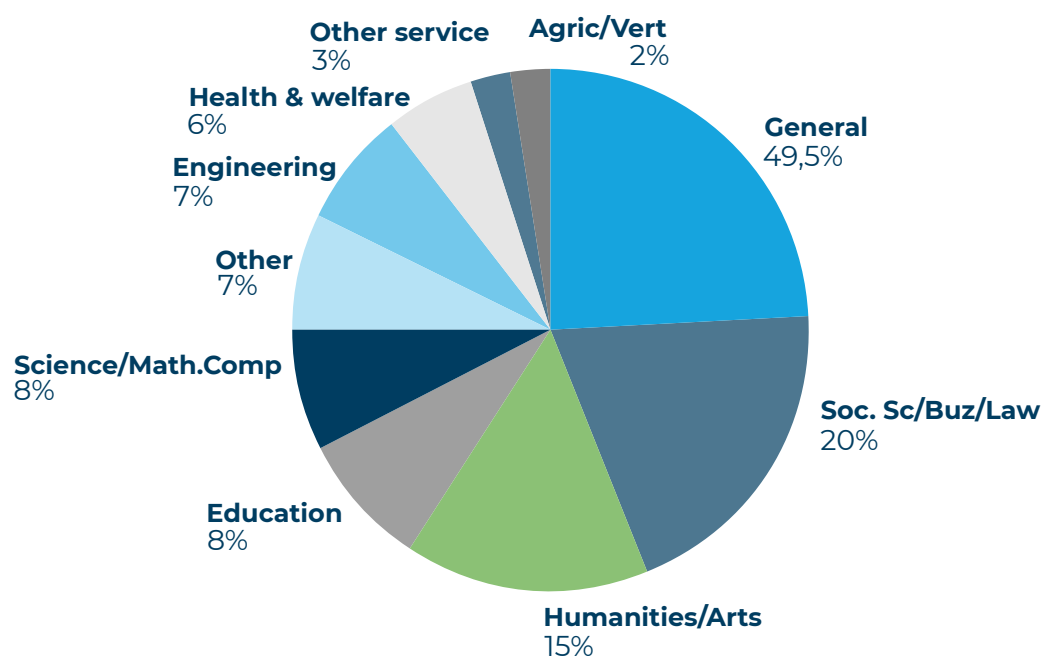
Skills for Green Jobs in Ghana

Figure 2: Educational attainment of the Labour Force 2000-2015 (%)

Distribution of Labor Force by level of education (%)



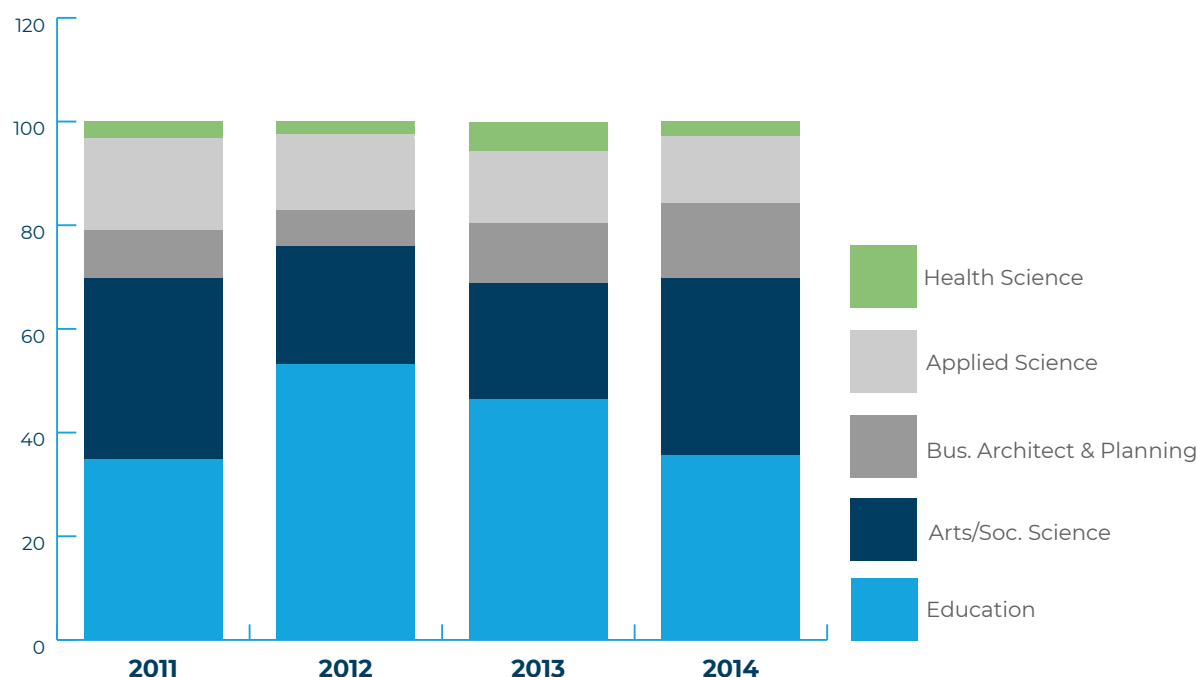
Source: Computed from Population Censuses, GLSS, CWIQ and Labour Force Survey. GSS

Figure 3: Distribution of the educated labour force by programme (%) in 2015

Source: Computed from 2015 Labour Force Survey. GSS

Figure 4: Graduate output from Public universities by major program

University output by program (%)



Source: Computed from Graduate Output, National Council for Tertiary Education (NCTE)

79% to 84.3%.

The situation is no different in the polytechnics, which have now been converted into technical universities. The share of graduate output in science, engineering and technology from polytechnics dropped from 26.9% in 2010 to 22.3% in 2015. In contrast, the share of graduates in business and management rose from 73.1% to 77.7% over the same period (**Figure 5**).

4.3.2 Problem of Skills gap

The Ghanaian labour market is characterized by a shortage of high and intermediate skills as well as vocational and technical skills. A study commissioned by the African Centre for Economic Transformation (ACET) suggests a shortage of highly skilled, semi-skilled and vocational/technical skills and an excess supply of low-skilled labour⁹ (Figure 6). A huge shortage is revealed in vocational and technical skills, with a gap in annual growth of -0.98 percentage points.

Based on the International Standard Classification of Occupation (ISIC) 2008, high-skilled occupations are defined as comprising professionals, technicians, associate professionals and managerial occupations, as well as membership of the armed forces, while clerical, sales and service activities, along with plant and machine operation and assembly occupations, are classified as semi-skilled occupations. Low-skilled occupations are traditional agriculture and elementary occupations, with craft occupations classified as specialized occupations. On the supply side, high-skilled individuals comprise those with university, polytechnic and professional education, such as teachers and nurses, while those with secondary education represent the semi-skilled and those with basic education or less are considered low-skilled. Vocational or technical skills are specialized skills.

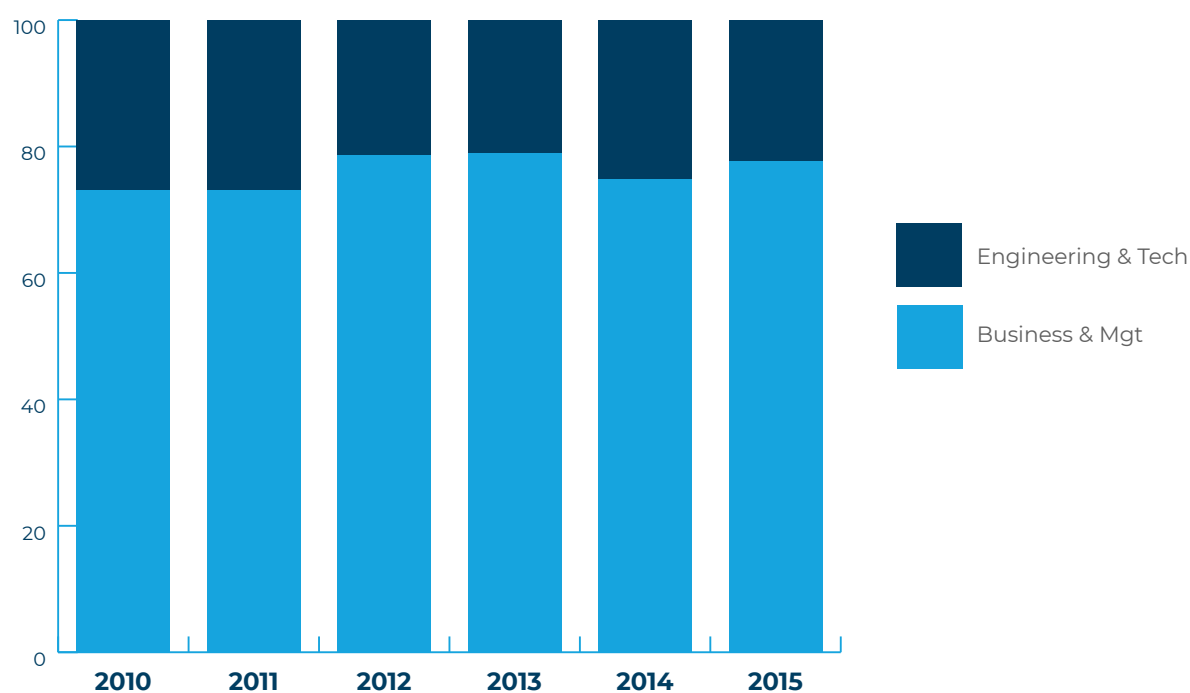
4.3.3 Skills development for the green economy

Ghana has yet to develop a coherent national strategy or policy to meet the skills needs for the green economy. Nonetheless there are a number

Skills for Green Jobs in Ghana

Figure 5: Graduate Output of Polytechnic by major programs 2010-2015

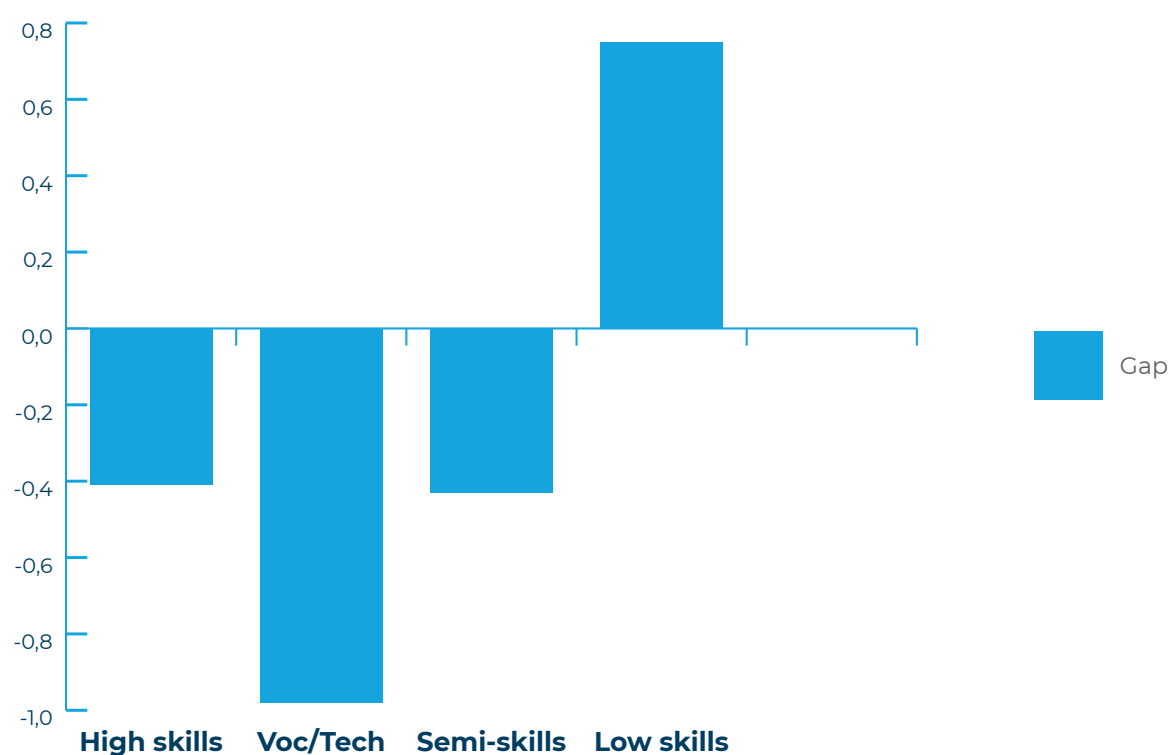
University output by program (%)



Source: Computed from Graduate Output, NCTE

Figure 6: Labour Supply–Demand Gap by Skills, 2006–2013

Average Annual Skills Gap (%)



Source: Computed by authors from GLSS 5&6

of climate-change-related educational efforts targeted on the formal and informal segments of society. Most of these educational programmes focus not only on increasing public awareness of climate change, but also place emphasis on behavioural change and community action. Formal environmental education focuses on the review of school curricula to include climate change at key levels of the educational system. In most public tertiary institutions, climate change and related subjects have either been integrated into existing courses or special graduate courses have been designed.

Some efforts have also been made in the transition towards the green economy, as far as skills are concerned, in the enactment of the Ghana National Qualification Framework (NQF). The framework, which was launched in October 2012 under the COTVET Act (Act 718 of 2012), is aimed at merging the existing qualification with the labour force requirements whilst improving and modernizing the system's ability to adapt to change. The policy goals of the NQF include the following:

- ✉ to bring all post-basic, occupation-oriented qualifications together under a unified qualifications framework;
- ✉ to facilitate access to further education and training for individuals in technical and vocational occupations;
- ✉ to improve product and service quality by ensuring uniform standards of practice in the trades and professions;
- ✉ to promote access to lifelong learning for all, especially those working in the informal economy.

A number of capacity-building initiatives in climate change have either been carried out or are on-going. Some of the initiatives have taken place at global and regional levels while others are specific to Ghana. They include;

- ✉ Netherlands Climate Change Studies Assistance Programme (NCCSAP)
- ✉ Climate Change Adaptation and Development Programme Initiative (CC-DARE)
- ✉ Adaptation Learning Programme (ALP) for

Africa.

- ✉ Insurance Products for Adaptation to Climate Change (IIPAC) Integrating climate change into the management of priority health risks
- ✉ International Development Association Programme Document for a Proposed Natural Resources and Environmental Governance First Development Policy Operation to Ghana
- ✉ Adaptation Learning Programme (ALP)
- ✉ Climate Health Project
- ✉ Low-Emission Capacity-building Programme
- ✉ Green Climate Fund
- ✉ Capacity-building on Measurement, Reporting, and Verification (MRV) Domestic Architecture
- ✉ Africa Adaptation Programme in Ghana
- ✉ Community Resilience Through Early Warning
- ✉ Technical Assistance for Sustainable National Greenhouse Gas Inventory Management Systems in West Africa (West Africa GHG Project)
- ✉ Ghana Technology Needs Assessment
- ✉ National Climate Change Adaptation Strategy
- ✉ Climate Change Education in Schools Programme (CCES, EPA)

4.3 Anticipation and Provision of Skills

From the perspective of the ILO a job is considered green if it contributes to preserving or restoring the quality of the environment, and which meets the principles of “decent work”. Transition to a green economy implies changes in occupations and skills in line with the transition. Currently Ghana does not have an established system of identification of skills needs for a green economy. A well-established system involves qualitative needs assessment and quantitative projection, institutional social dialogue mechanisms, and regular flows of information into the education and training system. Such a system is anchored to a well-functioning labour market information system

Skills for Green Jobs in Ghana

that analyses and publishes employment and labour statistics on a regular basis. The main sources of labour market information are population censuses and various nationally representative household surveys with different foci and objectives.

In the absence of a well-established mechanism to regularly identify and monitor skills needs for green jobs, the obvious option is to encourage enterprises to adjust to the changing economic situation. Essentially, regular collaboration between industry and education and training systems to ensure that training institutions are able to produce human capital that is trainable and adaptable to a green economic situation.

Three priority sectors identified for green economy in Ghana are energy, forestry and agriculture. Ghana emerged from four years of energy crisis between 2012 and 2016, which plunged the country into darkness. The heavy reliance on hydroelectricity came under threat in the mid-1990s and 2006-07 that compelled the country to diversify into thermal electricity generation with negative implications for the environment. The recurrence of the energy crisis from 2012 due to the low water level of the Akosombo dam, coupled with the high cost of operating thermal generating machinery, rekindled the debate on the need for Ghana to move into renewable energy supply. However a lack of skills capacity generally constrained the move into solar, wind and other renewable sources of power. Many households and enterprises resorted to various sizes of generating plant as alternative source of electricity but interest in solar energy continued to increase. As part of climate change mitigation policy and emission reduction policies, the Government has sought to scale up renewable energy penetration in Ghana by 10% by 2030. This was to be achieved by establishing 55 solar mini-grids with an average capacity of 100kW which translates into 10MW, and by scaling up the 200,000 solar home systems for lighting in urban and selected non-electrified rural households, among other things. This requires skills for the manufacture and installation of solar panels. In response to skills needs in this area, the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi has introduced a Master of

Science degree in solar installation.

Primitive and low-productivity farming practices involving clearance of large tracts of land and indiscriminate bush burning have been a major source of deforestation in Ghana. Greening-motivated farming practices require agricultural modernization with the object of increasing farm yields without increasing the use of farmlands. Other greening strategies include soil conservation; water efficiency; and organic growing methods, all of which require skills training and retraining in the agricultural sector. Training of agricultural extension officers to guide farmers in modern methods and technologically-driven farming practices is very essential for promotion of environmentally-friendly farming practices. Ghana boasts a number of agricultural colleges and universities that produce extension officers but these skills are left unused on the grounds of a lack of budgetary resources to engage them. This undermines the government commitment to green economic activities to save the environment.

Essentially, the desire of government is to halt the process of deforestation, reforestation and afforestation; agroforestry and sustainable forestry management requires development of human capital through training and retraining in skills to accomplish the green economy agenda. Training and retraining in afforestation skills is necessary for preserving the forest and preventing it from being degraded. There are moves in Ghana to encourage the use of steel in housing construction, especially for roofing, to prevent excessive use of timber in the housing industry. This calls for specialised skills in roofing.

4.4 Gender Implications of the Green Economy

Women continue to suffer vulnerabilities in many developing countries as they bear the greatest brunt of climate change effects. As primary care-givers and producers of staple foods, and possessing less economic power in terms of asset ownership, they are highly

exposed to the risk of drought and the vagaries of the weather. Their situation is even worse in the event of natural disasters. Despite this socio-economic displacement, efforts are being made to integrate them fully into plans and actions in respect of biodiversity management and the green economy.

In Ghana several efforts have been made to raise the voice of women and increase their visibility in the policy space. Given the significant role of women in the Ghanaian economy, the energy sector has incorporated gender issues into the energy policy document. Extracts from the Ghana Energy Policy document suggest that, with wood fuels constituting the bulk of the energy used for cooking and heating in Ghanaian homes and in other commercial activities, women in Ghana bear the brunt of the pollution and negative health impacts of emissions from these fuels.

Given that a majority (57%) of Ghanaians live in rural areas, statistics show that many people, especially women, lack access to electricity and rely on biomass for cooking. The negative health impacts of indoor air pollution from traditional

biomass fuels on women, girls and babies remain a critical issue in Ghana's energy development.

The policy direction of government in addressing gender and energy challenges includes among other things:

- ✉ promoting the use of modern forms of energy in households;
- ✉ supporting the capacity development of women in the energy sector;
- ✉ promoting development of solar and other renewable forms of energy in off-grid communities; *and*
- ✉ ensuring participation of women in the formulation and implementation of energy interventions.

5. Analysis of case studies

Q Case Study 1: Promoting Renewable energy through Solar Energy.

Electricity supply challenge

Almost all experts agree that photovoltaic energy – the conversion of sun energy into electrical energy – will be one of the most important energy suppliers on the planet. Worldwide, the number of photovoltaic installations is growing from year to year. Until recently, electricity from solar had not featured prominently in the discussion on finding alternative source of electricity to meet the ever-increasing demand for power in Ghana for domestic and industrial use.

For a long time Ghana has been relying on hydro sources for the supply of electricity. It is of course one of the major environmentally-friendly sources of power. However, indiscriminate tree felling and farming practices along water sources that feed the two main hydro-electric dams – Akosombo and Kpong – caused the water level to drop during the dry seasons and periods of heavy drought, plunging the country into darkness. Over the last 20 years Ghana has been through three different periods of energy crisis – in 1997-1998, 2006-2007 and 2012-2015 – when the water levels of the dams went so low as to cause a virtual shutdown of the hydro dams. During the 1997-98 crisis the government resorted to the use of alternative thermal equipment, leading to the installation of a number of thermal plants in the Western corridor of the country. In 2006-07 the government brought in independent power producers to install thermal plants and contracted a loan from the Chinese government to construct another hydroelectric dam, the Bui dam to supplement the two main source of hydro-electric power supply. Households and businesses resorted to the use of generators as alternatives source of electricity with their associated noise and fume pollution.

A Search for Alternative and renewable source of electricity supply: Challenges and outcome

The need for solar as an alternative source of electricity arose strongly during the last two periods of electricity supply crisis but the challenge has always been the huge initial investment requirement and, more importantly, the lack of expertise in the installation and maintenance of solar panels and other equipment. The Ministry of Energy in 2007 installed solar panels on its main building to demonstrate the importance of solar energy as one of the best alternative sources of electricity and encouraged households and industry to follow suit. This however did not make the necessary impact as the skills challenge and huge initial investment requirement remained a constraint. Households and enterprises that took a bold step to go into solar electricity generation encountered problems with the system (the system did not work properly) because many of the installers were not qualified or competent enough to install the system. While high-quality solar panels and other equipment are important in their contribution to proper functioning of installed solar systems, this might always not be the case if the installer had not been properly trained to demonstrate a high level of competence.

Renewed Interest in Solar System

Currently, solar energy is on top of the country's agenda, and in 2015 the President announced a Rooftop Solar PV initiative under the Rooftop Solar Photovoltaic (PV) Programme. Indeed, a number of rooftop solar systems of different capacities have been installed under different scenarios including the use of Net Meters, which will enable the beneficiaries to sell electricity generated from solar systems back to the distribution companies who will credit the beneficiary. To address the skills deficiency and constraints and ensure that Ghana has the skilled specialists for the manufacturing and application of photovoltaic components and systems, some institutions have taken up the challenge and introduced relevant courses of study in this area.

The Kwame Nkrumah University of Science and Technology (KNUST) has introduced an M.Sc. in solar installation along with short courses and workshops in renewable energy technologies. In addition, the Ghana Technology University College also offers a Solar Engineering programme at Bachelor level in collaborative programme with the Anhalt University of Applied Sciences in Germany. Students are taken through the basics and application of the natural and engineering sciences, and are trained in photovoltaic technology basics and the handling of solar cells and solar module implementation in conventional and new energy systems. It is a quality German Bachelor degree, provided in full in Ghana and adapted to domestic requirements.

Skills availability in the right quantity and quality in a country is a source of attraction for new investment and reinvestment. The improved availability of skills in the development of solar energy is attracting more investment in the provision of renewable energy through solar systems. Trade-works Company Limited has installed plants to manufacture photovoltaic (PV) panels to boost the penetration of solar energy in Ghana. A proportion of the workforce consists of Ghanaians trained locally and abroad in the manufacturing and installation of solar panels for enterprises and households. In spite of the improvement in expertise in the development of solar energy, some Ghanaian firms and households still rely on foreign expertise to install their photovoltaic (PV) panels because of the seeming lack of confidence in local expertise, an observation made by the director of a beverage-producing firm that uses solar energy.

and infrastructural development such as road construction.

Forest Plantation Strategy

A combination of policies is required to reverse the situation and one such measure is afforestation through forest plantation. In line with government commitment to the sustainable development goals (SDG) and the country's nationally-determined contribution to addressing climate change, the Ghana Forest Plantation Strategy (GFPS) 2016-2040 was launched. The goal is to achieve sustainable supply of planted forest goods and services to deliver a range of economic, social and environmental benefits over and beyond the planned period. This would be achieved through specific strategic actions directed towards the following:

- ✎ establishment and management of 625,000 ha of forest plantations;
- ✎ enrichment planting of 100,000 ha of poorly-stocked and degraded forest reserves;
- ✎ facilitation of the incorporation of trees within farming systems (trees-on-farms) covering 3.75 million (ha) of agricultural landscapes;
- ✎ maintenance and management of small-, medium- and large-scale forest plantations;
- ✎ creation of employment opportunities and sustainable livelihoods in rural communities through forest plantation development;
- ✎ timber utilization and marketing and improved governance in its regulation; *and*
- ✎ management of forest plantations using best practice principles.

The success of these policy actions would depend largely on the skills and human resource capacity for forest plantation development. Essentially, training and upgrading of forest guards and other frontline staff of forest plantation development, and of rapid response teams in forest law enforcement and forest protection, are required. Promotion of professional development programmes at local and international levels to strengthen institutional capacity would be pursued. This calls for collaboration with local universities and training institutions with programmes in forestry to regularly review curricula in line with the demands of the forest plantation

Q Case Study 2: Reversing rapid depletion of forest cover in Ghana:

Overview

Ghana's forest cover has been under siege, with a 2% rate (or 135,000 hectares) of depletion annually. This situation has arisen variously from wild-fires, logging for export, furniture manufacturing and housing construction, fuel wood harvesting for domestic use, agricultural expansion, mining,

Skills for Green Jobs in Ghana

industry. Advanced training in disciplines such as genetics and tree breeding; plantation silviculture and management; forest economics; forest engineering; and forest plantation pest and disease management and control, must all be priorities. Other crucial skills and training initiatives for the success of forest plantation initiatives variously include capacity-building of tree grower associations through support for group formation, administration, provision of technical support, access to markets, and product development, along with farmer field schools and demonstrations of good agroforestry practices and integrated nature-based livelihood options. In all, a new orientation of preservation of forest resources is needed for the entire population.

A shift from wood to other materials for furniture-making and housing development

Besides the need to replenish the depleted forest through plantation, many people have called for a shift from the excessive use of wood logs in manufacture of furniture and housing construction. Most houses in Ghana are roofed with wood logs and panels. Some building and estate companies are advocating a shift from wood to metals in roofing domestic and commercial buildings to reduce the pressure on the forest. The use of raffia in the manufacture of furniture

is also being advocated. This however requires new skills, skills upgrading and retooling to make it happen. Carpenters trained to use wood logs in manufacturing furniture would require retraining to be able to use raffia for furniture making and metals for roofing. Currently, TVET institutions and the apprenticeship system in this area have yet to review the training curricula to take this new thinking into account.

6. Conclusions and recommendations

Ghana is currently at the early stage of the green economy agenda and in many respects has not experienced any significant structural shift in the economy and the labour market within the greening framework. Currently, the country has no labour legislation and skills development strategies in preparation for a strong shift in the economy towards greener products, services and jobs. The country's commitment to greening economic activities is enshrined in policy documents in the areas of energy, forestry and climate change in general. However, the policies seem to be scattered and not well harmonized to make them more focused and effective in driving change in the greening direction. In addition, anticipation of skills requirements in line with a shift into green activities and jobs is quite weak. Currently the country faces a significant skills gap, particularly in high- and semi-specialized skills and this risks hampering the green economy agenda. Training in STEM, which is critical for speedy transition into green activities in energy, forestry, agriculture, manufacturing and so forth is quite limited.

It is recommended that a comprehensive, cohesive and well-coordinated approach is adopted for development of green skills at all levels of education through a review of the current education and skills training framework in line with the country's greening aspirations. The study identifies three sectors – energy, forestry and agriculture – to drive the green agenda and anticipate skills needs well in advance, and incorporating this into the education and skills curriculum from the basic level will be a major factor in overcoming the potential skills challenge. For instance, solar energy and afforestation should be introduced into the basic school curriculum with the aim of greater awareness creation among children so that they grow with it to become environmentally-conscious.

References

- Baah-Boateng and Barfour Awuah (2014) *"Skills Development for Economic Transformation"*, African Center for Economic Transformation (ACET), Accra
- Forestry Commission (2016), *"Ghana Forest Plantation Strategy: 2016-2040"*, Ministry of Land and Natural Resources
- Ghana Forest commission (2013). *"Report of mapping on forest cover and carbon stock in Ghana"* PascoCoperation-Japan.
- Ghana IND (2015), *"Ghana's intended nationally determined contribution (INDC) and accompanying explanatory note"*, Republic of Ghana
- Ghana Statistical Service (2010). *"Ghana's Economic Performance 2010"*. Government of Ghana, Accra.
- Ghana Statistical Service (2012). *"2010 population and housing census: summary report of final results"*. Government of Ghana, Accra.
- International Labour Organisation (2009). *Guide to the new Millennium Development Goals Employment Indicators, including the full set of Decent Work Indicators* (Geneva). Available at: <http://www.ilo.org/trends>.
- International Labour Organisation (2011) *"Skills for Green Job: A Global View"*, Synthesis Report Based on 21 country studies.
- Ministry of Lands and Natural Resources (MLNR) (2012a). *"Climate Investment Funds: Forest Investment Program"*. Government of Ghana, Accra.
- Ministry of Lands and Natural Resources (MLNR) (2012b). *"Ghana Forest and Wildlife Policy"*. Government of Ghana, Accra.

List of key resource persons

The following are the main experts consulted during the course of the study

-  **Ing. Godfred Mensah** – Electrical System Planning and Protection Engineer, ELECTRICITY COMPANY OF GHANA

-  **Ben Odame-Thompson**
ELECTRICITY COMPANY OF GHANA

-  **Dr. Simon Bawakyilleneo** – Institute of Statistical Social and Economic Research (ISSER), UNIVERSITY OF GHANA

-  **Eugine Abraham** – Research Officer, Ghana Employers' Association (GEA)

-  **Dr. Kwabena Otoo** – Director, Labour Research and Policy Institute, Ghana TRADES UNION CONGRESS

-  **Mr. Amponsah Tawiah** – Deputy Inspector of Mines, Minerals Commission

-  **Mark Detché** – Assistant Director, Ministry of Land and Natural Resources

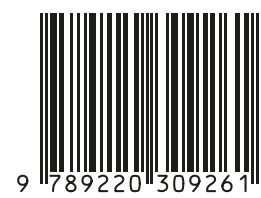
-  **Dr. Oteng Gyasi** – CEO of Tropical Cables and Conducted Ltd. and Former PRESIDENT OF ASSOCIATION OF GHANA INDUSTRIES

-  **Ernest Berko** – Deputy Director, Ministry of Employment and Labour RELATIONS

-  **Christopher Nyarko** – Ghana Chamber of Mines

-  Executive Secretary, National Council for Tertiary Education

ISBN 978-92-2-030926-1



9 789220 309261