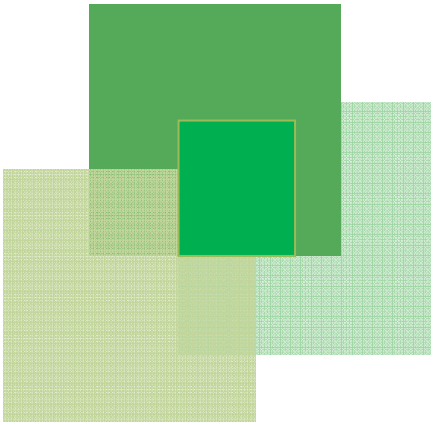

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Skills for green jobs in Uganda

Unedited background country study

Countryside Innovations Network Ltd.

ILO Skills and
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Foreword

The world finds itself in a slow recovery after the deepest recession since the Great Depression. The world is also coping with a host of environmental problems and the urgent need to reduce carbon emissions. A greener future also promises an enormous potential in a much needed employment growth. However, without suitable skills, this potential cannot be realized. Today, skills gaps are already recognized as a major bottleneck in a number of sectors, such as renewable energy, energy and resource efficiency, green building and retrofitting, environmental services and green manufacturing. Training response measures are successful where they are coherent across policy domains, systemic and systematic, and targeted at disadvantaged groups. These training measures can only be effective if based on timely identification of skills needs. Effectiveness of training measures is decisive not only for the economic recovery but also for a longer-term sustainability agenda.

This report was produced in the framework of the project, 'Skills for green jobs'. The project was implemented in cooperation between the International Labour Organization (ILO) and the European Centre for the Development of Vocational Training (Cedefop). The project identifies skills needed for greener economies with respect to structural shifts, and new, emerging and changing occupational profiles. The 'Skills for green jobs' study is embedded in the Green Jobs Initiative, a joint initiative of the United Nations Environment Programme (UNEP), the ILO, the International Employers Organization (IOE) and the International Trade Union Confederation (ITUC), to assess, analyze and promote the creation of decent jobs as a consequence of the needed environmental policies. The global study was jointly funded by the Skills and Employability Department of the ILO and the Green Jobs Initiative.

The following countries have been included in the study: the ILO covered Australia, Bangladesh, Brazil, China, Costa Rica, Egypt, India, Indonesia, the Republic of Korea, Mali, the Philippines, South Africa, Thailand, Uganda and the United States. In addition, Cedefop covered six European Union (EU) member States: Denmark, Estonia, France, Germany, Spain and the United Kingdom. The ILO global synthesis report,[1] which analyzes the situation in all 21 countries involved in the study and the European synthesis report,[2] which covers the six EU countries, as well as all individual country reports, are available at: http://www.ilo.org/skills/what/projects/lang--en/WCMS_115959/index.htm (the ILO website) and http://www.cedefop.europa.eu (Cedefop website; look under *Skills Needs* theme). The unedited background country studies have been published in the electronic form in order to make them available quickly. The summaries are published as part of the synthesis reports.

The global project in the ILO was coordinated by the Skills and Employability Department and, in particular, benefited from comments and technical guidance by the team under the leadership of Olga Strietska-Ilina, Christine Hofmann, Mercedes Duran and Shinyoung Jeon. The ILO coordinating team would like to express great thanks to the author of the report, Countryside Innovations Network Ltd., for the background country research which contributed to the global study. Special thanks also go to the ILO regional and country field offices for the project support and the ILO colleagues who assisted research at national level.

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[1] Strietska-Ilina, O.; Hofmann, C.; Duran Haro, M.; Jeon, S. (forthcoming 2010). *Skills for green jobs: A global view. Synthesis report based on 21 countries* (Geneva, ILO Skills and Employability Department).

[2] Cedefop. (forthcoming 2010). *Skills for green jobs: European synthesis report* (Luxembourg, Publications Office of the European Union).

Contents

Abstract

A policy research for greener economies through skills training is important in the current global economic and environmental crisis. Uganda, like other developing countries has not effectively responded towards mitigating and preventing environmental challenges, notably climate change. The cost of inaction by the majority of institutions mandated to protect the environment has led to the country becoming more vulnerable.

The ILO, in cooperation with the European Centre for the Development of Vocational Training (Cedefop), funded the Countryside Innovations Network (CIN), in collaboration with Makerere University, to carry out a study to identify areas of green skills training and development as a strategy of achieving environmental sustainability. This report explores and describes categories of green jobs with significant potential to spur sustainable economic growth in the country.

The emerging "green" employment areas are discussed, along with their skills and knowledge gaps and potential for greening the economy.

The authors hope that members of the national and international community working in greening economy will find the findings of this study useful and informative to require immediate, medium- to long-term attention and action.

Countryside Innovations Network Ltd.

Executive summary

Climate and environmental change presents both challenges and opportunities to global economies. Uganda like the rest of the world is experiencing global environmental challenges and therefore needs to put in place measures to adapt to these changes. This study was conducted to identify strategic skills development responses of Uganda amid the current environmental degradation, climate change and the global call for greening economies. According to the United Nations Environment Programme (UNEP), "greening the economy" refers to the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities.

Green jobs are "positions in a country's economic sectors such as in agriculture, manufacturing, construction, installation and maintenance, scientific and technical, administrative, and service-related activities that contribute substantially to promoting, preserving, protecting and or restoring environmental quality and health." The authors worked nationally in partnership with concerned parties and organizations in the climate and environment theme, to generate knowledge and propose institutional arrangements that will enhance effective policy reform and promote best practices. The research findings from these studies are designed to inform national planning and training in green jobs and skills for a greener economy. The following were the specific objectives of the study:

a). Identify major challenges and priorities related to climate change and the subsequent greening policies and strategies

b). Profile greening policies and strategies for economic development, including national positioning to tackle the current global economic crisis

c). Identify and analyze greening skills needs for both new and existing occupations

d). Identify major sectors with greening potential in Uganda and assess their programmes, frameworks and capacity for crisis response

e). Analyze whether and how skills and response strategies are incorporated into these greening policies

f). Profile methods, tools, systems and institutional framework in use to ensure skill provisions for current and future market demand to green collar jobs workers

g). Analyze how skill responses are organized to effectively meet green challenges in Uganda

h). Draw conclusions and policy recommendations for skills policies and strategies at national, sectoral and local levels

The study identified five key institutional factors which drive significant and sustained improvement in leading a green environmental performance. To reverse greenhouse gas emissions (GHGs) by 2025, retraining in skills delivery must be done in these key five factors which include:

a). Retarding the diminishing biodiversity.

b). Improving recycling rates.

c). Stopping unsustainable building construction and consumption patterns.

d). Improving higher education and innovation.

e). Strengthening renewable energy sector.

The key emerging observations from the study included:

a). The concept and scope of green job skills training is generally not well understood or implemented in Uganda.

b). There is a need for greater dialogue and coordination across the region to maximize opportunities for the integration of green job skills training adopting strategies.

c). The education sector especially with focus on the youth and the rural poor was identified as requiring particular support.

d). Rural areas in the country face particular problems associated with the potential effects of climate change, which can be improved through a strategic approach to green job skills training.

e). There are strong exponents and advocates of green job skills training in the country that have a desire to work more strategically with colleagues. This is especially among development partners and non-governmental organizations (NGOs).

f). The amount of staff time at district and local level devoted to green job skills training is generally limited, as expressed by some resource persons and this has to be addressed.

g). Policies on the promotion of green skills in all sectors of the economy should be developed.

h). For both the formal and informal sectors, skills development cooperation should be integrated or linked to development cooperation dealing with employment promotion. This is in agreement with the ILO (2005) Human Resource Development Recommendation No. 195 (Recommendation concerning Human Resources Development: Education, Training and Lifelong Learning), that 'education and vocational training policy should be linked to employment policy.'

Despite the success in conducting this study; the following limitations affected it:

a). The general absence of data and little knowledge on skills for green jobs in most relevant institutions.

b). Quantitative data on green skills and jobs in the country are either scarce or lacking in the sectors. Most of the sectors either know very little or nothing about the green jobs and skills concept.

c). The Ministry of Labour, the lead agency on labour markets and planning, was not aware whether these skills existed in the country. This combined with the general lack of data constrained the study process especially in terms of eliciting cooperation and engagement.

d). Unwillingness to provide data especially from some of the key sectors and actors.

Abbreviations and acronyms

ADB	African Development Bank
BSc	Bachelor of Science
BOU	Bank of Uganda
BTVET	Business, technical and vocational education and training
CCCI	Cities in Climate Change Initiative
CDM	Clean Development Mechanism
Cedefop	European Centre for the Development of Vocational Training
CET	Common External Tariff
CFCs	Chlorofluorocarbons
CIN	Countryside Innovations Network Ltd.
CO2	Carbon-dioxide
COMESA	Common Market for East and Southern Africa
CREEC	Centre for Research in Energy and Energy Conservation
DFID	Department for International Development (United Kingdom)
EAC	East African Community
EIA	Environmental Impact Assessment
ENR	Environment and Natural Resources
ERA	Electricity Regulatory Authority
EU	European Union
FAO	Food and Agriculture Organization
FIEFOC	Farm Income Enhancement and Forest Conservation
FOWE	Friends of Wealth Environment
FSD	Foundation for Sustainable Development
FUE	Federation of Uganda Employers
GATT	General Agreement on Tariff and Trade
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gases
GTZ	German Technical Cooperation Department
GWP	Global Warming Potential
HCFCs	Hydro chlorofluorocarbons
HDI	Human Development Index
HEP	Hydroelectric projects
HRD	Human Resources Development

IGAD	Intergovernmental Authority on Development
IK	Indigenous Knowledge
ILO	International Labour Organization
IPPC	Intergovernmental Panel on Climate Change
KCC	Kampala City Council
KYU	Kyambogo University
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MDG	Millennium Development Goal
MEMD	Ministry of Energy and Mineral Development
MGLSD	Ministry of Gender, Labour and Social Development
MoE	Ministry of Education and Sports
MOF	Ministry of Finance
MoH	Ministry of Health
MoU	Memorandum of Understanding
MP	Montreal Protocol
MTTI	Ministry of Tourism, Trade and Industry
MWE	Ministry of Water and Environment
NACFAM	National Council for Advanced Manufacturing
NAPA	National Adaptation Programmes of Action
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NGOs	Non-governmental organizations
NOGAMU	National Organic Agricultural Movement
NOTU	National Organization of Trade Unions
ODSs	Ozone depleting substances
PEAP	Poverty Eradication Action Plan
PMA	Plan for Modernization of Agriculture
PV	Photovoltaics
SAIM	Strategic approach to international chemical management
SD	Skills Development
Shs	Uganda Shillings
UBOS	Uganda Bureau of Statistics
UIA	Uganda Investment Authority
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation

UNFCCC	United Nations Framework Convention on Climate Change
URA	Uganda Revenue Authority
USAID	United States Agency for International Development
UTODA	Uganda Taxi Operators and Drivers Association
UV	Ultraviolet
WTO	World Trade Organization

1. Introduction and methods

1.1 Background

Climate and environmental change presents both challenges and opportunities to global economies. Uganda like the rest of the world is continuously experiencing global environmental challenges and therefore needs to put in place measures to adapt to these changes. This study was conducted to identify strategic skills development responses of Uganda amid the current environmental degradation, climate change and the global call for greening economies. According to UNEP, "greening the economy" refers to the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities.

Green jobs are positions/practices in agriculture, manufacturing, construction, installation, and maintenance, as well as scientific and technical, administrative, and service-related activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect and restore ecosystems and biodiversity, reduce energy, materials, and water consumption through high-efficiency and avoidance strategies, de-carbonize the economy, and minimize or altogether avoid generation of all forms of waste and pollution. "Green jobs" can occur at all levels in the global economy and can provide opportunities for people from all socioeconomic levels, ethnicities, backgrounds, races, genders, and social groups.

The following were the specific objectives of the study:

a). Identify major challenges and priorities related to climate change and the subsequent greening policies and strategies

b). Profile greening policies and strategies for economic development, including national positioning to tackle the current global economic crisis

c). Identify and analyze greening skills needs for both new and existing occupations

d). Identify major sectors with greening potential in Uganda and assess their programmes, frameworks and capacity for crisis response

e). Analyze whether and how skills and response strategies are incorporated into these greening policies

f). Profile methods, tools, systems and institutional framework in use to ensure skill provisions for current and future market demand to green collar jobs workers

g). Analyze how skill responses are organized to effectively meet green challenges in Uganda

h). Draw conclusions and policy recommendations for skills policies and strategies at national, sectoral and local levels

1.2 Study approach

The study combined both qualitative and quantitative research methods. In order to get some quantifiable data; various national reports that were envisaged to have relevant statistics for the study were reviewed. Much as some of these reports had important data most of it was scanty and had not been disaggregated by occupation, educational attainment, gender and age groups to give a detailed impression of the current status. An attempt was made to quantify estimates of

green sectors/ green occupations and the outlook on trends in demand for green jobs and skills using the scanty available data. Information on the supply of available skills and system's capacity to meet the demand in the larger context of the country greening policy was sought from national reports, however, it was also scanty.

Focus group discussions, panels of experts, structured interviews, key informant interviews, unstructured interviews, a workshop and in-depth case studies were the qualitative methods used in the study. Focus group discussions and structured interviews generated information on the current and expected demand for skills, areas of workforce shortages and skills gaps, and strategies and implementation channels applied to meet the demand. Key informant interviews, unstructured interviews and in-depth case studies were employed in getting information on retraining needs, new green collar occupations, and new types of skills, competences and skill groups. Eight in-depth case studies were conducted.

Interviews and focus group discussion included the relevant institutions e.g. National Organization of Trade Unions (NOTU), Federation of Uganda Employers' Association (FUE), policy makers at different levels in the key sectors such as agriculture, energy, manufacturing, Education, HRD (human resource development) and BTVET (Business, technical and vocational education and training) decision making bodies, sectoral organizations, public-private initiatives, representatives of companies in the forefront of sustainable development and those actively involved in the implementation of the greening policy agenda. The selection of interviewees and other resource persons primarily targeted economic sectors with the largest greening potential for the economy.

Individuals from various sectors with greening potential were purposively invited for a workshop. Data got from the workshop was used to triangulate information got from focus group discussions and interviews. The institutions consulted include the following:

a). National Environment Management Authority (NEMA)

b). Federation of Uganda Employers' Association (FUE)

c). Ministry of Gender, Labour and Social Development (MGLSD)

d). Ministry of Water and Environment (MWE)

e). Ministry of Education and Sports (MoE)

f). Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

g). Ministry of Energy and Mineral Development (MEMD)

h). Ministry of Trade, Tourism and Industry (MTTI)

i). Ministry of Works and Transport

j). National Forestry Authority (NFA)

k). International Labour Organization (ILO), Uganda Focal Point

l). Private Sector Foundation

m). UNESCO Focal Point Uganda

n). Uganda National Association for Refrigeration and Air Conditioning

2. Policy context

2.1 Key challenges and priorities for green economy

According to NEMA the following are the environmental challenges that the country is grappling with: exponential human population growth, biodiversity loss and habitat destruction, soil erosion due to poor farming practices, pollution of land, water and air, overgrazing, bush burning, deforestation, wetland degradation, poor waste management in urban areas, soil degradation, erratic weather conditions, low electricity production, poor utilization of renewable energy and climate change.

Climate change in Uganda is exhibited by mainly an increase in surface temperatures and erratic rainfall patterns. It is predicted that in 20 years there will be a rise in temperature by 1.5^{o}C and 4.3C by 2080. This has implications on water resources, food security, agricultural productivity, natural resource base, health, settlement and infrastructure. According to the National Adaptation Plan of Action (NAPA), 2007, the following are climate change adaptation and mitigation priority areas for Uganda:

a). Community tree growing

b). Land degradation management

c). Strengthening meteorological services

d). Community water and sanitation

e). Water for production

f). Drought adaptation

g). Vectors, pests and disease control

h). Indigenous Knowledge (IK) and natural resources management

i). Climate change and development planning.

In its efforts to mitigate or adapt to climate change Uganda is experiencing the following challenges: Lack of human and financial resources, unclear mandates of institutions involved, lack of institutional and professional incentives for pro-active action, high transaction costs involved in CDM (Clean Development Mechanism) and lack of committed strong leadership at various level to influence decisions.

According to Ministry of Energy and Mineral Development (MEMD), the demand peak for electric energy will be between 411-649MW by 2010 and the current production is a paltry 317MW which is very inadequate. The demand for charcoal and firewood for domestic use creates immense pressure on forest and woodland resources since production and consumption from other energy sources like oil and natural gas are more or less non-existing. Unutilized biomass estimates per capita are 73 per cent from vegetable matter waste and 5.4 per cent from paper waste. Other substantial increases are projected to include metals, plastics and glass waste. All these demonstrate the untapped greening potential in Uganda's economy.

Despite all these challenges, the Government has the desire to green the economy through the following:

a). Improve electrification from the current 1 per cent to 10 per cent by 2012 to reduce pressure on forest resources that have been the major source of energy

b). Switch from fuel oil to fuel-wood in processing especially agro-based industries since fuel-wood is renewable

c). Improve public transport by encouraging investors to buy buses for city service

d). Design roads with an aim of enabling non-motorized transport

e). Create a suitable environment for CDM

f). Levy environmental tax on imported vehicles and pollution tax on importation of controlled substances.

2.2 The response strategy

2.2.1 Uganda's general environmental strategy

The National Environment Statute of 1995 established the National Environment Management Authority (NEMA) under the Ministry of Water and Environment (MWE) as the overall body mandated with the management of environmental issues. NEMA in consultation with the relevant authorities and stakeholders sets laws and standards for the management and conservation of natural resources and the environment. There are no laws or regulations addressing climate concerns per se in Uganda but relevant regulations are implied in the laws and acts that address environmental resources. The only official document available in addressing Climate change issues is the Uganda National Adaptation Programmes of Action (NAPA) that was launched in 2007.

According to this document, the MWE established an institutional framework to coordinate the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol. It is comprised of a multi-sectoral and multidisciplinary National Climate Change Steering Committee and secretariat that advises the line minister on approval of CDM projects and climate change policy issues. The committee provides an oversight for implementation of the NAPA and liaises with UNFCCC secretariat. The secretariat is also expected to identify potential sources of resources.

Many government departments work together in a coordinated manner to ensure that response measures to climate change are properly directed, acceptable to all and carried out with a national focus. The Department of Meteorology in the MWE is the lead agency in coordinating stakeholder institutions that are involved in climate change issues. These include NEMA, Ministry of Energy and Mineral Development (MEMD), the Department of Disaster Management in the Prime Minister's Office, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), the Ministry of Health (MoH), Ministry of Tourism, Trade and Industry (MTTI), Makerere University, Water Development Directorate, NGOs and UN agencies. They hold periodical meetings and forums to discuss climate change, research and studies, as well as advocacy and sensitization. In the case of the Ozone Depleting Substances (ODSs), there are the National Environment (management of ODSs) Regulations, 2001, which are being implemented. The regulations provide for license system for controlling importation of ODSs into the country. Regulations also list all restricted or banned ODSs (CFCs, HCFCs (Hydro chlorofluorocarbons), carbon tetrachloride, halons, solvents, methyl bromide, and aerosols) and ODS-dependent equipment. They detail the phase-out schedule for different substances as prescribed under the Montreal Protocol (MP), on substances that deplete the ozone layer.

Stakeholders make a national communication to the UN forum and the annual Earth Summit on climate change concerns in the country. The overall aim is to establish a climate change policy as a guideline and blueprint for climate's green action in the country. However, the policy has not been formulated.

The Department of Meteorology in the MWE is involved in forecasting, planning, assessing and providing early warnings on climate change. Projects like the construction of hydropower dams to reduce carbon emissions from other energy sources have been implemented. Industries in the country are also required to install gadgets that reduce on the polluting elements from their production. The Government has also created an enabling environment to investors involved in Voluntary Carbon markets and CDM. The projects promoted are renewable energy, hydropower investment, industrial forest plantations and wood fuel efficiency projects. Currently there is only one reforestation project that is being implemented by the National Forestry Authority (NFA) in association with local community organizations. The trees absorb carbon dioxide from the atmosphere, in exchange for revenues from the World Bank Bio-Carbon Fund paid to NFA and the communities. The West Nile Hydropower project is the only registered renewable energy project registered with the UNFCC in Uganda. In line with CDM, a number of projects have been issued with letters of approval based on Sustainable Development criteria by the Designated National Authority under the CDM regulatory framework. These include: Kakira Cogeneration (energy), NFA forestry project in western Uganda, Kampala City Council (KCC) Municipal Solid Waste Management, Ishasha multi-hydro power project. These projects satisfy the Sustainable Development criteria of conforming to social, economic, environmental and technological aspects of development.

Uganda is signatory to the UN Climate Change Agreement and the Kyoto Protocol. With support from the Global Environment Facility (GEF), Uganda produced its National Adaptation Programme of Action (NAPA) in 2007, as the first step in a bid to address the impacts of climate change.

Studies were conducted and the following were the prioritized interventions suggested by the communities involved to address climate change and the challenges that emanate from it:

a). Promote community best practices of natural resource management

b). Promote tree growing in farmland

c). Promote community best practices of community water resource management

d). Enhance water supply to communities adjacent to protected areas

e). Scaling up water and sanitation using appropriate and sustainable water harvesting, storage and utilization technologies

f). Improve and expand health infrastructure

g). Expansion of weather observing networks

h). Promote use of indigenous knowledge as a coping mechanism

i). Develop and promote drought tolerant and early maturing plant varieties and animal breeds

j). Promotion of multimedia approach to dissemination of weather and climate information

k). Integrate climate change issues into sectoral planning and implementation.

Many of the aforementioned interventions require skills development if they are to be implemented. It is now two years since NAPA was launched but it is yet to be implemented due to lack of resources.

2.2.2 Uganda's green response to the current economic crisis

The world is currently experiencing the most severe economic crisis since before the Second World War. It was triggered off by the financial crisis in the world's greatest and advanced economies. Uganda being a player in the global economy was bound to be affected by this crisis. According to UBOS (2007), the economy of Uganda has slowed down from 9.4 per cent per annum that was recorded in 2005/6 to 2007/08 to about 7 per cent in 2009. According to Bank of Uganda (BOU), this was attributed to the following; weakening of export earnings, decline in

tourism receipts, decline in remittances, reduction in aggregate demand and reduction in foreign direct investment.

According to BOU, Uganda has not been severely affected by the crisis to warrant a policy shift. Nonetheless prioritization of public expenditure to focus on investment, job creation and economic growth and maintaining macro-economic stability are the strategies that the Government intends to put in place to cushion itself from the crisis. The Government strongly believes that prudent and flexible macroeconomic management coupled with smart financial market regulation and risk based banking supervision will ensure the country's survival in this crisis. In the strategies laid out by the Government to respond to this crisis greening economic practices is glaringly absent. However, there is increasing interest in producing more Hydroelectric Power to spur industrial growth that will create more employment. This implies that there will be need for more training in the area of Hydroelectric Power generation. The economic crisis has exacerbated the unemployment problem among the youth and the Government of Uganda in its budget of 2009/10 allocated an additional 3 billion shillings to the Directorate of Industrial Training to implement the programme for provision of vocational skills to the youth who are trainable.

2.3 The skills development strategy in response to greening

Policy-making and Human Resources Development (HRD) in response to climate change and environmental degradation in Uganda

Although there are no policies in Uganda specifically designed to address climate change and the implementation of the Kyoto Protocol - several sectoral policies do provide a basis for addressing climate change concerns. However, their major goal is poverty reduction through environmentally sustainable development as enshrined in the Government vision for 2025 and Poverty Eradication Action Plan (PEAP). The vision 2025 advocates employing cleaner energy sources and technologies to reduce emissions of CO_2 and pollutants that cause acid rain and other environmental problems. The main aspiration for Uganda in vision for 2025 is to have a science and technology driven country. In relation to greening, one of the focal elements of this aspiration include having an adequate well trained number of scientists and technologists in all fields of production and other human activities.

In NAPA, the following actions were suggested to promote greening of the economy; promotion of best practices in water for production use and management, training communities in integrated natural resource management, promoting of appropriate indigenous knowledge in natural resource management and sensitizing and training of local leaders, planners and implementers on impacts of climate change.

Realizing the economic importance of climate change, the Government of Uganda signed a Memorandum of Understanding (MoU) in 2008 with the Royal Danish Government to strengthen the institutional and technical capacity of the MWE. The aim was to coordinate the implementation of climate change issues among line institutions and ministries including the private sector, in accordance with international obligations, and to integrate climate change into research and educational agenda and curriculum. Efforts have also been made to build climate change negotiating skills.

Another MoU will be signed between Ugandan Government and the Belgian Government to strengthen technical capacity on CDM project formulation. Its activities will be based on UNFCCC principle i.e., learning-by-doing (conversion of knowledge into skills) to ensure maximum benefits and value for money. The areas of skill development will include energy generation and energy efficiency including transport, agricultural residual and municipal solid waste management. To green the economy, the skills development policies and strategies for

skills training shall involve technical officers from public, private and financial institutions in decision making.

Currently, the United Nations Development Programme (UNDP) is collaborating with MWE/European Union (EU) as they develop the HRD strategy/report. The report analyzes strategies to upgrade and enhance the relevance of skills training to improve skills of more men and women. This will facilitate the process of attaining higher productivity, employment and income growth, and development. It will also involve identifying the challenges which climate change has on HRD. There will be need for training on assessment and costing of impacts of climate change, vulnerability and communication skills to advocate for supporting greening policy agenda. Skills for green jobs and well designed, market orientated polices can reduce emissions and the costs of adapting to unavoidable impacts of climatic change, while generating economic benefits. For example, Uganda introduced an environmental levy in the 2005/2006 budget. This levy targets used motor-vehicles over 8 years old a 20 per cent levy. Specifically the environmental levy applies to a person who imports used motorcycles, scooters, mopeds, and bicycles and used spare parts of motor vehicles

Skills development strategies and policies

Uganda is one of the countries participating in the UN-Habitat project called "Cities in Climate Change Initiative (CCCI)". With financial support from the Government of Norway and the UN Development Account, this initiative has supported policy dialogue among various departments and implementation of awareness, education, and capacity building in areas of adaptation to climate change. The following activities have taken off in Kampala the capital city in a bid to green the local economy:

- City greening which involves planting of vegetation
- Alternative energy briquette utilization
- Clean wood fuel use
- Climate proofing of infrastructure
- Energy efficient transport system.

Although the aforementioned activities are underway, training of personnel to implement them is still at a micro-level mostly under local and international NGOs.

The major bottlenecks hampering skills development for greening the economy are; financial handicaps, nepotism, bureaucracy and lack of prioritization of climate change issues in critical institutions and ineffective enforcement of the current policies on environmental management. Some of those barriers can be addressed through informal and formal education and training at community level and to higher education.

Institutional coordination in greening the economy

Uganda does not have a definite institution or department mandated to promote greening of the economy. However, NEMA, by law, has the over-arching role of ensuring that the environment is sustainably managed. The policies and laws in the other sectors that may directly or indirectly affect the environment are drafted in close consultation with MWE, with NEMA playing a leading role. NEMA sets standards that developers have to follow as far environment sustainability is concerned. Currently the Environmental Impact Assessment (EIA) is a requirement for any project that can potentially affect the environment. Despite NEMA being the overall institution in charge of environment-instances of collision with other departments are not uncommon especially industrialists interested in utilizing vulnerable ecosystems like wetlands and forests.

Level and types of education and training crucial to promote green skills

Efforts have been made to integrate environmental education in the curriculum from primary to University level education. The Government of Uganda introduced Universal Primary Education and Functional Adult Literacy Programme in order to increase literacy levels that will lay a foundation for disseminating environmental, including climate change, information. Currently climate change issues have been integrated into the various programmes at Makerere University. The initiatives come mainly from the departments where these courses are housed, environment activists and policy makers.

The Government of Uganda also considers community training initiatives as viable options for training its citizens in green jobs. In 2004, Uganda embarked on a large community training initiative to help the unemployed youths and communities to engage in productive activities. The training was implemented through establishment of the community skills development centres one example is Alpha Secondary School & Vocational Training Centre in Jinja. Languages of instruction are the local languages in these communities, considering that the mother tongue is the best vehicle for teaching. The centre helps young people acquire practical skills in carpentry and woodwork, Sewing and tailoring as well as Bricklaying and masonry work. It also offers training in sustainable farming practical skills. In addition, interns, volunteers, and donors work with the Foundation for Sustainable Development (FSD) to provide support for programmes and initiatives that introduce environmental approaches to local communities, such as sustainable agriculture, organic demonstration gardens, fuel efficient stoves, water purification systems, and various agribusiness strategies.

To sustain and promote the industry of green jobs knowledge of sustainable business practices and entrepreneurship needs to be addressed. Greening businesses requires managers to be trained in business practices, management of people, projects, facilities, new technologies, human relationship skills, stewardship, work ethics and character and promotion pathways for employees. These modules are sparsely covered in the business institutions offering business related programmes especially at lower levels in Uganda.

3. Anticipation and provision of skills

3.1 Green structural change and (re)training needs

3.1.1 Green restructuring and its impact on the labour market

Due to burgeoning local and global advocacy on the importance of conserving the environment there is a shift from using equipment that release ozone depleting substances to those that do not release ozone depleting substances. This is demonstrated in the current ban on the importation of used refrigerators and high taxes on used cars. There are new business entities cropping up dealing with new equipment and motor-vehicles that have minimum negative impact on the environment. However, this new trend has left a number of petty traders unemployed since they do not have the economic means to deal in new and clean equipment and motor-vehicles. Even those that have the ability to remain in business have had to cut down their workforce due to poor sales. Ugandans propensity to spend on new clean items is still low-only a few people can afford to purchase new items.

There are various NGOs promoting the use of efficient energy saving stoves. GTZ (German international cooperation enterprise for sustainable development) has been very instrumental in promoting this in rural areas in partnership with the MEMD. The purpose is to shift from the traditional three stones stove that is so wasteful to locally made energy saving stoves. This will

reduce pressure on woodlands and forests whose coverage is dwindling due to excessive fuel-wood harvesting. This has created employment opportunities to a number of rural folks who have the skills of building these stoves. If this trend continues the demand for charcoal will plummet and this may negatively affect charcoal dealers. They will have to find alternative employment opportunities. However, building energy efficient stoves will flourish and new employment opportunities will be created and forests and woodlands saved.

Employment sectors/economic activities on the decline due to environmental degradation

Uganda has lost nearly a third of its forests in the last two decades. Forest coverage was more than five million hectares in 1990, but only 3.5 million hectares remained by 2005. According to NEMA, if deforestation continues at the current rate, Uganda will have lost all its forested land by 2050. Deforestation is attributed to expanding farmland, rapid population growth and increasing urbanization. Forests ameliorate the micro-climate and help check on the agents of soil erosion that would affect soil productivity. All of these will be lost when they are cut down and agriculture will no longer be profitable. About 85 per cent of Ugandans are directly employed in the agricultural sector and all of these are bound to lose their source of livelihood due to deforestation.

Forests provide a suitable habitat for biodiversity and their loss may enhance local extinction of some useful plants and animals. The loss of biodiversity due to deforestation will seriously affect tourism and wildlife conservation since forests are a home of up to 50-90 per cent of earth's terrestrial species. Tourists will avoid coming to Uganda if chances of seeing their most revered attractions are low. This is already observed in Mt. Elgon National park in eastern Uganda which is heavily encroached hence no longer attractive to some tourists. A decline in tourism will be affecting the 387,000 people who are directly employed in this industry in Uganda.

Lumbering, carpentry and woodwork industries have been heavily affected by loss of forests in Uganda. Due to scarcity of forests that can supply adequate amount of timber, former carpenters and artisans have had to find alternative livelihood strategies. Furthermore, forests are a source of raw materials like dyes, medicines, and resins whose industry support a number of Ugandans. They will lose their jobs if deforestation is not checked.

The fall in the water levels in River Nile and Lake Victoria, due to climate change has compounded the problems of clean energy by reducing the amount of electricity generated. Due to low water levels in Uganda's rivers there has been minimum investment in hydroelectric (HEP) projects hence reducing opportunities for job creation in the energy sector.

From the 1960s, an estimated 2,376.6 sq. km. of wetlands have been reclaimed. In addition, wetlands are threatened by drainage and pollution which adversely affect their flora, fauna and avifauna. Wetland degradation has reached a critical level in Uganda where 20 per cent of wetlands in the East have been destroyed compared to 2.8 per cent, 2.4 per cent and 3.6 per cent in Central, Northern and western regions respectively. Wetlands are a source of raw materials for craft making and therefore their loss would make a number of Ugandans unemployed. Wetlands also support growing of certain crops and are a habitat for fish and therefore their reclamation renders people who derive their livelihood from them unemployed.

Declining sectors

There is increasing interest in shifting from use of ecologically unfriendly technologies to clean technology. In the national environment management policy, clean technology is advocated for. This probably could be a result of Uganda's commitment to global environmental

sustainability treaties. Using technologies that can destroy ozone is unlawful in Uganda unless permitted by an authority.

The employment implication is that as soon as attempts are made to make these technologies eco friendly the net effect will be reduction of activities in these sectors as it will make them less viable. The skills implications is that chemists in laboratories [laboratory technologists], industrial chemists[operations managers], fitters in the aerosol sectors and architects [builders, fitters and civil engineers] have to be skilled in the new non ozone depleting approaches in production, building design, basic fitting and refilling of aerosols and extinguishers to ensure its eco- friendliness.

3.1.2 Identification of (re)training needs

Participatory rural appraisals involving key informants were employed at national and sectoral levels in determining (re)training needs considering the green structural changes that the country is experiencing. The following were identified as (re)training needs required in the country:

- Training of more personnel in chemical engineering to develop technologies that are eco-friendly to discard obsolete technologies that release substances that may destroy ozone,
- Training and development in energy efficient technologies to reduce pressure on forests and woodlands,
- Training in generation of energy from renewable sources like water, wind and solar and training in managing green businesses.

Improvement of the environment is one of the major areas that require chemical engineers. The treatments of gaseous, liquid, and solid effluents from power generation and from the oil industries all need chemical engineers. Uganda has recently discovered oil in western Uganda and it is tipped to produce about 100,000 barrels per day according to the MEMD. Chemical engineers skilled in designing technologies that minimize leakages and emission of gases that may destroy the environment from oil drilling and refining will be needed to ensure environmental sustainability. Oil drilling and refinery if not environmentally planned can result into environmental challenges like smog which affects air quality, oil spills and acid rain. All of these can be avoided if Uganda has a reliable well trained workforce in chemical engineering.

Uganda has a number of renewable energy sources that are yet to be harnessed despite the current energy crisis. According to the national renewable energy policy, the Government has a desire to increase the use of modern renewable energy from the current 4 per cent to 61 per cent of the total energy consumptions by the year 2010. The sources include; biomass, geothermal, hydro, wind, peat and solar. All of these according to the policy can produce 5,300MW. According to the Centre for Research in Energy and Energy Conservation (CREEC), a project running at the faculty of technology, Makerere University there is need to do the following to fully exploit renewable energy potential in Uganda.

- Educate people in renewable energy systems through short courses, demonstration projects and awareness programmes throughout the country.
- Train people in renewable energy systems maintenance, design, installation and efficient use of energy.
- Train people in specialist courses in renewable energy systems at diploma, degree and postgraduate levels.

Improving on energy efficiency is one of the interventions that the Government deems appropriate to overcome energy deficit that the country is currently experiencing. This is partly

because conventional energy sources are finite and may be detrimental to the environment. According to the energy efficiency strategy of the MEMD, the Government aspires to reduce on use of fossil fuels that contribute to emissions that have been found to cause global warming and climate change. In this strategy, the Government considers training of energy managers and consulting engineers on energy efficiency as areas of intervention.

There is need for training energy managers who can detect sources of energy loses in organizations and strategies for minimizing them. Consulting engineers need to get further training to design technologies that will improve energy efficiency in structures.

It is envisaged that with the aforementioned training other energy sources that have potential to damage the environment especially contributing to green house gases that may cause global warming will become obsolete.

3.1.3 Skills response to green economic restructuring

Kyambogo University has reviewed her curricula in the various certificate, diploma, higher diplomas and degree courses to equip students on techniques of energy waste detection, monitoring, clean energy fitting and enforcement. New programmes have also been mounted to cater for green economic restructuring that the country is experiencing and these include: ordinary diploma in refrigeration and air conditioning, water engineering, electrical engineering, and civil engineering. All these programmes have three levels i.e. ordinary diploma, higher diploma and degree apart from refrigeration and air conditioning. Kyambogo University has also introduced Bachelors degree programmes in industrial engineering management, environment engineering and management and environmental science technology and management. The university has an arrangement for those whose training is no longer relevant through greening the economy by its having different levels of training.

At the Makerere University, the Faculty of Forestry and Nature Conservation in its three programmes the BSc. Forestry, BSc. Wood Science and Technology and Bachelor of Community Forestry emphasize developing of energy efficient technologies when using biomass. The graduates have skills on how to utilize biomass that is always wasted for energy use. These programmes are currently funded privately or through government scholarships.

The Faculty of Technology, Makerere University, is currently hosting a project on renewable energy use. They train students and local communities on use of solar energy and also have developed locally applicable solar lamps that can be used instead of the traditional kerosene lamp that contributes to pollution of the atmosphere. A Masters Degree programme in renewable energy has been mounted at the Faculty of Technology, Makerere University.

Delivery/provision channels

These are some of the delivery provisions that could be put in place, however, at the moment they are yet to be implemented:

- Early warning system
- Systematic and planned targeted trainings
- Use of institutional mechanisms and structures like government ministries and departments.
- Use of the private sector and market mechanisms e.g. incentives
- Use of training institutions, universities and colleges to deliver these green collar skills through mounting academic programmes and awards

The only delivery channel of the training has been through academic institutions and NGOs yet the demand is high. There is need for exploring other avenues of delivery as suggested above.

3.1.4 Case studies

An overview of employment in Uganda

In Uganda less than 5 per cent of workers are under permanent employment, according to the latest figures of the Uganda Bureau of Statistics (UBOS, 2008) and the percentage is dropping. Whereas 4.8 per cent of workers had permanent employment in 2003 this declined to 4.5 per cent in 2006. Almost 12 per cent are in temporary employment, while the majority of Ugandan workers or 83 per cent are self employed mainly in the agricultural sector. The percentage of self employed increased in recent years from 63 per cent in 2003 to 70 per cent in 2006. These are people who employ themselves in all sectors although the majority are in agriculture.

The large numbers of persons in the labour force in rural areas exert pressure on the natural resources which may lead to desertification, land fragmentation, deforestation and soil degradation (UBOS, 2009). Uganda's working age population stood at 13 million in 2006 and it is expected to rise to 17 million in 2011 and above 21 million by 2017. In terms of education levels, close to 77 per cent of the labour force had either primary education or no formal education at all. This explains the low productivity as the majority of the labour force does not have skills.

Only 5.6 per cent of the Ugandans labour force had higher education. A recent report by the Public Service Commission stated that Uganda's labour market can only accommodate 50 per cent of University graduates. Of the more than 500,000 Ugandans who enter the labour market each year, only 113,000 are absorbed in formal employment and the rest have to join the informal sector. Broken down according to age, three quarters of all Ugandan workers are below 40 years of age. Therefore Uganda is characterized by a young, untrained and rural labour force (UBOS 2009).

(a) Case study 1: Brick burning

Wood is the main source of energy in impoverished and rural areas, nearly exclusively relied upon as cooking fuel and building material. Clearing trees for agricultural land use as well as firewood and charcoal collection are the two biggest reasons for deforestation in Uganda. Throughout Uganda, brick burning structures can be found interspersed with the small business owners, artisans and farmers who set up shop along main roads and highways. Ugandans use these dome-like structures as kilns to burn the clay-based bricks used for building. Trucks loaded with local trees are characteristic of Uganda's main roads and highways, delivering them to the kilns as firewood burned in the brick drying process (Kezimbira Miyingo, 2002)

Traditional methods of brick making in Uganda comprise of taking a clay based mud and making a square block by hand, they are approximately the same size as any other brick elsewhere in the world. The problem is that because they are made by hand they are not a consistent shape, and they come in a variety of sizes. The half-dried moulded bricks are then put into a pyramid stack with a gap in the middle where a fire is lit; the top of the pyramid is covered with banana leaves and dry grass (a handmade Kiln process). The bricks are then fired for a constant 96 hours with fire from wood, and are left to cool for 4 days. The bricks are then stored for 4-6 months before they are used. The United Nations Food and Agriculture Organization (FAO) estimated that the forestry cover in Uganda has shrunk from 45 per cent to 20.3 per cent of the total land area (loss around 1,297,000 hectares) since 1990 to 2005. The annual rate of depletion is estimated to be 2 per cent, which is increasing each year. With a growing population putting strain on the land, an urban demand for charcoal, harvesting timber wood faster than it

can be replenished and the lack of governmental planning and regulation to further prevent deforestation, Uganda's forests are facing a serious threat of complete devastation. Continuing to unsustainably harvest trees poses an enormous threat to food production and the livelihood of many Ugandans. Climate change characterized by unstable weather patterns such as severe flooding and drought are already creating mass famine and disease.

Brick burning activities using fire wood will have to become obsolete because of depleted forests and trees from the environment. The demand for these skills will decline since the brick burning business will no longer be profitable. It will not be cost effective to buy wood from tree farmers to perform these activities because it will be costly considering the input from tree farmers. It will only be cost effective for those buying timber for building. It is also driven by policy as there is no cutting of trees from forest reserves and wood transportation from one place to another is prohibited unless the dealer is licensed. The number employed could not be exactly got because they are not registered but what has been observed is that brick making too many is a part time job except to well-established enterprises. It was observed that a land owner or someone who has hired the land employs people to produce say one million bricks. This can take say one month after that they become jobless for a period say three months or so. The types of occupations include pit sawyers, brick makers, brick burners, transporters of wood for burning bricks and transporting the bricks

Identification of retraining needs

These training needs have been identified from the trends of the shifts in employment towards greening whereby there is a need to supply building materials (bricks) and energy for cooking. A number of local and international non-governmental organizations (NGOs), individuals have identified the training needs, like Haileybury Youth Trust. The conclusions were, to train brick burners in using methods that are energy efficient that use less wood, to train in other methods of brick making that do not use firewood, like those that use straw, industrial waste and other byproducts and lastly to train in making bricks that do not require burning. This is for the building sector under the Ministry of Housing and Urban Development. The methods used in identifying the retraining needs included interviews, check lists, assessment of the needs, observations of what is being produced and its effects on the environment. The stakeholders involved included the brick makers, the buyers of bricks, the local councilors, local government and the training institutions.

The new skills for these environmentally friendly brick makers should include efficient brick burning methods that conserve energy, skills in utilizing industrial waste, byproducts and other wastes in brick burning and lastly skills in making bricks without burning them.

Skills response

There is need to train in other methods of brick production. Dr Moses Musaazi, an engineer at Makerere University in Kampala, has developed a technique which, by mixing soil and cement and then compressing the dampened mixture in a mould, produces an interlocking block (twice the size of a normal brick) that is stronger and more uniformly shaped than a conventional brick. Dr Musaazi says: cutting down trees for firing bricks is second to charcoal burning in destroying Uganda's forest cover. The adoption of this technology will dramatically reduce this environmental damage. The new machines make bricks from a specific soil called murram, cement and water. It takes two people to operate and can produce 300-400 building bricks in an 8 hour day. In the traditional practices one person can be able to produce up to 500 bricks in 10 hours although it is labour intensive, it has to be dried in the sun, it has to be turned and it is prone to damage by rain. On top of all that they are also interlocking which saves on cement costs in between bricks. Several teams of Soft Power Builders have been trained in the process in association with the Haileybury Youth Trust. Soft power education is a British charity and Ugandan NGO working with communities in Uganda to improve quality of life through

education. They are involved in building schools as they build the schools they make bricks on-site at the same time training youth in brick making. These are short training courses of two weeks offered by this organization and this has been done in various localities in the country. These are tailor made practical training programmes to impart practical skills. They extend the potential of educational centres to adult learners and through partnership bringing conservation to the classroom. It was supported by well wishers and donations got from individuals. The number of people so far trained was not disclosed but at the time of interview they had built three schools. Other skills response is the hydraform which is an eco-friendly building system because the bricks do not need burning, thus saving fuel. It is cost-effective, labour-intensive and ideal for use in both remote rural areas and high-density urban areas. It is cheaper to use the interlocking blocks (bricks) than bricks because these do not need mortar and plaster. One can save up to 40 per cent on cement and labour when using the interlocking brick compared to when using ordinary bricks. The training programme is making of bricks that do not require burning. The new skills here include making of bricks with less cement than the traditional ones, skills in the mix designs, the percentages of the mixtures used, the brick making process and also skills in making interlocking bricks that are smooth surfaced There will be two employment shifts one will be from the traditional methods to the hydraform but this will be a small percentage of people because the bricks produced by this method are very expensive they will only be afforded by the rich. These will require the above mentioned skills. The other shift will be from the traditional brick making methods to other jobs as part of their market has been taken over by the new technology. This will be to other closely related activities, since most of this is done by people in rural areas most of the shifts will go into farming. Hydraform walls contain up to 50 per cent less cement than conventional cement brick walls. The hydraform brick is 10 times stronger than a brick and is bullet-proof. This makes them ideal for security boundary walling. Hydraform brick making machine is portable. Thus it reduces the transport cost of building materials because blocks can be made on the building site. There are two types of hydraform brick making machines the manual ones and the motorized ones. Several new motorized hydraform brick-making machines have been donated to the youth in northern Uganda. These are areas that are recovering from the effects of war, people are returning back to their homes from camps and the government and other organizations are supporting them to settle. About 100 interested jobless youths from northern Uganda were selected and trained on how to use the hydraform machines. Each motorized machine can produce about 3,000 blocks per day. In two days, the youth can produce enough blocks to build a simple three-bedroom house.

There has been uptake of brick making by others and there were more people trained, however, they could not get the hydraform machines to use in the villages they came from. They have the skills but they cannot apply them. The other issue mentioned is the cost of the bricks which is far higher than the ordinary villagers can afford this limits the number of people to be employed in making these bricks in their locality.

b) Case study 2: Public transport

Transportation is a key component of economic development and human welfare. An efficient transport sector plays a crucial role in the enhancement of Governments' strategy of poverty reduction and economic integration of the economy. Urban transport as in many other African capitals is a crucial element for smooth functioning of economic activities. This is so because most of the industries, central administration services and commercial sectors are located in the capital city.

In Uganda, road transport is the major transport mode constituting over 80 per cent of the transport sector. The output of transport and communication activities in Uganda increased by 20 per cent in 2008/09 compared to an increase of 21.3 per cent in 2007/08. The transport sector is also recognized as a major contributor to an extensive range of undesirable environmental effects. Due to lack of mass public transportation most people travel by individual cars, mini commuter buses, motor bikes, bicycles and foot. Traffic jams and subsequent delays in reporting

to work places are common headaches for most people but also there is a lot of pollution. In Uganda the drivers of greenhouse gas emissions in transportation include, increased rate of urbanization and urban population growth, increased rate of motorization with increase in number of vehicles dominated by second hand vehicles, especially with the shift in the structural composition of vehicles with increased 4- wheel drives and personal cars and also with increased vehicle kilometres travelled and lastly the share of public transport is extremely low. According to (UBOS 2009) structural composition of vehicle stock in 2008 included 236,452 which is (50.3 per cent) motorcycles, 90,856 (19.3 per cent) cars, 58,317 (12.4 per cent) pickups and four wheel drives, 49,235 (10.5 per cent) minibuses, 28,501 (6 per cent) trucks (high capacity trucks), 3,306 (0.7 per cent) agricultural tractors, 1,237 (0.3 per cent) buses and 2,584 (0.5 per cent) others. Estimates of vehicle kilometres in Uganda in 2003 showed that there was increased movement of vehicles compared to the year 1996.

Summary of vehicle kilometres

Type of vehicle	Year 1996	Year 2003
Car and taxis (special hire)	356,550,960	817,400,000
Light good vehicles (including 4 wheel-drive)	73,100,000	785,800,000
Minibuses and taxis	226,740,000	752,200,000
Buses	54,060,000	59,200,000

Source: Ministry of Works and Transport, 2009; trucks and motorcycles are not shown here.

The Government has plans to remove motorcycle taxis (*Bodaboda)* and commuter taxis off the city streets and introduce a city bus service. It has also directed heavy vehicles away from the city centre to the newly opened northern Bypass. This is to reduce congestion in the city and cut down on emissions since buses would take more people than commuter taxis. There are so far a couple of buses to the major outskirts like Mukono, Bweyogerere, Gayaza, Luzira and Entebbe. The number of buses is still low to cater for transport needs especially at busy hours of the day. Nevertheless this has created competition and some commuter taxi owners have had to abandon routes that have buses. Government has encouraged taxi owners to set up cooperatives and purchase buses. They have also encouraged them to ply routes that do not have buses on them so as to reduce congestion. Many of the workers who lost their jobs due to introduction of buses have become touts and conductors to guide passengers. The main organization of the commuter taxis Uganda Taxi Operators and Drivers Association (UTODA) has started other income generating activities like opening large chunks of land for farming to cater for drivers that have lost their jobs. The occupations are the drivers, transport managers in all government sectors, parastatals and all owners of vehicles

Identification of retraining needs

The transport industry is mostly dominated by men probably because Ugandan society is patriarchal. Most of the bus drivers have basic education of up to secondary school and have learned driving buses on job. There is need for more skilled and experienced bus drivers for this growing sector. There are currently no estimates available on number of bus drivers that will be needed if the all major towns switch to buses from omnibuses. Skill needs identification was done through direct observation of the situation, participatory rural appraisal, discussions, desk reviews, and consultations with the various stakeholders. And the following skills were identified, skills in the driving of large buses, servicing of the buses, bus maintenance and also awareness creation about green house gases. There is also need to sensitize the public, transport managers in the various organizations about the green house gas emissions in the transport sector

and their effect on the environment with advocacy towards use of public transport, car sharing and in use of non motorized means of transport like bicycles.

Skills response

There is no eminent training availed to those people whose livelihood is based on motorcycle and commuter taxis. Once buses are fully operational in the city they may have to relocate to other areas where they can be allowed

3.2 New and changing skill needs

Uganda is gradually greening its economy and if it is to be successful the following skills ought to be in place: improving energy efficiency, calculating the carbon footprint in the wholesale retail chain, industry and other occupations, transferring from declining thermal powered manufacturing, service and home heating industries to the new green collar sectors, agricultural skills adaptable to climate change and skills in harnessing energy from biogas.

3.2.1 New green collar occupations

Agricultural sector

Mitigation will not solve the problem of climate change completely. Because of long time lags built into the climate system to the extent that substantial CO_2 and other greenhouse gas emission has taken place for about 200 – 300 years. Mitigation of climate change cannot have a significant effect on curbing the effects of climate change on agriculture rather, there is need for both adaptation and mitigation practices in order to be able to sustain agricultural development. To this end, country practices for protection of agriculture from the impact of climate variability, aim at ensuring sustainability of community programmes; and production systems, expanding agricultural research into suitable adaptation practices. Uganda is experiencing erratic rainfall patterns and therefore occupations in the area of adaptation of agriculture to climate change will increase. There is need for more researchers in the field of agriculture that will develop varieties that can withstand the vagaries of climate change especially drought and floods. New jobs will be created in the area of developing agricultural technologies that can ensure maximum productivity amid the challenges of climate change. There will be need for new breed of soil scientists, plant and animal breeders and pathologists who will enable maximum agricultural productivity amid climate change scenarios.

Meteorology

One of the ways of adapting to climate change is getting timely and reliable weather information. More meteorologists will be needed to provide early warning, to develop models for climate prediction, organizing trainings, public notifications and advising on climate. There will be need for specialists in using satellite and internet climate related data as well as dissemination of the climate prediction data.

Environmental impact assessors

The Uganda National Environmental Statute of 1995 requires all individuals, companies or organizations whose activities or projects can potentially affect the environment to carry out Environmental Impact Assessment (EIA). It is a systematic examination conducted to determine whether or not a project will have any adverse impacts on the environment. It is used to identify and assess the potential impacts of a proposed project (activity), evaluate alternatives and formulate appropriate mitigation, management and monitoring measures in form of an environmental management plan. There is increasing need for Environmental Impact assessors,

considering that it is a legal requirement. The developers whose activities are likely to cause a significant impact to the environment provide project briefs to the appropriate consultants who conduct the study and prepare an Environmental Impact statement that is approved or disapproved by NEMA. There is increasing need for environment impact assessors considering that the government is cautious on any project that may render the country vulnerable to climate change

Solar technicians

Solar technology is one of the alternatives to dwindling hydro power energy, rising costs of fossil fuels and emissions resulting from use of petroleum products. This means solar technicians are at the forefront of greening tropical economies where there is plenty of energy from the sun's insolation. This is especially true in rural areas where this clean source of energy is the only available source in the absence of hydro and thermal power. Most rural health centres, schools and communal infrastructures in Uganda are using solar power. There will be need for more technicians in efficient solar panel installation and battery maintenance which are vital in minimizing energy loss.

Energy assessors

One of the ways energy is lost is through wastage, misuse and theft. In Uganda homes and manufacturing plants involved in power theft are usually very wasteful of power. Energy Assessors of domestic and industrial production are therefore of vital importance in the economy as they detect power/ energy losses through illegal connections and inefficient transmission and distribution and the use of inefficient technologies like inefficient cooking stoves, fire places, rudimentary kilns and stoves in homes and industries. These will be able to advise relevant institutions on strategies of minimizing energy loses.

Green collar technology installers, clean electricians and retrofitters

These are important in fitting energy efficient fittings, technology and electric installations like wiring transformers, switchgear and heaters. Refitting is of special importance for old buildings, physical facilities and premises which had not been built with energy conservation in mind to reduce the energy losses. These are especially vital in old buildings. In the construction sector they use mechanisms like detecting energy wastage, negative vent pressure, induced draft, sealed combustion furnaces, air conditioning systems, venting, insulation and home energy saving. These are yet to be exploited in Uganda.

Green collar pipe fitters, plumbers and clean-energy auto manufacturing line workers.

These are especially important in ensuring that pipe fittings, plumbing and assemblage systems optimize energy use. They should have ability to prevent energy loss and minimize the effects of the carbon footprint in the whole chain of domestic housing, manufacturing industry and other occupations. In plumbing; heat exchangers, heater systems/venting, insulation and home energy saving are important. With the increasing interest in saving energy technical people in this field will be needed.

Green accountants/auditors

These should be able to find out about the efficient use of energy in the context of the public investment in energy generation/development and the consequent efficient use of the energy. By using a cost benefit schema and a value for money approach they can assist in plugging energy losses and misuse. There is potential in green auditing despite that fact the industry does not exist in Uganda.

The major sectors for green occupations

The major sectors for greening are:

- agriculture
- energy
- water and environment
- manufacturing industries
- transport
- trade, and
- forestry.

Agriculture has massive potential for greening through employment of clean technologies in production like organic farming. Employment opportunities in organic farming are yet to be fully exploited. Uganda's demand for energy is on the increase yet there are still many untapped sources that can provide clean energy, however, there is lack of personnel to harness it. Environment sustainability is one of the areas that the Government considers strategic for spurring economic growth. This provides an opportunity for people trained in environment management to work as advisors or technical personnel in promoting environmental sustainability.

Public transport is mainly by commuter taxis and buses for distant areas and this contributes to emissions. However, if the Government introduced electric trains and trams for the city, it would greatly reduce on the number of people driving personal cars and would also create new employment opportunities for those working in that industry.

Manufacturing industries are by law required to ensure that the by-products from their production are not harmful to the environment. This provides an opportunity for more environmental engineering professions.

There is currently increasing interest in paying for environmental services. Forest owners need trained people to establish amount of carbon sequestered by their forests so as to get a fair premium from carbon buyers.

Using renewable energy to drill crude oil is becoming popular. Chevron, a foreign oil giant multinational is shifting the pumping of oil from diesel powered pumps to solar pumps using giant mirrors to concentrate the sun's rays into a water tank and turning the water into steam; which in turn turns a turbine to produce electricity to pump up crude oil or to loosen and heat it up when it is too heavy. The challenge the oil company is finding is when it is too cloudy to generate enough heat and power, the occupation here could be fuel solar technicians.

Tree planting by private farmers to reduce pressure on existing natural forests is another growing industry. There will be need for more trained and skilled people in forest plantation management.

With the change and emphasis on clean energy there is a new technological revolution involving new plants producing blades and towers for wind power companies from the old factories producing electric washing machines and motors. This creates potential employment for wind power technicians and engineers. Furthermore, the photovoltaic technological revolution has spawned new industries producing solar panels, batteries and associated equipment; as opposed to former factories producing diesel generators, electric motors, turbines, and fossil fuel

based equipment and machinery. This would also create employment for individuals trained in photovoltaic technology

The following are the required technical and generic skills and competencies:

- Clean energy manufacturing technical skills; spanning wind, solar, geothermal energy all covering energy conservation and efficiency are needed to promote employment opportunities in the renewable energy sector.
- Ability to initiate and draft legislation intended to curb greenhouse gases and invest billions in developing wind and solar energy. This is to equip public policy practitioners with technical information necessary for designing effective renewable energy policies
- Ability to influence the private sector and the market forces to utilize existing opportunities in building the equipment to power the nation with alternative energy. This is to create more opportunities in alternative energy industry.
- Skills to manufacture new equipment to generate power from lake waves.
- Competency to produce new programmes to encourage entrepreneurs and help existing manufacturers retool, to produce equipment to meet the new standards
- Skills to mount economic programmes to fund draw state economic development loans and grant to new green collar enterprises.
- Competence to build wind turbines and installing those turbines or attaching the turbines to a smart national electric grid.
- Skill and knowledge to make renewable energy practical and dependable. The biggest challenge has been how to store electricity for days when the sun isn't shining and the wind isn't blowing. New technology and skills to do these are essential.
- Competency to retrofit older buildings and constructing new ones which are more energy efficient to save on consumption and costs of hydro electric power.

Gender composition in new green collar occupations

In Uganda, most of the green collar employment opportunities are occupied by men. This can be attributed to low interest in studying what society considers men's professions e.g. engineering. However, there are many women practicing organic farming which seems to be the only green employment where the number of women is higher than men. The renewable energy industry is mostly dominated by men.

3.2.2 Greening existing occupations

Introduction

The occupations that tend to become greener include new skills for improved energy efficiency, plastic and polythene materials recycling, soil conservation methods, renewable energy like solar and biofuels and education.

The current energy loss in Uganda is put at 31 per cent according to the Electricity Regulatory Authority (ERA). This is due to poor energy transmission and insulation. For instance a lot of electricity generated is lost due to substandard, illegal, archaic transmission, transformation and distribution systems. This is compounded by inefficient energy use especially in domestic use. This demonstrates that there is need for skills development in the area of reducing generated energy and efficiency in energy utilization. There are no academic programmes at lower education level targeting improvement in energy transmission and efficiency in use apart from the recently-mounted programme of Masters of Renewable Energy at

the Faculty of Technology, Makerere University. There is need for more institutions at vocational and university level to develop programmes that will build capacity in energy efficiency.

Plastic and polythene are the most commonly used materials for preservation, packing, collecting and wrapping miscellaneous materials. However, most of them are disposed off after a single use yet they are non-biodegradable. There is a burgeoning interest in reducing plastic material in the environment due to the associated negative effects. The Government has encouraged investors and NGOs to recycle plastic materials. There are a number of women groups making crafts from used plastic materials, however, there is lack of adequate training to effectively utilize all wasted plastic in the country. It is only those lucky groups with training that can utilize waste plastic. There are also private companies involved in recycling plastics especially beverage and water bottles. There are still few individuals in the country that have technical skills in operating such industries.

There is an emerging interest in implementing green friendly practices in agriculture for instance sound soil and water conservation practices; use of better natural soil fertility measures like crop/grazing rotation, Natural pest/parasite and disease control approaches like use of natural predators on pests, increased use of organic matter and the effective use of livestock wastes to preserve soil fertility instead of using artificial and ecologically destructive agents. There is lack of skilled personnel in the area of biological pest and disease control and organic farming practices yet these are becoming the globally revered approaches of farming.

Training on the importance of greening is now emphasized by the Government at all levels of education. However there are few well trained and skilled instructors on emerging environmental challenges that the country needs to tackle. There is a need to improve on the curricula to incorporate greening course modules in the training at primary, secondary and tertiary level. This will require more instructors trained in the field of greening.

Growing of trees for environmental services is an emerging green occupation in Uganda. Tree farmers are selling the carbon sequestered by their forest to voluntary and clean development mechanism markets. This industry has aroused interest among investors however they are experiencing challenges in getting skilled personnel in the area of carbon estimation and marketing. The country does not have adequate trained and skilled people in estimating carbon sequestered by different forest ecosystems. This has left tree farmers relying on international experts who most often times are middle men that sell the carbon.

Sectors that are greening in Uganda

Uganda has ratified many international environmental sustainability conventions and this has had a profound influence on certain sectors necessary for her growth. The following sectors are steadily getting green due to international and local demands; i.e. energy, forestry, agriculture, transport and waste management.

Agriculture which employs over 85 per cent of the population is one of the sectors that is astronomically turning green. Organic farming is increasingly becoming the most popular way of farming. This is because of the readily available markets for organic products and advocacy of organic movements. Most of the organic farmers are rural based and are small-scale. However they form associations to which register with the national umbrella one called NOGAMU (National Organic Agricultural Movement). This is mandated to certify the products from its members and sourcing for local and international markets. With the increasing awareness on environmental sustainability hence demand for organic products - organic farming is a sector that is bound to grow by leaps and bounds in Uganda. Most of the people employed in organic farming are not formally educated however a few involved in management have trained in marketing and attended short courses in organic farming. In order to fully exploit the potential of

organic farming there is need for farmers to get training in some basic principles for instance pest control and maintaining of soil fertility using organic procedures.

The energy sector is also one of the areas that is undergoing greening. This is evidenced by the path that the MEMD is undertaking to curb the energy deficit that the country is experiencing. The Ministry targets renewable energy sources as an answer to the energy crisis instead of the conventional ones like fossil fuel that have detrimental effects on the environment. Private companies involved in energy generation are encouraged to invest in renewable energy. It is both large- and small-scale investors that the policy on renewable energy targets in improving the energy supply in the country. Most of the workers in this sector are both higher and lower training. Technicians, engineers, auditors, surveyors and accountants are all needed in this sector. Engineers need to have at least a degree while technicians may have a diploma in relevant training. Despite the growth of this sector there are still few training opportunities in renewable energy in the country. Renewable energy engineers are still few in the country and the few available ones are international expatriates mainly composed of men.

The transport sector is also becoming green. There is a trend of minimizing use of omnibuses that take only 14 people to use of buses in the city. This trend is bound to continue since the Government aspires to reduce congestion in the city and emission of greenhouse gases. Taxi owners are being encouraged to buy buses to fit in the new Government proposal. This is envisaged to improve accessibility in the city and minimizing of greenhouse gas emission in the country.

Waste management sector is also undergoing greening. There is interest in recycling certain wastes especially plastics and therefore there will be need for more chemical engineers and industrial chemists to develop models for making plastics that can be recycled. Recycling has been mainly an occupation in the capital city by large companies involved in plastic manufacture. However with increasing interest in clean environment other municipalities are bound to need skilled people to recycle their plastic wastes. Currently the people employed in this sector are a mixture of semi-illiterate and literate. The greatest skill gap is chemical engineers who can man the recycling plants. This trend will reduce amount of plastic deposited in the environment and will have positive economic implication to the manufacturers since raw materials will be readily available.

Qualifications and the level of educational attainment

The green skills development may not lead to any advanced qualification but the level of attainment which will be awarded will be certificates of attendance of the skills attained or even diploma depending on the individual being trained. In the sectoral training for capacity building in the various ministries higher degrees like masters and above may be attained for instance Master of Renewable Energy that has been introduced at Makerere University. The role of this technological change and innovation will be creation of new skill demands since the advance in technology requires new skills. For instance recycling plastic will need technological advancement and skills development in recycling. The current energy crisis in Uganda which is partly caused by poor energy transmission, insulation and inefficient energy use can be solved by developing skills in efficient energy transmission and energy utilization technology. These require both technical and advanced training up to PhD. A shortage in the supply of personnel trained in assembling solar panels, production of biofuels and waste recycling is one the biggest challenge encountered in greening Uganda's economy. The desired qualification for these skills is both at tertiary institution and vocational level. On job training is equally relevant.

3.2.3 Identification of skill needs

Small and medium / large-size establishment for each sector with a possibility of greening its occupations were consulted using the following methods: Interviews, check lists, direct

observation, participatory rural appraisal, studying business plans, documentary analysis, impact assessment reports and field studies. The study found out that in Uganda the need for green skills is mainly as a result of environmental challenges that the country experiences. For instance the current energy deficit that the country is experiencing influenced the Government to put in place avenues that would increase energy output from other sources other than the conventional sources that could potentially damage the environment. Local and international NGOs interested in environmental sustainability have a significant influence in identifying green skills needed in the country. This is through introduction of green occupations and advocacy for greening the economy.

There is currently no institution not even the Ministry of Gender, Labour and Social Development (MGLSD) that has a mechanism of anticipating future market demand for green skills. Institutions and companies involved in green occupations do not have models developed to predict their future green labour demands. The Uganda Investment Authority (UIA) - a semi-autonomous government agency operating in partnership with the private sector and government to drive national economic growth and development equally does not have a mechanism for predicting green jobs in the country. However, UIA projects employment opportunities regularly based on number of companies licensed. These projections unfortunately are not stratified to establish green occupations.

Organizations involved in green occupations identify green skills that they will need and conduct prior training. However, the MEMD has been outstanding in identifying skill needs in the renewable energy sector. They identify skills that will be needed in the sector of renewable energy in the strategic plan and policy. Universities are identified as responsible for training. Currently the Faculty of Technology, Makerere University, is offering courses ranging from certificates to masters degree in renewable energy.

Universities through interfacing with the private sector identify green skills needed in the market place and reorient their curricula. However there was no evidence that there is a deliberate interest in identifying green skills per se. Universities design their curricula to satisfy the demands of the market and unfortunately green employment is still at infancy in Uganda. In the ideal situation, the Uganda Investment Authority (UIA) and MGLSD)should have a mechanism to project skill need in various sectors since they are directly linked to employers unfortunately this information is not available.

The general labour market information status report is usually prepared by the MGLSD using the national household survey conducted by UBOS. This report, however, does not stratify the employment sector to include green occupation as an identifiable sector.

3.2.4 Skills response

Harmonized education and training systems are necessary to meet challenges faced in greening the economy. The mobility of researchers should be seen as a means to develop joint programmes of activities that will support effective activities to greening. In addition to science and competency, the education sector uses additional soft skills like teaching in local languages, knowledge management and transfer, research governance, sensitivity to country policies, understanding of and responding to societal needs and economical requirements, as well as communicating research and innovation.

There are a number of specific sectoral initiatives, policies, innovations, programmes and projects in education, economic development, science and technology as well as governance. In order to improve energy efficiency in Uganda, the Ministry of Education and Sports has made curricula changes to emphasize energy efficiency at all levels of education. This initiative has been supported by the Energy Efficiency and Conservation Department.

There are a number of local entrepreneur artisans who are training the local population and giving them skills to produce energy saving stoves and making briquettes which are got from rice husks, coffee husks among others and are used as charcoal and there is a high demand for these stoves and briquettes. Training on identified skills has mainly been spurred by development partners working with training institutions especially universities. Currently skill training is being conducted at higher degree level in universities.

Makerere University which is the oldest university in the country together with its international partners has responded fairly well to the green skill needs in Uganda. The major green sector has been in renewable energy, energy efficiency and organic farming. In order to support these sectors new programmes and short courses have been mounted to produce graduates that will adequately support the new occupational challenges.

Unlike in the past most public universities prioritize the input of all stakeholders before a programme is mounted. The National Council of Higher Education requires that before senate approves a programme it should have substantial input from relevant stakeholders. A case in point is the master of renewable energy at Makerere University which was developed with an input from both local and international stakeholders. The purpose is to have a programme that is demand driven. However the challenge universities have is lack of resources to do research to solve all technical problems faced by the private sector yet there are no arrangements where the private sector funds research. Despite the challenges the current crop of graduates in green skills are finding it easy to penetrate the employment sector because their skills are required. Most universities require students to have internships to provide them with practical skills in their areas of interest.

The efforts to build capacity for emerging need for green skills is still localized in colleges, universities and departments with local and international partners interested in greening the economy. Most of the new skills that have been a result of greening the economy in universities are solely private and this has implications on the number of students enrolling. This is despite the fact that some of them are offered in public universities. The number of graduates produced per year is still low considering the market demand. There is also a challenge of inadequate capacity for training. Green occupation is a new field with very few nationals having expert knowledge to train others. The country is heavily relying on international experts in training its citizens in green occupations hence a challenge for training institutions. Because of this situation there will be need for fast tracking training of trainers if the green economy is to be sustainable.

Considering the fact that green occupations are just emerging in the country there were very few companies/organization to establish their opinion on whether the training offered in Uganda in green skills was good enough. Most companies dealing in solar equipment suggested that the graduates had the skills but unfortunately there were very few to serve the entire country. There is need to have more people trained in solar technology to serve the ever increasing market.

However, other green sectors especially energy efficiency still find the current graduates needing extra skills. Engineering consultants and energy managers do have those extra skills of improving energy efficiency in homes and companies. There is currently only one university offering a degree programme in organic farming. The other universities offer short courses yet the market for organic products is growing. This implies that there is need for more institutions to include organic farming as a programme if the market is to be satisfied.

Much as universities develop curricula in close consultation with the private sector feedback mechanism is still weak. Curriculum reviews take a long time yet that would be the only avenue to incorporate the private sector interests in the programmes the university is training. In situations where curriculum reviews are done, the department send the course content to various stakeholders and seek for their input. In some instances a workshop is organized and comments on the on-going programmes are incorporated to better it to suit the market demand.

3.2.5 Case studies on new green collar occupations

(A) Case study 1: Solar energy engineering and solar panel business

Solar energy engineering is one of the new green collar occupations in Uganda. This has emerged due to increasing interest in harnessing renewable energy by the Government. Solar energy is one of the modern renewable energy resources that the government's renewable energy policy identifies. Existing solar data clearly shows that the solar energy resource in Uganda is high throughout the year. The mean solar radiation is 5.1kWh/m^2 per day, on a horizontal surface. This level of insulation is favourable for the application of solar technologies and these include solar water heating, solar photovoltaic systems for the supply of basic electricity in rural institutions and households. The total new installed photovoltaic capacity annually is estimated at 200kWp for households, institutions and commercial use. Solar thermal has great potential in the form of water heaters in electrified areas. This has created an array of occupations for solar panel technicians, sellers and engineers. The number of solar energy engineers is still unavailable, however almost all the companies dealing in the photovoltaic (PV) systems employ installers and technicians.

Origin and situation of the occupation

Solar energy engineering was initiated by government through its new policy on renewable energy. Government has created an enabling environment for investors and technical people in solar energy harnessing with an aim of providing energy that is adequate for social and economic development. The basis for government to support solar energy harnessing and solar engineers and technicians was to generate energy that can transform rural people. There are over thirty registered companies dealing in solar energy devices in Uganda. The sales companies include CDK Engineering Limited, Energy Systems Limited and Magric Uganda Limited, and these mainly deal in PV systems. Other companies are African alternative energy solutions limited who are manufacturers, wholesalers, retailers and exporters. There is currently no information on the composition of the labour force in this sector however a quick scan through most technicians and owners of the businesses; men tend to be more than women. Most of the workers in these companies have mainly training in business studies while the technicians have undergone short trainings by international consultants and Faculty of Technology, Makerere University.

Skill gaps

- Solar energy engineering training at national level is still lacking. The country still relies on international experts.
- Technical knowledge in assembling, installing and repairing of photovoltaic panels is still inadequate
- Solar energy business management

According to the MEMD, only about 9 per cent of Uganda's population is connected to the main national electric grid. This influenced government to come up with alternatives energy source to cover the deficit of which solar energy is considered to have a huge potential.

Curricula and training programmes

The training programme can be by short courses of general electrical engineers and technicians. This could be in the area of assembling, manufacture, maintenance and repair. This could be conducted at Makerere or Kyambogo universities. The curricula can be tailor made and developed depending on the skills gaps identified above. Government should also incorporate solar energy (all renewable energy) education into the curricula of educational institutions at all levels.

Policy response

The government is committed to address this knowledge gap and it clearly states that it will promote research and development, international cooperation, technology transfer and adoption of standards in renewable energy technologies**.** The aim is to increase the use of renewable energy, from the current 4 per cent to 61 per cent of the total energy consumption in the country by the year 2017. The policy has good intentions and if implemented will promote solar energy use in the country. Currently, the MEMD, in partnership with the Faculty of Technology under CREEC, are training local technicians on panel fitting and maintenance and also supporting academic programmes that will increase number of trained people in solar energy in public institutions.

Skills response to the situation

The skills response to the situation is first to acquire and disseminate information in order to raise public awareness and to attract investment in renewable energy sources and technologies. There is need to develop and promote knowledge and exchange of information on renewable energy to all stakeholders.

(B) Case study 2: Tree farming

Based on the 2002, National Biomass Study, Uganda has 4.9 million hectares of natural forests and woodlands, which cover 24 per cent of the land area. The majority of these forested areas are (81 per cent) woodland, 19 per cent tropical high forest and less than 1 per cent forest plantations. There is also substantial forest resource on- farm. Over 40 per cent of the land is used for subsistence agriculture, and this holds approximately 25 per cent of national biomass in the form of scattered trees, forest patches and agro-forestry crops included within farming systems. In 2007 a three-year countrywide project, called Farm Income Enhancement and Forest Conservation project (FIEFOC) funded by the African Development Bank (ADB) to the tune of $76.72 million, was initiated to contribute towards poverty reduction in Uganda through forest support and agricultural enterprise development. The project further seeks to improve incomes, rural livelihoods and food security in the country through sustainable natural resources management and agricultural enterprise development, thereby contributing to poverty alleviation. Forestry is crucial to the lives/livelihoods of millions of Ugandans, especially the poorest sections of society including the youth in the absence of other assets. The dependence on forest resources, and the ability to improve the livelihoods of the poor through forestry, is becoming increasingly obvious in the current climate change scenario. The government envisaged that in order to reduce pressure on existing natural forests the citizens should be motivated to grow their own trees.

There are currently 40,000 households involved in this project scattered in the following districts: Adjumani, Amolatar, Amuru, Arua, Budaka, Bududa, Bugiri, Bukedea, Bushenyi, Butaleja, Dokolo, Gulu, Hoima, Ibanda, Iganga, Isingiro, Jinja, Kabale, Kaliro, Kamuli, Kamwenge, Kasese, Kiboga, Kiruhura, Kisoro, KItgum, Koboko, Kumi, Lira, Luwero, Lyantonde, Manafwa, Maracha-Terego, Masaka, Mbale, Mbarara, Moroto, Nakapiripit, nakaseke, Nakasongola, Namutumba, Bebbi, Ntungamo, Pallisa, Rakai, Rukungiri, Sembabule, Sironko, Soroti, Tororo.

Selection of the districts was based on the following:

- Biomass deficiencies characterized by low percentages of vegetation cover
- High demand for forest products and unavailability of alternative products
- High population densities hence increased demand for forest products and services.

- Declining farm sizes, reduced crop yields and perseverance of dry season.
- Extent of denuded land. For example the bare and over-grazed and over burnt areas

Estimates for the future growth is that by the third year, the project will have trained 33,000 tree farmers, 297 staff, and 99 service providers to provide extension services to tree farmers.

Skill gaps in tree farming

- Tree nursery management
- Integrating tree planting with other forms of agriculture like livestock grazing and crop cultivation on the same land and providing alternative approaches such as boundary planting.
- Management and protection of established plantations from pests, diseases and bush fires
- Water and soil conservation management.

Identification of the skill needs for tree planting

Through interviews and reports from the MWE, the aforementioned skills were considered critical for the success of in tree growing.

Curricula and training programmes

The training in the aforementioned skills can be by short courses on forestry management for service providers and in some cases the tree farmers. These could be conducted at the Faculty of Forestry and Nature Conservation, Makerere University or Nyabyeya Forestry College. The curricula can be tailor made and developed depending on the skills gaps identified above in the two institutions. The training programme could be by short courses of 2-3weeks with practical hands on and demonstrations in the field.

Skills policy response to tree farming

According to the forestry policy of 2001, the Government will promote and implement public education programmes to increase awareness and understanding of the role of tree farming in Uganda's national economy and local livelihoods, and the crucial environmental services they provide. The Government will support the development of training capacity to respond to tree farming needs. Government training institutions and private training services will be encouraged to orient themselves towards new areas of market demanded for tree farming skills. Currently National forestry resources research institute has the mandate to undertake research in tree farming and tree management. The faculty of forestry and nature conservation at Makerere University is mandated to do teaching, research and outreach in tree farming.

Skills provision in response to identified need of tree farming

- Skills will be acquired in tree nursery management
- There will be improved management and protection of established plantations due to the skills acquired and water soil conservation measures will be practiced.
- Better tree varieties and more trees will be planted

The effectiveness of the process

The process will help restore environmental integrity through improvement of community watershed and promotion of tree planting at household level. Overall, this will improve tree cover in the country, improve incomes and revenue sources among farmers, guarantee livelihood, indirectly contributing towards crop yield through environmental services and abate micro-climate change catastrophes at community level.

(C) Case study 3: Biofuel processing

Biofuel manufacturing is becoming increasingly popular. This is to reduce use of fossil fuels that emit Green house gases that contribute to global warming. Biofuels such as ethanol and biodiesel are derived from agricultural crops, while methanol is derived from condensing smoke during wood distillation process. Ethanol and biodiesel can be blended with or directly substituted for gasoline or diesel, respectively. In Uganda, ethanol is being produced on a small scale by sugar manufacturers as a byproduct from the molasses and several cottage industries from cereals and fruits. Biodiesel is a by-product of fatty acids (like vegetable oils or animal fat) and alcohols like ethanol. Vegetable oils can be produced locally from jatropha, hemp, sunflower, soyabeans, groundnuts, castor oil and palm oil. It is estimated that in the year 2010 Uganda will import and consume 360 million litres of diesel and 385 million litres of gasoline. If this fuel could be blended with environmentally friendly locally produced biofuel, *methyl alcohol* (25 per cent gasoline and 60 per cent diesel), it would require a total of 312 million litres of methyl alcohol a product from timber locally grown by a rural population. In terms of impact on the environment, if a total of 312 million litres of petroleum products are replaced by methyl alcohol, this will replace nearly one million tonnes of CO_2 emission in the country.

Origin and situation of the occupation

There is no commercial production of biodiesels and therefore no specific available statistics on number of people involved or employed in biodiesel production since it is done on individual small scale. However, the MAAIF owns over 6,000 hectares of jatropha (tree species) that was planted originally to support vanilla plantations but with the failure of the vanilla to perform well on the international markets, the plantation has been converted into biodiesel production. In other projects, the MEMD undertook a fast track bio-ethanol (anhydrous ethanol) production with sugar companies in Uganda i.e. Kakira which is the leading company, Lugazi and Kinyara sugar works. They are partnering with these companies to convert the molasses from sugar production into production of anhydrous ethanol instead of losing it as wastes.

The MEMD also established multifunctional platforms in Luwero and Masindi districts in 2007 and January 2009 respectively with a power capacity of over 200 kilowatts supplying over 15 homes with power. It was one of the Ministry's initiatives to rural electrification and these platforms supply rural centres with shaft power for lighting, grinding cereals, cooling milk, pumping water, saloons and charging telephones. These platforms were also donated by the UNDP and are integrated systems using different sources of energy like solar energy, biofuels other than hydro electric power/electricity. Masindi grows lots of grain crops, sunflower and maize that are a source of biodiesel. While Luwero grows rice and maize and other grains that support these platforms in terms of biodiesel production.

Skills gaps

Uganda has potential for biodiesel manufacturing but lacks the following skills:

- Identifying the most suitable crops for biodiesel
- Identifying conditions that enhance biodiesel potential in crops

- Technical knowledge in biodiesel processing

Skills response

The aforementioned needs were identified as challenges by the MEMD. If these skills are to be availed there is need for improving the curriculum of industrial chemistry which is currently offered at Makerere University, Kyambogo University and Mbarara University to include biodiesel processing. There is currently no clear effort put in place to train people in biodiesel processing in almost all public universities.

(D) Case study 4: Refrigeration and air conditioning technician

Ozone depleting substances (ODSs)

An ODS is a chemical substance that has been shown to destroy/cause thinning of the stratospheric ozone. Usually ODSs consist of some combination of chlorine, fluorine, or bromine plus carbon, such as chlorofluorocarbons (CFCs) and hydro chlorofluorocarbons (HCFCs), halons. The substances are commonly found in aerosol products, foams, and fire extinguishers, and are used as refrigerants and in air-conditioning and cooling equipment. When ODSs reach the stratosphere, they are broken down by UV radiation from the sun to release chlorine or bromine atoms. The latter react with ozone and start chemical cycles of ozone destruction that deplete the ozone layer.

The stratospheric ozone is a naturally-occurring gas, found 15 to 50 km above the earth's surface, which serves as the earth's protective ozone layer and filters the sun's ultraviolet (UV) radiation. Therefore, any thinning of the ozone layer allows more radiation to reach the earth's surface. Human problems associated with overexposure to UV rays are the development of skin cancer, cataracts, and weakened immune systems. In terms of ecological health, increased UV can lead to reduced crop yield and disruptions in the marine food chain.

Sustainable development depends on large part, on the implementation of agreed environmental goals, targets and objectives. Among the considerable number of multilateral environmental agreements agreed between states over the past 40 years, include the Vienna convention for the protection of the Ozone layer and the Montreal Protocol (MP). Accumulating evidence indicates that the phase- out of substances known as CFCs has since 1990, alleviated the progression of climate change by as much as 12 years. In Uganda the methyl bromide phase-out project that targeted the cut flower sector involving twenty four flower farms, was completed in 2007, and the ODS phase-out in the refrigeration and air conditioning sector is ongoing and the Uganda National Association for Refrigeration and Air Conditioning are the beneficiaries. This occupation is found mainly in service sector, like hotels, restaurants and the flower sector the number of work force cannot be quantified and it is over 90 per cent male dominated according to the information got from the discussions. The level of educational attainment of the technician is that the majority up to 80 per cent have up to ordinary level education with very few 5 per cent being graduates. The estimate for the future growth of this occupation is medium to high as the number of hotels, flower farms, industries, servicing workshops and bottling companies are increasing and from the group discussions it was estimated to be growing at the rate of about 8 per cent per year.

Skill gaps for the new occupation

These included skills in refrigeration care and maintenance like ensuring of adequate air circulation, regular defrosting, free air circulation, designing, how to detect faulty refrigerator and proper procedures of repair, the dos and do not’s for refrigeration and most importantly the servicing of the ozone-friendly refrigeration and air conditioning equipment. It was also observed that this was a practical subject with hands on.

Need identification

The need was identified when they started phasing out CFCs and other ODS-dependant substances and this was identified by the, relevant government agencies including NEMA, international community and the multilateral Fund Secretariat provided funds for the ODS phase out management project.

Skills provision/Skills acquisition (ODS)

The training of refrigeration and air conditioning technicians commenced under the ODS Phase Project since the year 2003. To date (August, 2009), over 110 technicians have acquired this training from Kyambogo University (KYU), under the MOU signed between NEMA and KYU. These technicians were selected from different companies (hotels, industries, flower farms, embassies, repair workshops, health units), among others. Each trained technician was awarded a certificate in "Good refrigeration practices". This certificate will show that they have been trained and have skills to service the equipments. These skills will lead to reduced emission of greenhouse gases from these equipments. The untrained ones do not have these skills.

Regulations of ODSs

The MP outlines specific measures and timetables for reducing production and import of CFCs and other ODSs. The MP does not prohibit the use of CFCs or other ozone-depleting chemicals, only the production or import. The Protocol does allow CFC production only for essential uses where no substitute is available, or for allowed exemptions.

Classification of ODSs according to the MP follows under two categories:

- *Class I*: Includes the fully halogenated CFCs, halons, and the ODSs that are the most threatening to the ozone layer.
- *Class II*: Compounds are those substances that are known or reasonably anticipated to have harmful effects on the stratospheric ozone layer. Examples are hydro chlorofluorocarbons (HCFC).

Originally, the MP proposed to phase out the production of CFCs and several other ODSs by 1999. It has been amended several times, moving back the phase out dates of CFCs and allowing more time for implementing substitutes. A series of regulations to phase-out the production and import of Class 1 ODSs, including CFCs and Class II ODS, HCFCs has been promulgated. NEMA in Uganda has a list of authorized importers of ODSs in accordance with the allowable annual quota. The import quota for each year must not be exceeded regardless of the number of importers, when all the individual imports summed. A list of the companies dealing in ODSs and ODS-dependant equipment in Uganda is given in the appendix.

Importation of ozone-friendly substances and equipment

A number of ozone-friendly alternatives are already being imported into Uganda, for example, R-22; R-134A; R-404R; R-407; R-410A; ammonia; R600A (Isobutane). These substances are replacing use of CFCs in the country.

Skills response

Recent surveys reveal that more than 50 per cent of the refrigeration equipment imported into Uganda is obsolete or faulty, and the spare parts cannot be easily obtained. These old equipment are a main source of leakage of refrigerants and emission into the atmosphere as leak detectors are faulty or damaged. Also many technicians do not have the required skills to

maintain and service the delicate refrigeration and air-conditioning equipment, and also in terms of detecting leakages and performing repairs in an effective manner. This is one of the justifications for the ban on importation of old fridges into the country.

The challenge is the relatively high cost of new and ozone-friendly refrigeration and air-conditioning equipment. There is need to put in place an incentive (e.g., tax exemptions) and disincentive (e.g. tax levies) mechanism for dealers and importers of ODSs and ODS-dependent equipment, to promote trade in ozone-friendly technologies or equipment while prohibiting illegal trade in ODSs and ODS-dependent equipment. Since the refrigeration sector has most consumption of HCFC, the fleet of HCFC-dependent equipment continues to expand world-wide. This increases the need for HCFC servicing despite future controls under the MP that will limit supply. HCFCs are low price compared to alternatives and are readily available compared to affordable alternative technologies for the developing country context. The price of HCFC-22 in particular has remained low and is expected to remain so in the foreseeable future. The countries in the Common Market for East and Southern Africa (COMESA) region including Uganda the Regulations on ODSs have already been harmonized in order to ensure control and monitoring of illegal trade in ODSs and ODS dependant equipment in the COMESA region.

The skills and retraining needs have been mentioned above but the challenge is that few technicians have been trained and there is only one institution that is handling the training. This shows also there are few trainers in the country who are only limited to the centre while these equipment are all over the country. If more people are to be skilled there is need for adding the curriculum to other higher institution that can do the training.

3.2.6 Case studies on greening existing occupations

(A) Case study 1: Plastic waste management

During the past 25 years, plastic materials have gained wide spread use in food, clothing shelter transportation, construction, medical and leisure industries. Plastics offer a number of advantages over alternative materials; they are light weight, extremely durable and relatively unbreakable. However, plastic materials have several disadvantages, one of the largest being that plastic does not breakdown in the environment. Plastics are composed of petroleum based materials called resins (e.g. polyethylene, polypropylene) that are resistant to biodegradation. Plastic bags for instance can take between 15 and 1,000 years to breakdown in the environment. This prolonged disintegration results into choking of soils. They impede water infiltration hence causing soil degradation.

It is estimated that every year, 3,000 tonnes of plastic bags find their way into Ugandan soils. Plastics are also poisonous when they are burnt below 800^{o}C. They release toxic gases like dioxins and furans, which are dangerous to human health and the environment. Plastics can also clog waterways and channels causing floods and breeding sites for disease vectors especially in low land areas. In Uganda roads in slums are impassable due to flooding caused by clogging of water ways and drainage channels by plastic materials.

Plastics are negatively affecting the economy of Uganda because they affect soil productivity yet her economy greatly relies on agriculture. Research has shown that 60 per cent of stray cattle in Uganda die due to consumption of polythene bags. Because of the aforementioned challenges associated with plastics there is an interest from government and civil society on change of strategy in management of plastic wastes.

The role of technological change and innovations

Recycling and use of biodegradable plastics are the strategies being promoted as suitable for plastic waste management. At the moment it is only Nile plastics and Medipoint investment that

are manufacturing biodegradable plastic products. These companies employ up to 200 workers with over 60 per cent of them up to primary seven education level and the employment here is about 45 per cent males and 55 per cent females. There are eight recycling industries of which plastic recycling industry is the leading plastic recycling company in the country employs 20 permanent staff and 45 casuals of which 80 per cent are women. It is predicted that in the next two years at least 90 per cent of the companies dealing with plastics will invest in recycling and production of biodegradable plastics.

There are also many people employed indirectly in the plastic recycling companies by collecting plastic materials from garbage bins and landfills. However it is difficult to establish the number benefiting from this green occupation due to lack of official statistics from participating companies.

The skill gaps include:

- Training of all manufacturers of plastics the process of recycling used plastics.
- Training in the technology of making biodegradable plastics
- Training in the technology in conversion of used plastic in to other useful products.

Identification of the need to transform this occupation

Through interviews, desk reviews and observations the aforementioned needs were identified. Industries involved in recycling lacked adequate well trained and skilled people especially technicians in recycling. There is need for government to put in place avenues for training in manufacturing of biodegradable plastics and recycling of plastics. Currently business entities involved in recycling offer basic training to their workers but heavily rely on foreign experts.

The provision of skills

The technology of recycling existing plastics in the environment and turning it into other useful products is one of the skills needed. This has been done be through short training courses lasting 2-3 months. There have been some local initiatives of collecting of straws and making bags and mats from the used straws. This innovation of waste management was started by an individual and has trained over 450 people including foreigners on how to make products mats, belt, shopping bags earrings, shoes, bangles, table mats. These training have been ranging from two weeks or longer up to three months for one to grasp all the course units. The courses would involve cutting, designing, tailoring and weaning of up to 21 products all made out of straws. These courses could be done even by the illiterates. These could also be done to other plastic products.

There should be development of innovative training options for the management of plastic wastes. The manufacturers should be trained to be able to utilize all used plastics to ensure that recycling is carried out on all plastic products disposed off. Plastic manufacturers also need training on techniques of producing biodegradable plastics**.** This may be through short training courses conducted at Kyambogo University, for all manufacturers and their representatives so that produced plastics are biodegradable and are environmentally safe.

Skills policy response to the situation

Government is supporting local initiatives involved in recycling wastes through tax holidays and guaranteeing loans from international banks. There is no observable response towards supporting training in academic institutions on plastic recycling. In the 2007/2008 joint budget by all the East African community member states it was agreed that the ban for polythene is below

30 microns. Uganda, Tanzania and Rwanda took it on and Kenya did not implement. This total ban was announced in the 2009/2010 budget follows absolute ban in Tanzania's Zanzibar islands in 2007and Rwanda in 2008. However, there are conflicting reports from the MWE about a total ban. What is transpiring is that they may take their time as companies develop recycling and development of biodegradable polythene and the total ban may not be implemented

Skills provided

This training will equip manufacturers with skills in plastic recycling and production of biodegradable plastics. More investors will join the industry due to availability of skilled people in recycling hence more employment opportunities. The skills provided will help sensitize about waste management awareness campaign and also provide different dustbins for waste, sorting and recycling.

(B) Case study 2: Revenue Officers

Introduction

The International Labor Conference of June 2008 recommended skills development to be an integral part of an effective response to changing conditions with climate change. Identifying skills requirements for adaptation to climate change and mitigation measures via reduction of GHG emissions is therefore an important pillar in policy development.

Greenhouse gases (GHGs) overview

Gases that trap heat in the atmosphere are often called greenhouse gases. Some GHGs such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are:

- Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- Hydro fluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for (ODSs) (i.e., CFCs, HCFCs, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as "High Global Warming Potential" gases ("High GWP gases").

Overview of Uganda Revenue Authority (URA) as a target for green jobs

The URA was established on 5 September 1991 by the Statute No.6 of the URA. The main aims of the URA is to assess and collect the tax revenue specified, to employ the laws regarding the collection of taxes and take the responsibility of accounting for the revenue collected by this

central organization. This mandate makes URA interface with all businesses, business communities and hold control of all the sixty (60) customs stations in Uganda, most of which are entry points and gateways to Uganda. The tax body employs over 2,000 revenue officers who undergo basic customs and income tax and domestic taxes training with emphasis on:

- Classification of goods
- Rules of origin
- General Agreement on Tariff and Trade (GATT)
- World Trade Organization (WTO) valuation agreements
- International trade protocols
- Common External Tariff (CET) and East African Community trade protocols
- Computation of Duty
- Excise duty, VAT and Income tax regimes
- Customer care and Public relations.

Skills requirements for adaptation to climate change.

Whereas the mandate to manage all entry border point, gazetted and non-gazetted where all the environmentally hazardous substances especially ODPs and GHGs emitters are imported to the country, there is no component in the training of Revenue Officer jobs that relate to the environment and climate change. The current green policy of a prohibitive environmental levy of 20 per cent on all used motor vehicles and motorcycles of more than eight years old from the date of their manufacture, ban on importation of all used fridges and refrigeration equipment is being implemented by the URA. This enforcement of such green policy cannot effectively be done unless there is a deliberate policy of training all staff responsible on environmental issues, GHGs and ODSs, global warming, and global climate change interventions.

Identification of green skill needs in URA

URA recruits mostly people of the first degree among its ranks; the basic entry requirements being first degree in commerce, computing, information technology, economics and many other social science courses. Skill needs identification are done by the Human Resources (HR) section which formulates the key result areas for each job category, makes job descriptions for recruitment purposes and desk instructions for the all jobs filled. The HR team has also not had an exposure on climate change and environmental issues and may not be effective agents in this environment effort. The job needs identification, recruitment process and execution of work at the tax body is in accordance with the institution mandate of assessing and collecting the tax revenue, employing the laws regarding the collection of taxes and takes the responsibility of accounting for the revenue collected by this central organization. This is in total disregard of enforcing protocols and regulations relating to climate change despite the fact that URA has a privileged mandate of controlling, scrutinizing, verifying all cargo and substance entering or leaving Uganda. Some of the competences and skill gaps which need to be incorporated into existing occupational profiles of Revenue Officers (greening existing occupations) include:

- Understanding ozone layer
- GHGs
- ODSs, identification and handling.
- Ozone layer depletion and international responses.
- Legal regime for protection of ozone layer

- Aspects of strategic approach to international chemical management (SAIM)
- Restricted imports and their licensing systems
- Prohibited imports: Environmental view point.
- Montreal Protocol (MP)
- Status of implementation of MP in Uganda.
- Implementation of ODSs licensing system.

Skills responses

URA has not developed internal capacity to train and equip all staff on issues of climate change and global warming. This is largely because climate change is not their mandate. However, the enforcement of restrictions and prohibitions of GHG emitters and ODS which have a catastrophic effect on Ozone layer and cause global warming should largely be URA responsibility because of their mandate to manage all entry points into the country through which the ODs are imported. The mandated institution, NEMA has made effort to distribute brochures and conduct seminars on climate change but URA is not an effective participant. If URA can build internal capacity in form of training and equipment to detect ODSs, NEMA will be effectively be synergized by nationwide infrastructure of URA.

URA employs staff most of whom have no exposure on climate change and global warming by nature of their professions which are mostly non-science. The skills identified are not too difficult to learn for the kind of people that are recruited for Revenue Officer jobs. NEMA is willing to give a hand in training and development of training manual for Revenue officers. It is therefore vital and important to give on job training for all the staff and impart skills kills required for adaptation to climate change and mitigation measures via reduction of GHGs emissions.

Climate change and global warming subject is not exuberated institutional concern of URA because of mandate issues. It therefore does not feature in any of the institutional priorities of training, enforcement and monitoring. URA is better placed to enforce all protocols relating to climate change because of its mandate that makes it interface with all businesses, business communities and hold control of all the sixty (60) customs stations in Uganda most of which are entry points and gateways to Uganda. The mandated institution, NEMA, does not have visible infrastructure to enforce compliance of protocols relating to climate change but has for a long time been a watchdog and has adequate institutional capacity to monitor. It would therefore work well if URA builds adequate institutional capacity in terms of training (made green) and equipment to detect and enforce environmental compliance at point of entry during importation, build sufficient network with environmental watch dogs like NEMA who would do monitoring. URA would hence adapt to changes as a consequence of environmental policies or climate change.

(C) Case study 3: Organic farming

Over 80 per cent of the Ugandan population derives its livelihood from agriculture. Due to global interest in conserving nature products from countries like Uganda are gaining market because they are produced in a green way i.e. organically. There is a shift from use of chemicals especially in food crop production to growing crops following the ideals of organic farming. Organic farming relies on crop rotation, green manure, compost, biological pest control and mechanical cultivation to maintain soil productivity and control pests, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects on the

environment. Since 1990, the market for organic products has grown rapidly to reach $46 billion in 2007. This demand has driven a similar increase in organically managed farmland. Farmers in Uganda are increasingly shifting to organic farming due to readily available global markets for their products. It is currently promoted by the NOGAMU. According to NOGAMU, there are more than 200,000 farmers practicing organic farming registered in Uganda. They form associations comprising women and men with numbers from five to 100 or more for certification of their products.

Role of technological change

As of 2001, the estimated global total market value of certified organic products was estimated to be $20 billion. By 2002 this was $23 billion and by 2007 more than $46 billion according to organic monitor. Organic farming with its emphasis on closed nutrient cycles, biodiversity, and effective soil management has the capacity to mitigate and even reverse the effects of climate change. The elimination of synthetic nitrogen in organic systems decreases fossil fuel consumption and organic matter used in organic farming sequesters carbon-dioxide from the atmosphere.

Skill gaps

According to NOGAMU, there is need to build capacity in production and processing of organic products in Uganda. Farmers need to get skills in soil management, pest control and post harvest management that do not contravene the principles of organic farming.

Identification of the need to transform into this occupation

Through interactions with NOGAMU staff and reviewing their reports the aforementioned were identified as needs which need to be addressed. Government needs to put in place mechanisms of training farmers and individuals interested in organic farming in areas like management of pests and diseases in organic production, soil fertility management in organic systems, post harvest handling, and weed management in organic farming, processing of organic products and marketing of organic products.

Currently organic farming is only offered at Uganda Martyrs University at a degree level and it targets individuals who have had basic training in agriculture. The course is conducted over four years, each involving a three-week's workshop, two days of assessment, two months of field on-job placement, and one month of on-job report writing. NOGAMU offers a range of services in the areas of training research and extension. Makerere University through the faculty of agriculture has been offering an international training course on organic agriculture since 2005. Its aim is to build capacity in organic agriculture in east Africa. Currently undergraduate students in the field of natural sciences are the only eligible ones. There is need to have training opportunities for farmers that are demand driven and affordable. Government needs to have centres in rural areas that can directly offer this training.

Policy response

There is no clear government policy on promotion of organic farming in Uganda. However, it has benefited from the economic liberalization policies and The NGO Act (1999) that formally recognized NGOs as important development agents. Currently, government policy for agricultural development is based on the Plan for the Modernization of Agriculture (PMA). PMA does not mention organic agriculture, but stresses the development of sustainable agriculture. The PMA is part of Uganda's Poverty Eradication Action Plan (PEAP). It aims at improving incomes, reducing food insecurity, creating gainful employment and a good environment for sustainable

natural resource management. Without a clear policy to promote organic farming; it is heavily relying on NGOs and NOGAMU.

Skills provided

The training in the aforementioned skills equips graduates with new strategies of farming that do not compromise the environment. Much as it is still done only at a small scale there is a potential for it to have a trickledown effect if the trainees train others.

4. Conclusions

4.1 Main "greening" shifts in economies and labour market

The overall nature of Uganda's economy determines the greening shifts. A literature review of the limited number of quantitative assessments of the impact of mitigation measures on labour markets in Uganda showed that there is a progressive transition from a high carbon to a low-carbon economy which will lead to a net increase in employment. Case studies revealed that throughout the districts of Uganda, people are struggling with the impacts of the fuel, food and economic meltdown to cater for their human needs. Opportunities exist to reorient the Uganda's economy to support sustainable development and build long-term resilience by protecting the natural resources upon which the economy depends. Climate change itself, adaptation to it and efforts to mitigate it by reducing emissions, have far-reaching implications for economic and social development, for production and consumption patterns, and therefore for employment, incomes and poverty reduction. Statistics on employment patterns and labour markets are in constant change, driven by many factors, including technology, trade, finance, demographics, demand cycles – as well as the environment. The study showed that mitigation-related activities are likely to be more labour-intensive than the more capital intensive, "carbon-based" activities they replace. Also, projections for employment growth in emerging energy sectors are remarkably strong. The economy of the Uganda is shifting towards energy efficient industrialization that is supported mainly by renewable energy using resources that are sustainably harvested.

4.2 Skills implications and development

4.2.1 Anticipation and identification of skill needs

The anticipation system in this report involved analysis of job advertisements in newspapers, surveys of industries, companies, ministries, UBOS and training institutions. Case studies showed that skill needs included not just opportunities for managers, scientists and technicians, but will primarily benefit a broad cross-section of the population that needs them most: i.e., youth, women, farmers, rural populations and slum dwellers.

The study showed that there will be need for more personnel in chemical engineering to develop technologies that are eco-friendly since obsolete technologies that release substances that may destroy ozone are being discarded for clean technologies. Technicians in energy efficient technologies to reduce pressure on forests and woodlands, generation of energy from renewable sources like water, wind and solar and managers of green businesses will be needed.

4.2.2 Response policies and programmes

This study shows that maintaining a policy framework that facilitates and encourages change is one of the main responsibilities of employment and labour market. Climate change and other environmental issues add a dimension to that process of change. The future will not be

"business as usual" and will represent yet another management challenge. The present document highlights some basic strategies for doing this. They include shifting to a low-carbon economy while boosting employment, economic opportunities and growth. Uganda does not have defined policies on recycling of wastes, organic farming and ecotourism yet these are emerging green occupation that would require policy guidelines. However there is a policy on renewable energy which is an indicator that government prioritizes the energy sector.

4.2.3 Effective delivery mechanisms

Uganda still needs to deliver the right knowledge and skills, and the ability to apply that knowledge and skill, in a vocational context, and in a way that meets the challenges represented by climate change. Effective delivery and building of green skills in the vocational and higher education sectors requires analysis of what jobs, require what knowledge and skills, and in what context. That analysis can only take place in industry, by industry and varies from one community to another since there is good evidence to suggest that the environment plays an important role in attracting and maintaining businesses in rural areas. The existing workforce, and those who enter the workforce in the future, should be the basis of targeted training and workforce development since the solutions aim at building awareness and commitment to climate change mitigation strategies. However, the general shift in the relative importance of tangible and intangible factors in business location decisions suggests that enhancing the environment and thereby improving quality of life factors may increasingly provide the cutting edge to enhanced local competitiveness in urban areas. Effective delivery mechanisms should be complemented by dedicated programmes designed to encourage take-up from the workforce and the community if the country is to attain a green economy.

5. Recommendations

5.1 Policy recommendations

a). Government should include green skills development in all its development policies. This is to develop the green potential, competency and green skills of people to cope with competitiveness by increasing knowledge for sustainable development. This will enable the country to harness the socio-economic and environmental benefits associated with greening the economy.

b). There should be a deliberate policy to train people in green skills and government should promote linkages with the private sector and the community. The policy should promote short green skill training courses, practical training and workplace learning and should set up a system that matches skills and competencies with the wage structure. The Policy should also extend green skills training to vulnerable people. The government should view labour as the vital basis for the green economy which should be strengthened by the cooperation of workers, the public and private green skill development sectors and the improvement of workforce quality at all levels.

c). The country should adopt the National Adaptation Programmes of Action (NAPA) as a quick channel to adapt to climate change challenges. The MEMD should also tighten home and domestic energy saving through enforcing the use of energy saving lighting and heating technology. The renewable energy policy should be fully operationalized.

d). There is need for a new paradigm and thinking on planning of transport networks with a shift from individual and multiple small cars to efficient, rapid mass transit system using trains and public transport systems. This will create new employment opportunities that are eco-friendly.

e). The Uganda Government should have a clear policy on human resources development (HRD) related to green skills and should consider to develop a workforce at work.

f). The State should put in place cap and trade programme which will create green jobs.

g). There is need for new innovative cost effective ways of reducing green house gas emissions.

h). The State should put in place new green collar investment policies that aid entrepreneurs and provide them with financial incentives to put in place green investments.

i). Government should operationalize the polluter pay principle in the National Environment Statute of 1995 on polluters like oil companies

j). Government should promote the growth of robust new energy markets.

k). There is need for improvement in monitoring of compliance to regulations and conventions related to the green policy in Uganda. Encourage individual responsibility and support private sector initiatives on environmental performance standards.

l). There is need to strengthen the capacity of stakeholders participating in the weather-related issues through training and retooling of the workforce.

m). In both rural and urban areas it is important to encourage participatory environmental management through developing strategic partnerships, empowering civil society, providing institutional mechanisms and legitimacy to community-based resource management practices, giving the people a clear stake in the environment, as well as assigning responsibilities.

n). In the energy sector, the Ministry in charge of energy can force power producers to cut emissions of GHGs by requiring and instituting a provision for buying an allowance which will shrink annually to offset their emissions.

5.2 Recommendation for education and training

a). The Ministry of Education (MoE) should have curricula reoriented in schools, colleges and universities so as to develop green skills.

b). The Ministry of Labour on the other hand, should be responsible for the development of the workforce in the labour market and should promote skills training to enhance employability in the green sector.

c). The government of Uganda should consider developing and offering of various training courses which focus mainly on skills for green jobs. Pre-employment green skills training should be provided to prospective new labour market entrants and should be conducted in all the training institutions all over the country.

d). Upgrading training should be mostly provided to the existing labour force with the aim of enhancing their green skills knowledge, potential to cope with greening specific jobs and the rapid change of technology.

e). Community colleges and universities doing green-collar job training and collaboration on clean energy projects may also augment public and private universities

Approaches of green skills development and skills training

Skills development should be delivered through a number of approaches:

a). The government should maintain the Universal primary education as well as adult literacy education in order to build climate change awareness in a larger community.

b). Government should strengthen the capacity of stakeholders participating in the weather-related issues through training and tooling and retooling of the workforce

c). The MEMD should also encourage home and domestic energy saving training through enforcing the use of energy saving lighting and heating technology.

d). People should be trained in tree planting through dedicated support actions at national level with media participation to enhance awareness- through the organization of dedicated events

e). Encourage individual responsibility and support private sector initiatives on environmental performance standards.

f). Training in manufacture and use of solar photovoltaic panels.

g). Training on knowledge and skills to work on renewable energy technologies.

h). Training on manufacturing of tools, appliances, and materials to supply the clean-energy market.

5.3 Recommendations for further research and data collection

a). Research should be carried out to find which sectors of the economy need more sensitization and should be trained first.

b). Research also should go further to establish which vocational training institutions in the country have the capacity to offer courses in green skills development.

c). Research should be done to establish how Ugandan farmers can increase productivity and income without degrading the environment.

d). More research in developing a warming index including weak emissions targets which could later be strengthened to guide future policy. This could be used to track global warming and its impacts.

e). New and more funding for research and development of new green collar technology

f). There is a need for more data collection as it relates to skills for green jobs in Uganda. At the moment little information is available on how these sectors have positioned themselves to greening. The Ministry of Animal Industry and Fisheries knows very little on this while it is one the sectors with the highest greening potential in Uganda.

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