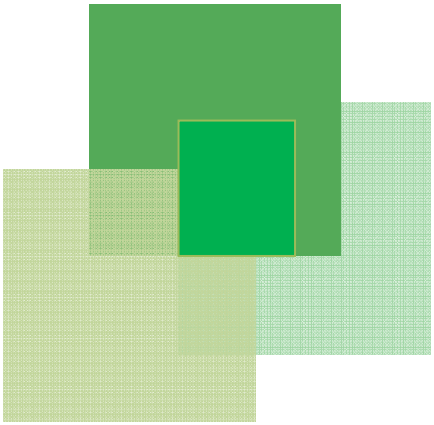

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Skills for green jobs in Egypt

Unedited background country study

EcoConServ Environmental Solutions

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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 EcoConServ Environmental Solutions for their 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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Director
Skills and Employability Department, ILO

[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).

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Abstract

This report represents the “Egypt Country Study” on Skills for Green Jobs. The study is prepared in response to the ILO and European Centre for the Development of Vocational Training (Cedefop) for conducting policy applied research into skill needs for greener economies. Within this context, Egypt has been identified among twenty one countries for the development of country case studies with the objective of identifying strategic skills development responses of countries in the light of environmental degradation, climate change and the global call for greening economies. The study sheds light on the key challenges and priorities for the green economy in Egypt. It outlines the main environmental challenges currently facing Egypt, which also are the main drivers for the green policy responses in the country, affecting the economy, employment and labour markets. It then analyzes the skills development strategy corresponding to greening, highlighting the institutional framework guiding skills development in Egypt at large and examining the linkages, in terms of complementarily, relevance and coordination, between environmental policy making and those related to education and training. The study then investigates the obstacles for the integration of skills development related to greening into relevant policies and strategies. It further addresses the anticipation of skills needs, including identification of some economic sectors “energy, manufacturing, agriculture and waste management” undergoing change in response to greening policies and identification of retraining needs, greening of existing jobs and new jobs arising in the market as a result of these changes. Analytical case studies are used to further illustrate and support each of these trends. Finally, the study outlines the main findings and provides recommendations at policy and sector levels.

Executive summary

The Green Jobs Initiative is a partnership established between the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), and the International Trade Union Confederation (ITUC), and the International Employers Organization (IEO) in 2008. The initiative was launched to assess, analyze and promote the creation of decent jobs as a consequence of the needed environmental policies to address the global environmental challenges. Against this background, the ILO in cooperation with the European Centre for the Development of Vocational Training (Cedefop) are conducting policy applied research into skill needs for greener economies. Within this context, Egypt has been identified among twenty one countries for the development of country case studies with the objective of identifying strategic skills development responses of countries in the light of environmental degradation, climate change and the global call for greening economies. This report represents the "Egypt Country Study" on skills for green jobs.

Section 2 of the study begins by shedding light on the key challenges and priorities for the green economy in Egypt, and which are the drivers for the green policy responses in the country, affecting the economy, employment and labour markets. It emphasizes the increased burden on Egypt's limited natural resources as a result of the rapid population growth in Egypt, coupled with unsustainable economic activities which directly led to environmental problems including air and water quality, waste management, coastal pollution, nature protection and desertification. In light of this, there is a responses strategy in Egypt in relation to the environment and greening of the economy.

The need to attain sustainable economic growth and development at large is recognized at the national level in Egypt and is reflected in national socioeconomic plans produced by the Ministry of Planning. Specific environment policy making and planning is largely mandated to the Egyptian Environmental Affairs Agency (EEAA), the national authority responsible for environmental management in Egypt. EEAA has a wealth of strategies and plans, which tackle different aspects of environmental issues. The most significant include among others, the 1992 and 2002 National Environmental Action Plans (which covers the period 2002-2017), National Strategy for Cleaner Production in 2002 and the National Framework for Sustainable Development in Egypt in 2007. A Framework of Environmental legislation guide Egypt's efforts in the Environmental Protection field, most importantly Law No. 4 for the year 1994. In addition to this a number of measures in response to climate change are being adopted in Egypt including the development of the National Communication on Greenhouse Gases and the National Plan on Climate change in 1999, the ratification of the Kyoto Protocol in 2005 and the announcement of EEAA as the Designated National Authority (DNA) for Clean Development Mechanism (CDM). At the global level, Egypt is a signatory of a number of multilateral environmental agreements, including three Rio conventions, namely, the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification.

In spite of the great efforts that have been exerted in the environmental sector in recent years, there are a number of impediments that negatively impact these efforts. Most importantly, there is a lack of an integrated approach in developing most of the environmental strategies, national plans, and programs, which result in duplication and/or conflict in implementation; there is a lack of proper enforcement of legislation already adopted, and sometimes a need for more detailed and elaborate legislation to protect the environment, there is a weak enforcement of environmental laws which contribute to a lax implementation of environmental strategies, and in turn, diminishes the need for a structured approach of skill identification and development in

response to greening trends. Finally, implementation mechanisms in support of environmental strategies, plans and programs are largely missing. This leads to ad hoc uncoordinated implementation effort, which jeopardizes the achievement of objectives. In spite of the fact that Egypt has committed 5.4 billion dollars to an economic stimulus plan to overcome the repercussions of the global financial crisis, however, to date, Egypt is not among the countries that have an explicit green response to the current economic crisis.

Section two then explores the institutional framework guiding skills development in Egypt at large and investigates the existence of skills development strategy, in response to climate change and environmental degradation and the linkages, in terms of complementarity, relevance and coordination, between environmental policy making as highlighted in the above section, and those related to education and training. Finally, it also investigates the impediments for the integration of skills related to greening in relevant policies and strategies.

The mandate for skills development through education and training in Egypt is shared among many stakeholders, including: the Ministry of Education; the Ministry of Higher Education; and line ministries with their own supply-driven training infrastructures which for long has not been able to respond to labour market needs. In pursuit of enhancing the coordination for identifying the skills and specializations required in the labour market, both at policy and strategic level and between the multiple ministries and agencies working in education, technical education and training, and business, a number of coordination mechanisms have been developed at different levels. The most important examples is the establishment of the Supreme Council for Human Resources Development Committee, three training councils within line ministries and the formulation of 12 sectoral Enterprise Training Partnerships (ETPs), which act as a feedback mechanism between employers and the technical education and training systems. These coordination mechanisms, lacks the absence of a representation of the Ministry of State for Environmental Affairs (MSEA), which clearly reduces the prospects that these mechanisms would address skills development in relation to environment and sustainability issues.

The Mechanisms for Labour Market Forecast in Egypt is undertaken through a number of institutions who are responsible for identifying current and future skills needs, among which the main institutions are: Central Agency for Public Mobilization and Statistics (CAPMAS); Ministry of Manpower and Emigration (MoME) and the Egyptian Education, Training and Employment Observatory (EETEO). Programs such as the Technical and Vocational Education Training also participate in this endeavor.

In light of the above analysis, the study shows that to date no attempts have been made to develop a skills development strategy in response to greening. This could be attributed to the lack of coordination between the multiple ministries and agencies working in education and training, and businessmen, on the one hand, and those working on environmental issues, on the other hand, which hinders the ability to identify and supply the labour market with the green skills and specializations needed. There is also no evidence of a systematic skills response by either the education or training systems to the skills needs identified for both new green jobs and occupations undergoing greening. The knowledge of the skills needs identified remains at the level of the implementing agencies and programs, which are usually responsible for responding to the identified skills through the provision of short-term courses to a limited number of beneficiaries. Furthermore, there is an apparent separation between the environmental policies and the skills development policies, as none of the main environmental institutions has a role in the policy and strategy formulation process or mechanisms. In addition, ministries, agencies and institutions concerned with education and training do not take part in the process of developing environmental policies. Most of the mitigation measures adopted to combat climate change and environmental degradation, only briefly points to the skills implications and needs of these activities; however, there is no evidence that attempts have been made to share this with the education and training systems.

Section three of the study addresses the anticipation and provision of skills. A number of themes are explored under this section, including the identification of some of the economic sectors undergoing changes in response to greening policies, the identification of retraining needs, and the greening of existing jobs and new jobs arising in the market as a result of these changes. As a result of environmental mitigation measures currently adopted in Egypt, a number of sectors and economic activities, especially those having high environmental impact, are experiencing employment shifts as they strive to eliminate their negative impact on the environment. Given the scope and the resources dedicated to this study and the difficulty to obtain data for analysis, four sectors which are directly related to these mitigation measures will be included for analysis; namely, energy, manufacturing, agriculture and waste management. Other sectors which could possibly be impacted but will not be analyzed in details in this study include tourism, construction and building and materials. In this respect, the study explores a number of case studies to support these trends in the four selected sectors. The first set of case studies deal with retraining needs and focuses on Organic Farming. The second type of case studies address new and changing skills needs and presents case studies on Environmental Impact Assessment Consultants, Training Egyptian Subcontractors on Remediation of Heavy Metals Contaminated Sites, Skills related to Rice Straw Recycling and finally Skills Related to Wind Farm Operations.

The Study finally draws up a number of conclusions based on the above analysis. The conclusions reinforce the notion that the linkage between environmental policymaking and education and training policymaking is non-existent. In light of this, the current approaches to the anticipation and identification of green skills are almost negligible, and the mitigation measures implemented have only led to a limited reaction in terms of skills identification of new jobs and greening of existing occupations. The study proposes a number of recommendations at the policy levels, and sectoral levels to achieve a better coordination and linkages between environment and education policymaking and to ensure a better mechanism in place in identifying, anticipating and responding to green skills needs.

Acronyms and abbreviations

BOD	Biological Oxygen Demand
CAA	Competent Administrative Authority
CAPMAS	Central Agency for Public Mobilization and Statistics
CARE	An international NGO working in the development field in Egypt
CCIMD	Centre for Curriculum Development and Instructional Materials Development
CD4CDM	Capacity Development for Clean Development Mechanism
CDIAC	Carbon Dioxide Information Analysis Center
CDM	Clean Development Mechanism
Cedefop	European Centre for the Development of Vocational Training
COAE	Center of Organic Agriculture in Egypt
CP	Cleaner Production
CSDC	Construction Skills Development Council
CTU	Central Training Unit
CVT	Continuing Vocational Training
Cedefop	European Centre for the Development of Vocational Training
Danida	Danish Development Agency
DfID	UK Department for International Development
DNA	Designated National Authority
EBA	Egyptian Biodynamic Association
EB-CDM	Egyptian Bureau
EC-CDM	Egyptian Council for Clean Development Mechanism
ECO	Environmental Compliance Office
ECOA	Egyptian Center for Organic Agriculture
EE	Energy Efficiency
EEAA	Egyptian Environmental Affairs Agency
EETEO	Egyptian Education, Training and Employment Observatory
EIA	Environmental Impact Assessment
EMU	Environmental Management Unit
ENCPC	Egyptian National Cleaner Production Centre
EPAP	Egyptian Pollution Abatement Program
ERSAP	Economic Reform and Structural Adjustment Program
ESP	Environmental Sector Programs
ETF	European Training Foundation

ETPs	Enterprise Training Partnerships
EU	European Union
EUREPGAP	Euro-Retailer Produce Working Group for Good Agricultural Practices (the global partnership for safe and sustainable agriculture)
FAO	Food and Agriculture Organization
FDI	foreign direct investment
FEI	Federation of Egyptian Industries
GDP	Gross Domestic Product
GEAP	Governorate Environmental Action Plan
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GoE	Government of Egypt
HACCP	Hazard Analysis and Critical Control Points
HCWW	Holding Company for Water and Wastewater
HRD	Human Resources Development
IDSC	Information and Decision Support Centre
IEO	International Employers Organization
IFOAM	International Federation of Organic Agriculture Movements
ILO	International Labour Organization
IMC	Industrial Modernization Centre
IPM	Integrated Pest Management
ITC	Industrial Training Council
ITUC	International Trade Union Confederation
KFW	German Development Bank
LM	Labour market
MED TEST	A project funded by the United Nation Industrial Development Organization
MoE	Ministry of Education
MoH	Ministry of Housing, Utilities and Urban Development
MoME	Ministry of Manpower and Emigration
MoP	Ministry of Planning
MoT	Ministry of Tourism
MoTI	Ministry of Trade and Industry
MPN	Mean Probable Number
MSEA	Ministry of State for Environmental Affairs
NCPC	National Cleaner Production Centre
NEAP	National Environmental Action Plan
NGO	Non-governmental organization
NREA	New and Renewable Energy Authority

NSSP	National Skills Standards Project
RBO	Regional Branch Officer
RCREE	an independent regional think tank based in Cairo, dedicated to promotion of renewable energies (RE) and energy efficiency (EE)
RE	Renewable Energy
SCHRD	Supreme Council for Human Resource Development
SEAM	Support for Environmental Assessment and Management
SEKEM	An Egyptian organic farming initiative - the transliteration of a hieroglyph, meaning "vitality"
SFD	Social Fund for Development
SMEs	Small and medium enterprises
TOE	Ton Oil Equivalent
TTC	Tourism Training Council
TVET	Technical Vocational Education and Training
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development

1. Introduction

The Green Jobs Initiative is a partnership established between the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), and the International Trade Union Confederation (ITUC), and the International Employers Organization (IEO) in 2008. The initiative was launched to assess, analyze and promote the creation of decent jobs as a consequence of the needed environmental policies to address the global environmental challenges.

Against this background, the ILO in cooperation with the European Centre for the Development of Vocational Training (Cedefop) are conducting policy applied research into skill needs for greener economies. Within this context, Egypt has been identified among twenty one countries for the development of country case studies with the objective of identifying strategic skills development responses of countries in the light of environmental degradation, climate change and the global call for greening economies. This report represents the first draft of the "**Egypt Country Study"** on skills for green jobs. The report has been developed to the extent possible in light of the TORs presented by the ILO and following the methodological framework previously submitted to and approved by the ILO.

Section one of the report sheds light on the key challenges and priorities for the green economy in Egypt. It outlines the main environmental challenges currently facing Egypt, which also are the main drivers for the green policy responses in the country, affecting the economy, employment and labour markets.

It further outlines the policy context in Egypt and addresses the current response strategies and skills response strategy in relation to climate change, environmental degradation and greening the economy. This section is divided into three subsequent sub-sections. The first highlights the key challenges and priorities for the green economy in Egypt. The second tackles the response strategy including two parts: part one deals with general environmental strategy of Egypt and it provides an overview of the main environmental strategies, programs and policies currently in place, while part two addresses the green response to the economic crisis in Egypt. Finally, the last sub-section focuses on the skills development strategy corresponding to greening. In that respect, it highlights the institutional framework guiding skills development in Egypt at large. It also sheds light on the skills development strategy, if any, developed in response to climate change and environmental degradation, by examining the linkages, in terms of complementarily, relevance and coordination, between environmental policy making and those related to education and training. Finally, it investigates the obstacles for the integration of skills development related to greening into relevant policies and strategies.

Section 3 of the report addresses the anticipation of skills needs. A number of themes are dealt with under this section, including identification of economic sectors undergoing change in response to greening policies and identification of retraining needs, greening of existing jobs and new jobs arising in the market as a result of these changes. In addition, five analytical case studies are provided in section three to further illustrate and support each of these trends. The case studies are used as supportive evidence to the changing labour market trends in response to new greening regulations. They are based on literature reviews, in addition to empirical analysis to illustrate these changes.

Section 4 outlines the main findings of the study, while Section 5 provides recommendations. Finally, Section 6 is an account of the short and long term action needed to implement the proposed recommendations.

In order to fulfil data requirements, an extensive desk study comprising a review of main secondary data on both environmental and skills development policy making in Egypt was undertaken. This was complemented by one-on one-meetings, including interviews and consultations with the main stakeholders at both the policy and operational levels.

1.1 Delimitations

- It needs to be emphasized that the team faced a number of challenges in formulating the case studies. In the area of retraining, there was a great difficulty in identifying retraining initiatives for workers in obsolete sectors. Some sectors were undertaking greening in terms of change in their technologies; however, they did not become entirely obsolete as sectors because of the greening economy. Moreover, since green jobs are still in an embryonic stage in Egypt, there is a very thin line between greening existing jobs and emerging new green jobs in the market. Distinction between the two categories was made to the extent possible.
- Occupational classifications and standards are defined in terms of *the activities performed by a person in a selected occupation* (e.g., a production manager develops and assess production plans, develops measures to enhance productivity, reports to top management, etc.). Egypt is currently lagging behind in developing a nationally recognized occupational classification and in standardizing occupations and trades (only 105 occupations/trades have been standardized, non of which include green occupations), which makes it difficult to directly relate a skill identified to a specific occupation.

2. Policy context

2.1 Key challenges and priorities for the green economy

There is an increased burden on Egypt's limited natural resources because of the rapid population growth in Egypt, coupled with unsustainable economic activities. As a result, a number of key environmental challenges, including air and water quality, waste management, coastal pollution, nature protection and desertification are facing Egypt.

Air quality is deteriorating in Egypt, particularly in Cairo and Alexandria, where more than 80 per cent of the country's industrial activity takes place. The main causes are energy-inefficient production techniques, smelters and solid waste dumps, along congested roads and natural environmental hazards, such as dust and seasonal sand storms. Air quality is also affected by air emissions from heavy metallurgical industries, refineries, cements and power plants, as well as an obsolete transportation sector. [3]

Water quantity and quality are both negatively impacted. There is acute water scarcity whereby per capita water share is expected to decline from a current level of $900m^3$ to about $670m^3$ in 2017. Unsustainable usage of the Nile water is one of the main contributing factors, either in unsustainable irrigation techniques, high network losses of potable water or poor services related to water coverage in rural areas. Water quality in the River Nile and the canals is deteriorating because of disposal of municipal and industrial solid and liquid waste. Drainage canals are heavily polluted, with a high average of Biological Oxygen Demand (BOD) and mean probable number (MPN) of total coliforms, amounting to 300 mg/l and 8000-10,000 MPN respectively, which exceeds by far the Egyptian set standards of 20-40 mg/l and 500-1000 MPN.[4] In spite of estimated sanitation coverage of 97 per cent for urban and 70 per cent for rural

[3] World Bank, Country Environmental Analysis of Egypt, 2005

[4] Ibid.

households, the lack of connection to the sewerage system remains a serious threat with an only less than 5 per cent of households connected in rural areas.[5]

Waste management remains one of the main challenges to the environment in Egypt. Moreover, the waste management system at large of both hazardous and non-hazardous municipal, agricultural, construction/demolition and industrial waste is inefficient.[6] An average of 15.3 million tons of municipal solid waste is generated each year, out of which almost 2.5 million tons remain uncollected and lack appropriate sanitary landfills for their final disposal.[7]

With regard to nature protection, there is currently a network of 27 protected areas in Egypt, which covers almost 15 per cent of the country's territory. Protectorates Law No. 102 for the year 1983, defines a protected area a "as any area of Land, or coastal or inland water characterized by flora, fauna, and natural features having cultural, scientific, touristic or esthetic value."[8] Protected areas are designated by the Prime Minister who is provided this authority by virtue of the aforementioned law. A Prime Minister's decree "defines the limits of each protected area and sets the basic principles for its management and for the preservation of its resources"[9] based on recommendations of the Egyptian Environmental Affairs Agency (EEAA). Egypt has a significant natural heritage comprising a wide range of rare species and unique habitats. However, the rapidly growing population puts an increasing pressure on natural resources, resulting in the fact that habitat destruction remains one of the largest threats to biodiversity in Egypt. In addition, there is a general lack of public awareness as well as of resources, which is leading to loss of biological diversity. Serious ecological problems resulting from both pollution and unsustainable developments have brought about phenomenon such as shoreline erosion and flooding.[10]

The above environmental challenges have contributed to climate change threats. Serious ecological problems are manifested in shoreline erosion in coastal zone areas, and the Delta region faces problems of possible flooding because of rising sea levels. In addition, agricultural productivity could be negatively impacted by the increase in average temperatures. Human health hazards are also prone to increase, as climate change may lead to possible outbreak of vector-borne diseases.[11]

Energy-related emissions contribute to 71 per cent of the GHG emissions worldwide. In 2004, Egypt's total carbon dioxide (CO2) emissions were estimated at 158 million metric tons, which represents some 1 per cent of the total world emissions.[12] In spite of this, the trend in Egypt is alarming as emissions escalated by 40 per cent between 1996 and 2004. A number of sectors are major contributors to greenhouse gas (GHG) emissions in Egypt, primarily including: the energy sector (22 per cent); manufacturing (19 per cent); transport sector (18 per cent); agriculture (15 per cent), small combustion (9 per cent), non-combustion emissions in industry

[5] Ibid.

[6] EU, Egypt Country Strategy Paper 2007-2013

[7] World Bank, Country Environmental Analysis of Egypt, 2005

[8] Law No. 102 for the year 1983.

[9] EEAA. http://www.eeaa.gov.eg/English/main/Protectorates.asp.

[10] Ibid, and EU, Egypt Country Strategy Paper 2007-2013

[11] Ibid.

[12] Data calculated in 2007 by the Carbon Dioxide Information Analysis Center (CDIAC), based on data mainly collected by country agencies for the United Nations Statistical Division.

(9 per cent), and waste (5 per cent). The analysis of the future trends in GHG emissions in Egypt indicate that they may triple by 2017, compared to 1990 levels.[13]

2.2 The response strategy

This section outlines Egypt's response strategy related to the environment and the greening economy, and is divided into two subsections. The first deals with the general environmental strategy of Egypt, while the second addresses the green response to the economic crisis.

2.2.1 General environmental strategy

a) General country strategy in environment and sustainable development

This section aims at shedding light on the general country strategy in environment and sustainable development. The need to attain sustainable economic growth and development at large is recognized at the national level and is reflected in national socioeconomic plans produced by the Ministry of Planning (MoP). National Socioeconomic policy and planning in Egypt at large is guided by a long-term development vision until 2022. The vision addresses economic improvements, social welfare, and sustainable use of natural resources[14] through a set of directives as reflected below:

- Conservation of natural resources and direction of urban growth towards desert land
- Steady reduction of current population growth rate
- Achievement of high and sustainable Gross Domestic Product (GDP) growth
- Gradual removal of balance of payments deficit
- Alleviation of poverty and attenuation of income disparities
- Development of human capital and attainment of full Employment
- Improvement of social services[15]

The vision emphasizes the need to converse natural resources in an effort to attain sustainable economic growth. Specific environment policy making and planning is largely mandated to the EEAA. EEAA has a wealth of strategies and plans, which tackle different aspects of environmental issues. Problems pertaining to horizontal and vertical integration and mainstreaming of environmental policies into other economic sectors, have been reflected in several documents for example, “A Proposed Coordination Mechanism for the Three Rio Conventions Report” and Egypt National Capacity Self-Assessment (NCSA): National Strategy and Action Plan for Capacity Development” among others. These problems were further acknowledged and emphasized by different stakeholders who were interviewed during the scope of this study.

This section will shed light on the most significant strategies and policies, tackling environment and sustainable development in Egypt. Until the early 1990s, environment policy and planning was not particularly high on Egypt’s political and economic agenda. The 1970s and 1980s were marked by economic development, which was achieved at the expense of over-exploitation of natural resources and degradation of the environment at large. During this period,

[13] Global Environment Benefit Assessment Analysis & Environmental Institutional, Legal and Policy Framework Analysis, 2007

[14] Environmental Sector Programme, Danida.

[15] Socioeconomic Long Term Vision 2022. http://www.mop.gov.eg/english/PDF/PART%201.pdf

Egypt was in a state of "environmental neglect"[16] with serious problems pertaining to lack of water supply and sanitation, land degradation and waste management.

During this period, a number of heavy polluting industries emerged, which was highly dependent on heavy fuel and environmentally unsustainable operations. The most significant were constructed along the Nile mainly Kima Fertilizer Company and Misr Aluminum Company in Aswan, cement factories in Helwan and fertilizer companies and refineries in Alexandria. Power plants and heavy industries were dependent on heavy fuel which contained high sulfur content. In addition, the building of the Aswan High Dam, altered the Nile silt deposition of agricultural land in Egypt and in effect led to the increase of its reliance on fertilizers and hence contributed significantly to the soil pollution and deterioration of surface water and groundwater quality[17]

Among the first attempts to regulate the environmental sector in Egypt in the 1980s, were embodied in the issuance of two laws, namely, Law No. 48/1982 that tackled pollution control for the water resources in Egypt, and Law No. 12/1984 which was responsible for the management of water resources related to irrigation. An important milestone was further reached in 1984 with the establishment of the EEAA, as a coordinating body reporting to the Council of Ministers. EEAA's Board had at that time 15 staff members, and was primarily concerned with the protection of marine resources in the Red Sea, as well as monitoring water quality.[18]

The 1990s witnessed the first signs of "reconciliation" between environment and development in Egypt. The notion was largely attributed to the Economic Reform and Structural Adjustment Program (ERSAP), which Egypt adopted since 1989. The late 1980s witnessed a major decline in the economic performance of the country, which led to the adoption, and implementation of the ERSAP. To ensure a successful implementation of this program, there was a need to adopt more sustainable economic development patterns and hence environmental considerations started rising on the political agenda. In 1992, the World Bank and other international donors provided support to Egypt to prepare the first National Environmental Action Plan (NEAP). The 1992 NEAP is considered the initial policy instrument used to address environmental policy issues and challenges in Egypt.[19]

In 1994, Egypt worked on laying down the legal framework for environmental protection by drafting Law No 4/1994 and its executive regulations. The law redefined the role of EEAA, granting it new responsibilities including the formulation of strategies, policy directives and management guidelines in different environmental areas. Subsequently, in 1997, an increased political support for environmental protection was manifested in the assignment of a fully dedicated MSEA to head the Board of EEAA for the first time. Law No. 4/1994 was amended in Law No. 9/2009 to strengthen and update the environmental legislation, which, among other things, included new regulations for collecting, transporting and treating solid waste and prohibition of burning and dumping waste, as well as better regulation of the environmental consultancy work by suggesting the development of a system for registration in EEAA.

In 1998, the MSEA published a seven-point policy implementation framework. The seven policy directives read as follows: "to foster partnerships and coordination at national level; to enhance partnerships at bilateral, regional and global levels; to implement the 1994 Environment Protection Law; to enhance nature protection; to strengthen the Egyptian Environmental Affairs

[16] World Bank, Country Environmental Analysis of Egypt, 2005

[17] Ibid

[18] Ibid.

[19] Ibid.

Agency (EEAA); to support environmental management systems; and to use market-based instruments."[20]

The year 2002 witnessed a number of milestones on the part of EEAA. On the one hand, EEAA management formulated a vision for EEAA to include economic and social aspects in sustainable development, and on the other hand, to integrate the environmental dimension into national policy plans and programmes. The five-year EEAA work plan 2002-2007 spelled out these priorities, including capacity building, both within EEAA and at the local governorate levels. The plan had a directive dedicated to environmental education, training and awareness, which aimed at raising public awareness of environmental issues and development of human resources within the field of the environment.[21] Another directive was concerned with capacity development of EEAA and RBO's with the objective of supporting the institutional structure of environmental management at the national level.

In the same year, the updated NEAP was finalized by EEAA, and the aim was to use this action plan as the main "environmental source document" for other ministries to use in integrating environmental considerations. The NEAP covers the period 2002-2017 and addresses key environmental issues, such as water quality, air quality, management of land resources, desertification, protection of the marine environment, solid waste management, biodiversity and biological safety.[22] Integration of environmental considerations into all relevant national policies, plans and programmes is considered an overall strategic objective of Egypt's environmental policy. The NEAP recognized the importance of developing Governorate Environmental Action Plans (GEAPs) to set environmental priorities and actions at the local level. A number of GEAPs were developed, mostly with the support of donor-funded projects; however, their implementation was largely constrained by lack of financial and technical capabilities. The NEAP, according to the "Country Environmental Analysis" study can be "viewed as an impressive diagnostic document with qualitative analysis of the environmental issues but with little quantitative analysis for setting priorities". The documents lack any estimated costs for its proposed actions and has neither "complete targets and detailed plans nor an effective legal instrument to guide and support its implementation.[23]

In 2002, EEAA issued the National Strategy for Cleaner Production. The strategy acknowledges the NEAP and states that "The national strategy for cleaner production has a specific focus and therefore intersects with a number of specialized documents (e.g. those energy related) and elaborate on the principles expressed in the more general ones (e.g. NEAP)."[24]

The strategy states three main objectives:

- To define cleaner production and contrast it to other measures for achieving environmental compliance, such as end of pipe treatment
- To clarify the advantages of cleaner production to the Egyptian industry and other stakeholders
- To identify the barriers which may hinder the wide application of cleaner production in the Egyptian industry

[20] Egypt Country Strategy Paper 2007-2013

[21] EEAA Five Year Plan (2002-2005). http://www.eeaa.gov.eg/english/main/policies4.asp

[22] Ibid.

[23] World Bank, Country Environmental Analysis of Egypt, 2005

[24] EEAA, Cleaner Production Strategy, 2002

In 2007, in the context of realizing sustainable development goals, a "National Framework for Sustainable Development in Egypt", was developed with the objective of laying down the foundation for creating a national sustainable development strategy to create "harmony" between economic, social, and environment dimensions.[25] The framework does not make clear reference to the 2002 NEAP. The Framework was developed through a consultation process headed by the Minister of State for Environmental Affairs and relevant stakeholder ministries. Concisely, it illustrates in a bullet points form, the main factors essential for attaining sustainable development across different sectors, for example, transportation, tourism, agriculture…etc. HRD is briefly mentioned under some sectors as one of these factors. However, the framework does not include an exclusive skill development component and only refers to a number of policy tools essential for achieving sustainable development in Egygt mainly: institutional, legal and economic tools. The national sustainable development strategy is still under development.

b) Measures in response to climate-change related issues

In response to climate change-related issues, Egypt has taken a number of key steps, and the following provides the main achievements, as presented by EEAA:[26]

- In 1999, Egypt issued its Initial National Communication on Greenhouse Gases and developed a National Plan on Climate Change.
- In 2005, Egypt ratified the Kyoto Protocol, and announced EEAA as the Egyptian Designated National Authority (DNA) for the Clean Development Mechanism (CDM); consisting of the Egyptian Bureau (EB-CDM) and the Egyptian Council for Clean Development Mechanism (EC-CDM).
- In 2007, EEAA restructured the National Committee of Climate Change to act as a coordinator on the national level concerning all climate change-related issues, and to develop policies, strategies and implementation mechanisms in this respect.
- The DNA has approved 36 CDM projects across different sectors, including: New and Renewable Energy; Industry; Waste Recycling; Afforestation; Energy Efficiency; and Fuel Switching to Natural Gas. The total amount of investments in CDM projects is estimated at 1,200 million US dollar. According to EEAA, these projects are considered as a "source for attracting foreign investments, providing employment opportunities, and contributing in the implementation of Sustainable Development plans in Egypt." [27] Some of these projects are finalized and others are still in the implementation phase. There is no data available regarding employment opportunities generated.
- At the global level, Egypt is a signatory of a number of multilateral environmental agreements, including three Rio conventions, namely, the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification.

Framework of environmental legislation

Law No. 4/1994 is the main legal framework guiding environmental protection in Egypt. It spells out the roles and responsibilities of EEAA, sets standards for pollution abatement and nature conservation and levies penalties associated with violations. Other sector specific

[25] Egypt National Capacity Self-Assessment (NCSA): National Strategy and Action Plan for Capacity Development", 2007.

[26] The Egyptian Environmental Affairs Agency
http://www.eeaa.gov.eg/English/main/env_ozone_ecc_neg.asp

[27] Ibid.

legislations are developed and implemented by relevant key ministries. The most important, concisely, are as follows:[28]

- **Air quality**: Environmental Law No. 4/1994 covers the main legal framework for air pollution. In 1973, a law on transport air pollution was adopted.
- **Water quality**: The most important laws are No. 48/1982 Law on protection of the River Nile and No. 12/1984 Law on irrigation and drainage.
- **Waste management**, the main legislation is No. 38/1967 Law on control of solid waste management, including hazardous waste.
- **Nature protection**: The guiding law is Law No.102/1983, on natural protectorates and biological diversity. By virtue of this law, the Prime Minister can declare certain areas as natural protectorates.
- **Industrial pollution**: There is no specific legislation guiding industrial pollution per se, instead it is tackled across sectors whereby industries should comply to legislations guiding pollution control of air, water and waste as per listed above.
- Marine environment and coastal zones: Law No. 4/1994.

Constraints facing environmental strategy formulation and implementation with special application to skills development

In order to set the scene for the upcoming analysis of skills development related to greening the economy, it is imperative to highlight some of the main constraints associated with environmental strategy formulation and implementation in Egypt, especially those related to skills development.

In general, a number of key constraints face environmental strategy formulation and implementation, most importantly the following. The constraints mentioned below are reflected in a number of documents for example, Egypt National Capacity Self-Assessment (NCSA).[29] They are also based on the research team's analysis and deductions from interviews that were conducted during the course of this study:

- There is a lack of an integrated approach in developing most of the environmental strategies, national plans, and programs, which result in duplication and/or conflict in implementation. This issue further highlights the missing linkage between promoting environmental protection and developing the skills needed to achieve this. An example to this problem is seen in the NEAP and Framework for Sustainable Development in Egypt. Although in principal both documents are based on a consultation process between different stakeholders, the outcomes and recommendations of the documents were not translated into binding line actions to be implemented by different stakeholders. Irrespective of the development of these documents, national and sector plans are still developed while neglecting the integrated approaches and result in the lack of mainstreaming of environmental considerations. Further assessment of the causes and results of this phenomenon is out of the scope of this study.
- There is a lack of proper enforcement of legislation already adopted, and sometimes a need for more detailed and elaborate legislation to protect the environment. Weak enforcement of environmental laws contributes to a lax implementation of environmental strategies, which, in turn, diminishes the need for a structured approach of skill identification and development in response to greening trends.

[28] Egypt Country Strategy Paper 2007-2013

[29] Egypt National Capacity Self-Assessment (NCSA): National Strategy and Action Plan for Capacity Development", 2007.

- Implementation mechanisms in support of environmental strategies, plans and programs are largely missing. This leads to *ad hoc* uncoordinated implementation effort, which jeopardizes the achievement of objectives. On the one hand, this is largely associated with a lack of demand to identify and develop skills in the public sectors to coordinate and implement strategies. On the other hand, while current environmental strategies, plans and policies indicate the need for capacity building, education and training, the skills development components in terms of skills identification are either missing, or lack a proper implementation framework. The 2002 NEAP, which represents Egypt's orientation for the environment until 2017, identifies the need for training and sets out clear-cut goals backed up with cross cutting sectoral activities to be implemented (Box 1 outlines the most relevant activities).[30] In the scope of this study, it was difficult to obtain data on the level of implementation of the NEAP actions in general. However, regarding the activities addressing training needs, interviews, whether with EEAA representatives or stakeholders in the Education and HRD sector - did not point out to the realization of any of these activities

Box 1. Activities addressing training needs in the NEAP, 2002

- Identifying workforce training needs and assess measures required to meet those needs, including a periodic review of progress in this area;
- Establishing "community-based" local training centers, reflective of the specific problem issues and characteristics of the region or locality, for example, urban environments, industrial problems, coastal environments, and biodiversity issues;
- Integrating environmental and development issues, as promoted by educational institutions, into existing training curricula and promote the exchange of methodologies and evaluations (e.g. "training the trainers" notion);
- Encouraging all sectors of society (Government, private sector, academia, and non-governmental organizations (NGOs)) to include an environmental management in all relevant training activities;
- Supporting training programs for business, especially SMEs (small and medium enterprises), to build capacity/skills pertaining to environmental auditing, technology, Best Practices, and environmental services markets;
- Establishing practical training programs for graduates from vocational schools, high schools, and universities, enabling them to achieve sustainable livelihoods;
- Contract cooperation protocols between the MSEA and other institutions with the capacity of understanding the training responsibilities, such as universities, research centers, Radio and Television Union, Al-Ahram Regional Institute for Journalism, Institute for Environmental Studies and Research, Institute for African Studies.
- Developing advanced environmental technical training courses, such as GIS (Geographic Information Systems) applications and remote sensing technologies; and
- Developing updateable national and regional environmental labour-market information systems and resource guides that would supply, on a continuous basis, data on environmental job and training opportunities.

The constraints facing environmental strategy formulation and implementations have taken their toll on the skills development mechanism, in response to greening initiatives in Egypt, as will be illustrated in the sections that follow.

2.2.2 Green response to the current economic crisis

There is no "Response Strategy" per se to the economic crisis in Egypt,. However, like many countries in the world, the Egyptian Government has adopted a policy focusing on fiscal stimulus plans and a marginal relaxation of the monetary policy to combat the impacts of the current economic crisis. Dr. Youssef Boutros Ghali, Minister of Finance, acknowledges the financial crisis in his testimonial in the Egyptian Competitiveness Report of Egypt in 2009. In this respect, he stresses the need to focus equally on "sustainable long term growth and competitiveness," not only to overcome the current crisis, but also to prepare Egypt for responding to global changes and needs in the markets beyond the crisis.

[30] The National Environmental Action Plan, 2002.

Egypt has committed 5.4 billion dollars to an economic stimulus plan to "confront the repercussions of the global financial crisis. The allocation has been earmarked for infrastructure projects and export subsidies aimed at compensating for falling foreign direct investment (FDI) and declining overseas demand."[31] A Parliamentary report released in March shows that GDP growth fell to 4.1 per cent in the last quarter of 2008 compared to 7.2 per cent in the previous fiscal year. It is estimated that this will result in a loss of up to half a million jobs.[32] Egypt's unemployment rate increased to 9.4 per cent in the first quarter of 2009, compared to 8.8 per cent the previous quarter.

According to a study conducted by the Center for Trade Union and Workers Services in June 2009, "(There is) a rising phenomenon of business owners exploiting the global financial crisis as an opportunity to dismiss employees without paying them their legal financial rights."[33]

Some countries, such as China, South Korea and the United States, have integrated clear-cut financial stimulus plans in the area of climate change mitigation. For example, South Korea has dedicated 20 per cent of its financial stimulus schemes to cleaner energy.[34] This will most likely increase the demand for green jobs in the market, in addition to creating new job opportunities, as recent studies confirm that a transition to a low carbon economy should not be a "job killer," but rather lead to a net increase in employment. [35]

To date, Egypt is not among the countries that have an explicit green response to the current economic crisis. While the use of green stimulus plans reflect a strong "political will for a number of governments for securing future growth through greener economic development,"[36] the lack of it in Egypt, underlines the fact that greening the economy in Egypt is still in an embryonic stage.

2.3 The skills development strategy in response to greening

This section aims to highlight the institutional framework guiding skills development in Egypt at large. It also investigates the existence of skills development strategy, in response to climate change and environmental degradation and the linkages, in terms of complementarity, relevance and coordination, between environmental policy making and those related to education and training. Finally, it also investigates the impediments for the integration of skills related to greening in relevant policies and strategies.

The mandate for skills development through education and training in Egypt is shared among many stakeholders, including: the Ministry of Education (MoE); the Ministry of Higher Education; and line ministries with their own supply-driven training infrastructures which for long has not been able to respond to labour market needs. These line ministries include, inter alia: the Ministry of Trade and Industry (MoTI); the Ministry of Manpower and Emigration (MoME); the Ministry of Housing, Utilities and Urban Development (MoH); the Ministry of Social Solidarity; the Ministry of Agriculture and Land Reclamation; the Ministry of Transportation; the

[31] IPS, Egypt: Workers reeling under financial crisis http://ipsnews.net/news.asp?idnews=47234, 16 June 2009

[32] Ibid.

[33] Ibid.

[34]UNEP. Economic crisis hits EU and US clean energy as emerging economy investments rise 27% to $36

http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=589&ArticleID=6201&l=en&t=long

[35] ILO, The social and decent work dimensions of a new Agreement on Climate Change, June 2009

[36] UNEP. op. cit.

Ministry of Electricity and Energy; the Ministry of Health and Population; the Ministry of Water Resources and Irrigation; and the Ministry of Tourism (MoT).

In pursuit of enhancing the coordination for identifying the skills and specializations required in the labour market, both at policy and strategic level and between the multiple ministries and agencies working in education, technical education and training, and business, a number of coordination mechanisms have been developed at different levels. (See Box 2).

On the operational level there are multiple, and sometimes overlapping, responsibilities among different organizations. Examples include, among others, the institutional arrangement for early identification of skills requirements and labour market forecasting (Box 3), and the transfer of the findings into occupational profiles and curricula. (Box 4)

Box 2. Skills development coordination mechanisms

The first form of skills development coordination mechanisms exists at the ministerial level including the Supreme Council for Human Resources Development[37] (chaired by the Minister of Manpower and Migration), The Human Resources Development Committee (chaired by the Minister of Military Production), and the Technical Vocational Education and Training Committee (Chaired by the Minister of Education). The main role of these mechanisms is to set policies and provide the strategic direction for human resources development in Egypt.

The second form of mechanisms is the establishment of three Training Councils[38] within three line ministries, Ministry of Trade and Industry, Ministry of Housing and Urban development and Ministry of Tourism, for the purpose of coordinating and enhancing the quality and relevance of the provision of training activities to the three economic sectors, including: the Industrial sector, the Building and Construction sector; and the Tourism sector. The Boards for these training councils include private sector, government officials, education and training authorities.

A third form is the formulation of 12 sectoral Enterprise Training Partnerships (ETPs)[39], which act as a feedback mechanism between employers and the technical education and training systems. These ETPs were established with the aim to develop and/or strengthen a demand-driven approach for the formulation and provision of training services to the productive sector. The partnerships are comprised of groups of enterprises from the same sector[40], or sharing common technical skills needs, with public and private technical and vocational education and training (TVET) centers covering the different components of the TVET system and capable of meeting the enterprises training needs. These ETPs are legally established via ministerial decrees and plans to be sustainable through provision of services.

A common observation – by the research team, among all these coordination mechanisms is the absence of a representation of the MSEA, which clearly reduces the prospects that these mechanisms would address skills development in relation to environment and sustainability issues.

The three forms of coordination mechanisms operate at different levels, all together, offering the potential for adjustment of skills' provision to the demand of the greening economy.

[37] Established by a Presidential Decree in 1982 and reactivated by a new Presidential Decree issued in 2000.

[38] Industrial Training Council (ITC), Construction Skills Development Council (CSDC), Tourism Training Council (TTC), established in 2006 and 2008.

[39] As part of the TVET Reform Programme; a 66 million Euro Project, co-financed by the EU and the GoE, under the auspices of the MoTI, for a duration of 6 years commencing mid 2005

[40] of which eight ETP for manufacturing sector, two for building and construction and two for tourism sector.

Box 3. Mechanisms for labour market forecast

- There are a number of institutions responsible for identifying current and future skills needs, among which the main ones are: Central Agency for Public Mobilisation and Statistics (CAPMAS); Ministry of Manpower and Emigration (MoME) and the Egyptian Education, Training and Employment Observatory (EETEO).
- **CAPMAS** was established in 1964 by the Presidential decree No. 2915/1964, as the official source for providing the country's organizations, universities, research centers, individuals and international organizations, with data, statistics and information for planning, development, and evaluation for policy and decision-making purposes.
- However, most of CAPMAS statistics deal with the existing situation rather than forward-looking predictions. For instance, forecasting in the field of training is not a favored field, unless a special project or a special survey is needed. In such cases, CAPMAS is not allowed to distribute this information without the permission of the client, which usually keeps this information for its own objectives.[41]
- **MoME** is the main ministry dealing with all matters related to the labour force's working condition, relations, employment and training. Within the MoME, the **Central Administration for Research and Studies** is responsible for designing and implementing annual research and studies, as bases for balancing the supply and demand of the labour force, on which policies and recommendations can be prepared to serve the labour market planning objective.
- Field studies are conducted annually and are usually sectoral, covering the status of labour force, the level of wages, employment opportunities, the level of productivity, future development, training needs, job creation costs and education status, etc. Information is collected through the labour offices in the governorates, computerized in the ministry's computer section and analyzed by the Central Administration. Copies of the studies are then circulated to concerned ministries and organizations.
- However, the main perception is that the field studies and research outcomes are not indicative of the actual situation due to shortage of proper methodology and lack of financial resources to carry out the field work and analysis.
- The **EETEO** was originally initiated by the European Training Foundation (ETF) in 2005,42 and operates within the Information and Decision Support Centre (IDSC).[43] EETEO acts as a coordinator for the various agencies working in the education, training and employment fields,[44] and the main objective of the observatory is to contribute to well informed decision making through quality data, analysis and policy advice. Among other things, EETEO prepares a comprehensive information system for demand and supply in the labour market, sets indicators for the required professions and the numbers of employees needed in each profession, carries out research and studies in the subjects related to education, training and employment, which help the decision maker formulate education, training and labour market policies.[45]
- In spite of the fact that the EETEO, in terms of its institutional setting and activities, is still at in a pilot phase, especially in labour market forecasting, it has already positioned itself as a valuable and reliable source of information in the area of TVET and LM at the national, regional and even international level.

None of the existing labour market forecasting mechanisms in Egypt had so far addressed or analyzed skills for green jobs. Moreover, no entity is currently responsible of collecting systematic data on the skills and knowledge base of the workforce necessary to sustain the shift to a greener economy. On the other hand, there is a good understanding of green skills

[41] European Training Foundation (ETF), Structures and mechanisms for information and needs forecast on training, qualification and employment, The Observatory Function Egypt, 2003

[42] The ETF is an agency of the European Union based in Turin, Italy. It works with transition and developing countries to apply HRD strategies to socioeconomic development. As the EU's centre of expertise, ETF supports education and training reform in the context of EU external relations programmes.

[43] Established by a presidential decree in 1985 within the Cabinet of the Prime Minister with the objective of accelerating the socio-economic development using relevant information technology. The IDSC is also inked to 87 information centres in the ministries and authorities, 112 public services and economic agencies, and 442 governorates and affiliated specific directorates and main departments, as well as 853 information centres in towns, districts and villages.

[44] The members of the working group/network, the steering committee and the task force have been defined and consolidated to include representatives of a variety of public and private education, training and labour market institutions which allows embedding the project into the Egyptian institutional environment.

[45] IDSC and ETF, Egyptian Education, Training and Employment Observatory, Nov. 2006

requirements among organizations concerned with the environment and various agencies implementing and piloting different mitigation measures for climate change and environmental degradation. As reflected in section 2.1, the NEAP has identified the need for labour market information systems; however, due to institutional and technical constraints related to implementation, this need has not yet been translated into concrete action.

Box 4. Occupational standards and curriculum development

The traditional mechanisms for curriculum development are through the **MoE**; The Technical Education Unit (for Secondary Technical Education) and the **Centre for Curriculum Development and Instructional Materials Development (CCIMD)** (for General Secondary Education). The CCIMD was established by the Ministerial Decree no 176/ 1990 for the purpose of designing, field testing, revising, monitoring, and evaluating curricula and instructional materials, as well as training teachers in using revised curricula and the corresponding Instructional material. The main tool for skills identification and formulation are curriculum committees, assembled on *ad hoc* basis, including experts from the MoE, from higher education, private sector and federations, to review and develop new materials.

Furthermore, the **Ministry of Manpower and Emigration (MoME)**, which is the designated authority for issuing occupational licences for individuals,[46] through its technical training sector, has developed 325 occupational profiles, including theoretical and practical means to measure skills at two skill levels (basic and skilled).[47] The need to develop a certain occupational profile is identified by the MoME offices at the level of governorates, where these receive request for licensing, then the governorate transmits this need to MoME's Central Training Unit (CTU). Accordingly, a committee is formulated by the CTU, which consists of four participants (two MoME internal experts and two external experts, either from the Ministry of Education or from a relevant sector).

Two of the three **Training Councils** are currently updating and completing the outputs of the National Skills Standards Project (NSSP) in relation to their respective sectors. The NSSP is a project financed by the GoE through the Social Fund for Development (SFD), which commenced in 2000 and extended to June 2005, for the purpose of equipping the Egyptian workforce with the skills required, to meet the current and future needs of the national and international labour market. To achieve this objective, the project aimed to create a sustainable system that will allow for the development and delivery of skill standards, implemented and evaluated initially in three sectors (Manufacturing, Tourism, Building and Construction), and to benchmark the standards against the best European practice.

In addition, the **TVET Reform Programme,** co-financed by the EU and the Egyptian Government (Euro 33 million EU Fund, which was matched by the same contribution by the Egyptian Government) and managed by the Ministry of Trade and Industry, has the objective of securing a demand-driven provision of skills, through building partnerships between enterprises and TVET institutions, where the enterprises are taking the leading role. The partnerships are between groups of enterprises from the same sectors, and/or sharing common technical skills needs, with public and private TVET providers covering the different components of the TVET system (from technical education to Vocational Training Centres managed by different ministries). Twelve ETPs in 12 sub-sectors have been established and are currently working with other organizations, such as the Industrial Training Council and their relevant chambers for the development of Occupational Profiles and supporting the completion of the NSSP.

Notwithstanding the common understanding among environmental organizations and programs of the importance to integrate the skills and concepts of greening in the education and training curricula in order to enable environmental sustainability, which is reflected in policies, strategies and programme reports, to date, a number of initiatives have been undertaken, which include components for skills development, however, it is not possible to classify them as "skills development strategy". As an example, the NEAP included skills development components which were not implemented. Similarly, the National Cleaner Production Strategy is a generic document which acknowledges the need for capacity building, but has no specific proposals in terms of skills needed or means to develop them. In addition to this, training within EEAA, as the

[46] New Labour Law No. 12/2004

[47] Initially this initiative was financially supported by the USAID and adopted the NSSP methodology which included Trade committees were formulated to carry out the functional analysis and development of standards including assessment criteria as well as writing the training material. Professionals from private sector (employers), representatives from technical education, vocational training centres and trade unions were all members of these trade committees with the federations, as the representation of the sector, playing the role of the coordinator and facilitator. Currently, with the limited financial resources, a different methodology is used.

organization mandated with environmental management, is limited to raising environmental awareness especially in schools. Training programs conducted by EEAA are internal and directed to civil employees, other specialized trainings in CP related concepts are conducted by EEAA, but almost always are supported by donor funded projects.

The lack of a skills development strategy, could be attributed to the lack of coordination between the multiple ministries and agencies working in education and training, and businessmen, on the one hand, and those working on environmental issues,[48] on the other hand, which hinders the ability to identify and supply the labour market with the green skills and specializations needed. This notion stems from the review of available strategies, policies and programs in relation to skill development, and it has been further confirmed by the statements of relevant stakeholders, who were interviewed during the course of the study.[49]

Furthermore, there is an apparent separation between the environmental policies and the skills development policies, as none of the main environmental institutions has a role in the policy and strategy formulation process or mechanisms (Box 1), such as the SCHRD, the HRD committee and the TVET committee. In addition, ministries, agencies and institutions concerned with education and training do not take part in the process of developing environmental policies.

Most of the mitigation measures adopted to combat climate change and environmental degradation, only briefly points to the skills implications and needs of these activities; however, there is no evidence that attempts have been made to share this with the education and training systems.

A number of obstacles that hamper the skills development for a transition to green economy include: the lack of an agreed national framework for coordination among various organizations, ministries and agencies, whether policy makers or implementers; and the absence of a formal communication channel between organizations and institutions concerned with skills development and those developing and implementing environmental policies and strategies.

Opening communication and collaboration channels between the various organizations concerned with the issue of environment at all levels (policy and operation levels), and the various organizations and agencies active in education and training is crucial for paving the way for a skills development strategy that would address the future needs of greening.

In general, TVET, in-company training, continuing vocational training (CVT) and higher education are crucial in promoting green skills among the population. While the in-company training should provide companies with immediate skills, the integration of the demand for green skills with TVET and CVT would ensure equipping the labour force with the skills needed for manufacturing, installing, operating and maintaining new technologies, as well as educating generations of students and young workers to take up new green jobs. Furthermore, students of higher education, the future decision makers in industries and government, providing engineering and financial services, should be able to recognize the greening concepts and thus influence the behavioral changes in the long run.

[48] Seventeen institutions are involved in environmental matters in Egypt, example of which are; MSEA, NREA, EEAA, MED TEST ENCPC, COAE, EC-CDM, UNEP.

[49] A series of interviews were conducted with officials in the environment, education and training sectors. They are indicated in the list of references below.

3. Anticipation and provision of skills

Section three of the report addresses the anticipation and provision of skills. A number of themes are explored under this section, including the identification of economic sectors undergoing changes in response to greening policies, the identification of retraining needs, and the greening of existing jobs and new jobs arising in the market as a result of these changes.

3.1 Green structural change and (re)training needs

3.1.1 Green restructuring and its impact on the labour market

Environmental policies in addition to a considerable amount of resources are being directed towards adopting and undertaking mitigation measures to combat climate change and other environmental challenges, the most important of these are identified within the Sustainable Development Environmental Criteria for Project Selection within the Egyptian CDM Framework.[50] These criteria include: reducing GHG emissions; reducing the use of fossil fuels; conserving local resources; reducing pressure on local environment; providing improved health and other environmental benefits; and meeting renewable energy targets.

As a result of these mitigation measures, some sectors and economic activities, especially those having high environmental impact, experiencing major employment shifts as they strive to eliminate their negative impacts on the environment. Given the scope of this study and the difficulty to obtain data for analysis, four sectors which are directly related to these mitigation measures will be included for analysis; namely, energy, manufacturing, agriculture and waste management. Other sectors which could possibly be impacted but will not be tackled in this study include tourism, construction and building and materials.

The foreseen employment shifts in these sectors will favor jobs in the environmental sector and/or jobs requiring specific environment related skills, as will be elaborated later in this report.

Firstly, the **energy sector** is one of the major sources of air pollution, as well as a threat to ecosystems, contributing to more that 70 per cent of total GHG emissions, of which 35 per cent is attributed to the electricity sector, in addition to oil spills stemming from off-shore oil exploration. The most important mitigation measures encouraged by the Egyptian Government to combat the impact of the energy sector on the environment, as well as to meet the short and long term national energy demand, are activities undertaken in the fields of **renewable energy** [51] and **energy efficiency**.

The most prominent type of renewable energy applications in Egypt is the **wind power development.** Egypt has been identified to have many favorable points in this regards, most importantly: wind resources that are among the best in the world; availability of ample land with low alternative economic value; an increasing demand for electricity and other sources of energy; air quality considerations in the major cities are a key environmental concern; strong existing donor support, including studies, capacity building and grants.[52]

[50] CD4CDM – Fourth Regional Workshop, Tunisia, 2004.

[51] Implemented by NREA, an organization established in 1986 that has the mandate to develop RE resources, as well as to conduct information dissemination and training programs to raise the public awareness on RE.

[52] Clean energy investment in developing countries: Wind power in Egypt, International Institute for sustainable development, March 2009

The direct and indirect benefits of developing large scale grid-connected wind farms in the country are, among others: saving natural gas and oil; protecting the environment through the use of clean energy; contributing to capacity building and knowledge transfer; contributing to develop remote desert areas; and stimulating local manufacturing of about 25 per cent of the wind projects' material.[53]

The Egyptian Wind Energy Program commenced in 1993 with pilot plants and a demonstration wind farm in Hurghada, consisting of 42 wind turbines, where the towers and blades were manufactured locally. All following projects have been in the Zafarana area on the coast of the Red Sea. In addition, a two phase extension plan, extending beyond 2012, is in place, aiming to involve international donor agencies and the private sector. [54] Furthermore, the GoE is deliberating an **energy efficiency** policy and plan, which is expected to lead to the reduction of energy use by 8.3 per cent through energy efficiency implementations by 2022. Initiatives to create an institutional framework for energy efficiency in Egypt were debated on the highest political level in Egypt throughout 2008, which among other things, included deliberations on an Energy Efficiency Agency and an Energy Efficiency Law. Moreover, a proposal elaborated by experts from six ministries was submitted to the Supreme Council of Energy, and a decision by the Council on the establishment of an Energy Efficiency Agency is expected in due course. There are a number of, considerably small scale, donor-assisted energy efficiency programs that are currently being implemented in Egypt in a number of sectors, including manufacturing, building and construction, tourism, and others.

Analyzing the employment trends related to wind energy to date, we can observe the following: [55]

- **El-Zafarana Wind Farm Project**: 60 Engineers and operation and maintenance specialists employed
- **Hurghada Wind Farm Project** : 50 engineers and operation and maintenance specialists employed
- **The Gabal El-Zeit Wind Farm Project:** This development, still in the feasibility study phase, will be constructed on the Red Sea coast and is expected to cost US$ 880 million and to be developed in 2010. The project is developed by Italgen, a subsidiary of Italcementi Group. When operating fully, the plant will generate an output of 350 GWh per year, and it will cut carbon dioxide emissions by 500,000 tons per year. The plant is expected to employ up to 40 workers for plant maintenance, in addition to more than 100 workers in the construction of the wind farm.[56]

  In addition to this direct employment in the wind farms, local manufacturers and suppliers of equipment are also expected to increase significantly in the market. Currently a number of local companies are operating in this field, both in manufacturing and in operation and maintenance. They are not merely specialized in supplying wind farms, but they integrate this line of production, within their already existing manufacturing schemes. It is difficult at this point of time to estimate the number of workers employed by these companies and who are directly involved in the wind farm local manufacturing only. The operations of these companies are elaborated in the case study on wind farms.

Companies currently operating locally in the production of wind farm components include:

[53] Energy Efficiency and Renewable Energy, Egypt - National study's summary, 2007

[54] Clean energy investment in developing countries: Wind power in Egypt, IISS, March 2009

[55] Interview with Eng. Asharaf Abdel Meged. NREA Consultant, Apr. 2010

[56]Ministry of Investment. http://www.gafinet.org/English/SectorsValuePreposition/GAFI-Sectors-REnergy.pdf

- Aarab Organization for Industrialization
- Haydelco
- Helwan factory
- Saqr factor
- Egyptian Company for Cables
- ElMaco company
- EGEMAC company
- ELJECT company
- NSK
- TEPCO company
- SWEEDY company
- Cairo for contractors Company
- DSD Company
- Nile Engineering Company
- Adham for Electric Works
- Banha for Electric Works Comapny
- Military Factory Company
- ElGindy Company

Furthermore, the Egyptian Government attempts to develop selective wind turbine components to serve the increasing demand of local and regional markets. Its goal is to commence on local manufacturing of turbine towers and blades to supply the local market with supplies adequate for 400 MW yearly. Medium and long term goals aim at supplying these products to emerging North African and Middle Eastern markets. It is estimated that the blade manufacturing project on its own will require investments of around US$ 59 million, while the tower industry is estimated at US$ 147 million per year. Employment generation on these projects are expected to be 400 new created jobs.[57]

Employment in the wind energy sector extends also to civil engineers and administrators in the New and Renewable Energy Authority affiliated to the Ministry of Electricity. Currently, 150 employees are employed by the authority in relation to this activity.[58] Given the Government commitment to increase the capacity of wind farms in the coming years, it is projected that wind energy would impact the employment in this field leading to the creation of 75,000 jobs by 2020.[59]

Secondly, the **manufacturing sector**, contributing to 20 per cent of the Egyptian GDP, employs approximately 15 per cent of the workforce, and is the source of a number of grave environmental impacts, such as industrial emissions affecting air and water quality, and old technologies and production processes resulting in an inefficient use of natural resources.

The main mitigation measures adopted to address the impact of the manufacturing sector on the environment, is in the form of adopting cleaner **production measures**, which aim at

[57] Ministry of Investment. http://www.gafinet.org/English/SectorsValuePreposition/GAFI-Sectors-REnergy.pdf

[58] Interview with Eng. Asharaf Abdel Meged. NREA Consultant, Apr. 2010

adjusting the production process in an effort to eliminate polluting activities. A number of cleaner production programs, initiated and supported by donors, are being implemented at the level of industrial establishment. This trend has greatly impacted employment on a number of fronts. On the one hand, the Egyptian Environmental Affairs Agency (EEAA) has created a number of Regional Branch Offices (RBOs) for itself, to undertake, among other things, inspection and ensure that industrial establishments abide with environmental regulations. Currently there are about 320 employed in eight regional branch officers, with an average of 40 employees in each office. In addition to this, 26 Environmental Management Units (EMUs) exist at the Governorate level in Egypt. An average of 15 people are employed in each office, and these are extended also to the Markaz and villages. In total, 2,000 employees are employed by the Governorates to overlook environmental management related issues. EMUs follow the Governorates administration wise, while they are affiliated technically to EEAA.

On another front, the need to adopt Cleaner production related techniques has also created significant employment in terms of increasing the number of consultancy firms which provide their services to different industries. It would clearly be very difficult to estimate the size of employment in this sector. However, we can shed light on a number of programs currently in demand in the market and are provided by companies in Egypt, which are triggered by the need to promote cleaner production techniques to abide by environmental regulations both internally and internationally: for example, ISO 14000, ISO 18001, HACCP (Hazard Analysis and Critical Control Points) for the food industry, ISO food safety (22000), REACH and ROHS relating to the use of hazardous materials, and Eco-labels and finally Energy Efficiency Measures. The adoption of Cleaner Production techniques has also triggered employment in terms of local manufacturing of machinery and spare parts used in these fields. Thirdly, the **agriculture sector** in Egypt is facing some key environmental challenges, such as: water contamination due to extensive use of fertilizers; impact of climate change on production practices and quantity; more extreme fluctuations in weather conditions witnessed over the past three to four years adversely affecting crop yield; inefficient use of resources and widespread reliance on unsustainable practices; and limited fertile land, which has been subject to a continuous degradation trends, including salinization and soil pollution from inefficient use of agrochemicals.

Organic agriculture is one of the main initiatives encouraged by the GoE, to mitigate climate change, due to the fact that: it reduces greenhouse gases, especially nitrous oxide, as no chemical nitrogen fertilizers are used and nutrient losses are minimized; it stores carbon in soil and plant biomass by building organic matter, encouraging agro-forestry and forbidding the clearance of primary ecosystems; and it minimizes energy consumption by 30-70 per cent per unit of land by eliminating the energy required to manufacture synthetic fertilizers, and by using internal farm inputs, thus reducing fuel used for transportation.

Fourthly, with reference to the **waste management sector**, poor waste management is directly related to GHG emissions resulting from open burning of waste. The burning of agricultural waste in Egypt has been accused of contributing up to 42 per cent of the air pollution problems in Egypt. Other fields of waste management include appropriate hazardous waste collection, disposal, and recycling to eliminate major health hazards associated to exposure to hazardous contaminants in air, soil or water either by direct contact, inhalation and or ingestion. Employment in the waste management sector has greatly expanded in the past years as a result of new regulations and or programs aiming to regulate this service and to combat its impacts on the environment. One of the main triggers to these growing employment trends, is the development of independent waste management systems based on segregation of hospital and hazardous waste from the municipal waste stream. Each type of waste is handled into a standalone system and in turn has also led to increased employment. One of the very popular programs adopted by the government of Egypt in the waste management sector and which has impacted employment is the privatization of waste services to international waste management companies. The introduction of these services has increased employment in this sector over the last years. It has been estimated that in Alexandria and Cairo Governorates only over 15,000 jobs were created related

to these initiatives in the private sector and 1000 monitoring related jobs in the public sector. [60] Finally, recycling of agricultural waste is currently promoted by EEAA as part of an overall initiative aiming at combating the black cloud phenomenon, and it is also expected to lead to job creation in this sector.

3.1.2 Identification of (re)training needs

The ToRs for this study restricts the definition of retraining needs to "retraining of labour who were previously working in sectors that became obsolete as a result of environmental regulations." In Egypt, while there are no sectors that have become entirely obsolete as a result of environmental regulations. In manufacturing, however, there are a number of highly polluting industries which undertook on the job retraining to comply with environmental regulations. Some of these industries were required by law, not only to adjust their production processes but were also required to relocate all together. Relocation plans of these industries often address the retraining needs for labour to adjust to the new operations, especially that the new factories usually comprise the use of new technologies. Most of retraining undertaken in these industries is in the form of on the job training and are mostly performed by the industrial facility owners.

Box 5. Relocation of the heavily polluting activities outside the populated areas[61]

Due to the variety of pollution sources especially within Greater Cairo, the Ministry of Environment has formulated a plan of the relocation of the polluting activities outside the populated areas, among them the smelters, quarries, potteries, crackers, brick factories and coal and lime facilities as well as 1,206 mining factories and 6,000 textiles factories.

This funding plan is based on the contribution of the owners of these activities, applying the principle " Polluter pays". The estimated budget of this plan is L.E. 1,745 million; the share of the government is about 15 per cent of its total. In addition to that, the government provides soft loans for the relocation of these polluting activities to the desert. The owners of these activities contribute to the remainder of cost.

The Ministry has, in cooperation with the competent governorates, identified the places of relocation of these polluting activities in El-Amal region in the Ain El Sokhna Road for all Cairo smelters and in Akrasha region for Qaluibia smelters, in addition to relocation of coal facilities to the industrial zone in Belbeis as well as the brick factories to Arab Abu Saad region.

The above mentioned relocation plan is still in the implementation phase and has not fully materialized.

In addition to the above, a number of other retraining needs arise in relation to implementation and or enforcement of environmental laws and legislations. Among the most important are retraining of Environmental Impact Assessment Consultants as well as retraining of environmental officers at the RBOs of EEAA. These two green occupations have existed in the market in Egypt since the mid 1990s as a response of requirements of Environmental Law No. 4 for the year 1994. However, both jobs currently require retraining and better regulations to ensure more efficient performance.

3.1.3 Skills response

In light of the above analysis, it is safe to say that there is no holistic skills response at a national level from the formal education and training systems in Egypt, with regards to green jobs. Skills response is in the form of training and retraining and is undertaken by several institutions on individualistic basis. Problems of coordination and duplication, as reflected above,

[60] USAID. http://www.usaid.gov/stories/egypt/cs_egypt_waste.pdf

[61] EEAA. http://www.eeaa.gov.eg/english/main/accomp21.asp

still overshadow these efforts. In this section, skills response in relation to training and retraining in manufacturing will be addressed to correspond to the identified needs in the above section. Skills response in relation to other sectors will be tackled in Section 3.2.4. Much of this training and retraining for green jobs related to manufacturing are undertaken by donor funded programs in Egypt, which often include capacity building components integrated within their programs. There are numerous examples across all sectors. Other forms of training and retraining are either conducted within training programs of different Ministries and or on the job training conducted in house by enterprises for their own labour force.

In the field of manufacturing, the Egyptian Pollution Abatement Program (EPAP) - which is a major industrial donor funded program, implemented by the MSEA to help industry improve performance and comply with environmental regulations, has a capacity building component. The Program has so far trained 1,500 candidates between RBO representatives, factory workers and auditors on several issues related to CP. Other programs such as Support for Environmental Assessment and Management (SEAM) and Environmental Sector Programs (ESP), also had significant capacity building activities. Box 6 provides an example to trainings provided by the ESP program to the RBOs in terms of subject and training days:

Box 6. Retraining of Regional Branch Offices of EEAA[62]

Training support to the RBOs – days	CDBA	Cairo RBO	Suez RBO	Assuit RBO	Total
Technical training	782	298	398	62	1,540
Management training	1,835	294	1,212	577	3,918
IT training	333	148	363	56	900
Laboratory training	468	17	101	59	645
ISO training	368	30	151	56	605
Total training	3,786	787	2,225	810	7,608

In addition to this, a number of institutional arrangements are in place in Egypt to adopt CP activities. These include the Industrial Modernization Centre (IMC), and the National Cleaner Production Centre (NCPC) both operating under the Ministry of Industry; the Environmental Compliance Office (ECO), within established in the Federation of Egyptian Industries (FEI) and the industrial unit as well as the Egyptian Council for Clean Development Mechanisms within EEAA.[63] All these organizations run a number of training programs in different issues related to CP applications. There are some examples for CP related training for workers undertaken by the enterprises, for example the Egyptian cement company is training their employees as part of the cement sustainability initiative

[62] ESP at a glance: Danida Environmental Sector Program in Egypt: 2002-2008

[63] EEAA. National Policy for Cleaner Production, 2004.

3.1.4 Case studies

1. Environmental Impact Assessment Consultants

The Environmental Impact Assessment (EIA) is a systematic process aiming at assessing the positive and negative environmental impacts of a given project, to ensure that it poses no threat to the environment and or to human health. The EIA process provides a framework for gathering and documenting data related to environmental consequences of activities to assess their environmental impacts, as well as the scope of "enhancing, modifying or mitigating them."[64] EIAs are conducted with the long-term objective of attaining sustainable economic development at large.

Within this context, Law No. 4/1994 for the protection of the environment and its executive regulations 338/1995 stipulate: "all new establishments and or upgrades or expansions of existing establishment should undertake an "Environmental Impact Assessment (EIA)", as a prerequisite for issuing permits. According to the EIA system, projects are classified into three different categories based on their anticipated levels of pollution; namely category (A or white), (B or gray) and finally (C or black). The competent administrative authority (CAA) is the authority under which the proposed project falls, for example the Ministry of Industry in the case of a manufacturing project. The CAA is responsible for providing the owner of the project with relevant information on the categorization of his project.[65]

- Category A requires an "Environmental Screening Form A" to be filled out and forwarded by the CCA to EEAA for review and evaluation.
- Category B requires an "Environmental Screening Form B" to be filled out and forwarded by the CCA to EEAA for review and evaluation.
- Category C requires a full-fledged EIA study.

Guidelines for different sectors are developed by EEAA to identify main issues that should be addressed with respect to each sector. However, each EIA study is unique and it has to take into consideration the factors specific to each project. The EIAs are submitted by the project developers to the CAA for review against a checklist prepared jointly by EEAA. Once the EIA is deemed complete, the CAA forwards it to EEAA for review, evaluation and approval.

EEAA reviews and comments on the proposed EIA within sixty days, otherwise the EIA is considered approved. EEAA notifies the CAA with its decision to inform the project developer, which falls under one of these categories:

- Approval of the EIA
- Approval pending changes, or additions of further information or analysis
- Disapproval of the EIA, providing legal and scientific evidence for the basis of the disapproval

In light of the above outlined requirements, a pool of EIA consultants has emerged to meet this demand since the mid 1990s. The consultants are all holders of a Bachelors or post graduate degree, they were not required to have any special certification to demonstrate their skills to undertake EIAs. The team could not attain any estimates of the number of EIA consultants currently operating in the market, however, EEAA is currently embarking on a registration system. To date, there is no system in EEAA to rate EIA consultants according to preset

[64] Egyptian Environmental Affairs Agency. Guidelines for EIAs: Oil and Gas Sector, 2005.

[65] Ibid.

qualification and skills scheme ratings. Moreover, the number of EIA consultants operating in Egypt is undefined because of a lack of a registration system within EEAA. The result is that the standard of professionals conducting EIAs is not consistent and neither is the standard of EIA reports presented. Training for EIA consultants is normally acquired in the form of on-the-job training. This means that consultants acquire the skill and master it overtime by conducting the EIA studies.

Occasionally training is conducted as an activity within donor funded projects, such as the Environmental Pollution Abatement Program in Egypt. In 2009, a number of provisions in Law No. 4/1994 was amended by EEAA in Law No. 9/2009. The amendments called for better regulation of the environmental consultancy work by developing a system for registration in EEAA. The registration system will include screening criteria of consultants based on qualifications and skills required It is anticipated that if the system is adopted as it currently stands; it could create a need for retraining of EIA consultants to meet the new requirements. At this point, although the legal framework was provided for this initiative, the study team could not identify any implementation mechanism in place including: kind and content of training provided if any, the bodies who will deliver the training, etc.

3.2 New and changing skills needs

By introducing new technologies and implementation of new processes within environmental mitigation measures, such as in the case of renewable energy systems, cleaner production activities, energy efficiency, organic agriculture, and waste management, the major challenge will be to equip the workforce with the necessary skills to apply and use these new technologies and practices.

In the following section, skills needs will be highlighted, both newly emerging green collar occupations and changing skills requirements for existing occupations, as a result of adopting these mitigation measures. The main focus will lie on four sectors: energy; manufacturing; agriculture; and waste management.

3.2.1 New green collar occupations

The skills needs for newly emerging green collar occupations have been clearly identified in sectors where there has been a complete change in the technologies adopted to mitigate the impact of climate change and environmental degradation. Examples of this were mainly reflected in the renewable energy sector.

In the case of **renewable energy,** which is a proactive approach to identifying new sources for cleaner energy through wind power development, a number of pilot initiatives has been undertaken since 1993, namely the Hurghada pilot plant, followed by the Zafarana wind farms. These initiatives have pinpointed the need for. new occupations in the energy, manufacturing and construction sectors.

Firstly, in the energy sector there is the need to prepare new workers for designing, installing, operating and maintaining wind farms. Secondly, in the manufacturing sector there is the need to prepare engineers, technicians and supervisors in manufacturing of different components of wind farms, such as wind blades. Thirdly, within the construction sector there is the need to prepare engineers in the design and construction of wind farms.

A major expansion plan for wind power is being adopted, which extends beyond 2012. The Egyptian Government plans to embark on major investments, involving donors and the private

sector in wind power to capitalize on the country's competitive advantage.[66] These initiatives are expected to create a considerable demand for these new green skills requirements.

3.2.2 Greening existing occupations

The adoption of proactive and remedial environmental measures, such as energy efficiency and cleaner production has impacted the skills requirements in the manufacturing sector. As industries respond to the demands of a greener economy and policy environment, jobs will require new skills and workers in these industries will need training and up-grading their skills, so that they can adapt to new technology and new ways of working. In addition to this, the adoption of organic agriculture techniques is also an important shift towards greening the agriculture sector.

Energy efficiency activities are expected to lead to the reduction of energy use through energy efficiency implementations by 8.3 per cent by 2022. In this respect, a number of programs has been adopted by both national and international organizations at different levels. The most important of these initiatives are the Industrial Modernization Centre (IMC), the energy efficiency component of the MED TEST Programme, and Support for Environmental Assessment and Management (SEAM).

At the level of industrial establishments operating within the manufacturing sector, these initiatives aim to reduce the specific energy consumption per unit product without any negative impact on the product quality or quantity, as well as limiting polluting emissions. Some of the skills requirements identified through these programmes has been for the purpose of conducting energy audits, calculating energy consumption, determining the proper options for energy efficiency, and assessing the implementation of energy efficiency practices.

Cleaner production activities involve supporting industrial establishments in applying the cleaner production tools to processes, products and services to increase overall efficiency and reduce risk to human health and the environment. It focuses on sources conservations, such as water, energy, and material, as well as on waste management.

In this respect a number of donor-supported initiatives have been piloted, the most important being: SEAM, supported by the UK Department for International Development (DfID), which has a component for implementing cleaner production (CP) projects in industries with the objective of enhancing competitiveness and reducing pollution; and the cleaner production component of the MED TEST Programme, a UNIDO initiative implemented by the Egyptian National Cleaner Production Centre (ENCPC), which is also supported by the Ministry of Trade and Industry.

Skills requirements identified by these initiatives as prerequisite for adopting cleaner production, were mainly focused on: auditing the industrial process; determining the proper options for CP and assessing the implementation of CP practices according to a standard code; in-plant assessment methodology to increase overall efficiency of the industrial process; and reducing impact to the environment as well as reducing operating cost.

Organic farming, on the other hand commenced in Egypt as early as 1976 with the SEKEM farm starting to produce organic herbs and essential oils for exports, there are presently

[66] According to the International Institute for Sustainable Development, in its report of March 2009; wind power development in Egypt has many points in its favour; Egypt's wind resource is one of the best in the world; There is ample land available with low alternative economic value; Demand for electricity and other sources of energy is increasing strongly; Air quality considerations in the major cities are one of the key environmental concerns; Donor support has been extremely strong. It has included studies, capacity building and grants.

around 500 organic farms listed with the Egyptian Center for Organic Agriculture, and 25,000 hectares of organic farmland, representing 0.8 per cent of the country's total farmland.

Although there is no organic regulation in place (a draft is currently being prepared on producing, processing and handling organic products), there are a number of general governmental programmes and policies that influence the organic sector. These programmes and policies include: a programme to reduce the use of pesticides, based on the Government's regulation from 2000 that ban the use of pesticides in five zones; the agricultural policy, which promotes integrated pest management technology in pest control, with the Ministry of Agriculture establishing a laboratory for chemical residue analysis (heavy metals and pesticides) in food and other commodities in 1994; a decree to establish the Central Laboratory for Organic Agriculture, the Department of Organic Farming within the Central Laboratory of Agricultural Climate, and the Department of Soil Microbiology within the Soil, Water and Environment Research Institute, which carries out research on compost, nitrogen-fixing organisms, etc.

Through the implementation of these initiatives, it has become clear that organic farming calls for a workforce capable of undertaking organic farm management, with skills required to serve as organic farm workers, natural land management operators, pesticide operators, plant and machine operators, including bio-fuels generators, farm supervisors, land care coordinators, and land management specialists. In addition, the certification of organic farms would require auditors and certifiers.

Egypt has high potential for organic farming and has reached an important stage in implementing this practice for a large number of crops. In addition, newly reclaimed areas of more than 500,000 hectares are available to expand the cultivated area with organic practice. This potential, in addition to the increasing demand for organic products on both the local and export markets, could eventually encourage further investments in the sector, and thus create higher demand for these skills.

It is worth mentioning, that the identified sets of skills requirements has neither been translated into occupational profiles, nor has a listing of potential occupations been produced in the field of organic agriculture.

3.2.3 Identification of skills needs

As explained earlier in Section 2.3, the existing labour market information systems for skills identification and forecasting has not yet taken green jobs into account. Moreover, no entity collects systematic data on the skills and knowledge base of the workforce necessary to sustain the shift to a greener economy. However, there is a good understanding of green skills requirements among organizations concerned with the environment and the various agencies implementing and piloting different environmental mitigation measures Identification of skills needs is mainly undertaken through practical experiences by the relevant agencies and or as a result of needs arising within these agencies. For instance, the technical problems associated with wind turbines in the wind farms, including the problems encountered in maintaining them, has indicated the urgent need for technicians with the appropriate skills to maintain wind turbines.[67] Another example is the companies' inability to implement the energy efficiency recommendations as identified by the Industrial Modernization Center, primarily due to lack of expertise in this field, has indicated the need for engineers and technicians with appropriate skills to implement and assess energy efficiency measures.[68] Skills needs are otherwise identified on an ad hoc basis within the relevant agencies as the need arises. As an illustration, Box 7 reflects

[67] Interview, Mr. Andreas Holtkott. KFW, Oct. 2009

[68] Interview, Eng. Mohammed El Sobky. IMC, Oct. 2009

labour needs identified by NREA in relation to its Wind Resources Assessment Program. The Box however, does not illustrate, the skills needs associated with performing each task.

Box 7. Labour needs for wind resources assessment program [69]

In the renewable energy sector, NREA has identified a number of labour related needs for its wind resource assessment program. Assessment of wind potential is crucial as a preliminary step before approving any project in this field. Labour needs were identified as administration, site selection, iinstallation, operation and maintenance, data collection and handling. To implement this NREA identified the need to hire in the Wind Resource Program the following:

1. **Project Manager** to perform two main tasks to ensure that human and material resources are available; oversee the measurement and quality assurance plans

2. **Field Manager to** install and maintain the monitoring equipments, transfer the data to home office, should be available whenever a problem arises in the site.

3. **Data Manager**, data validation and report generation

All in all, a considerable amount of practical knowledge and experiences currently exists within the programs and agencies implementing various mitigation measures, including the identification of a wide range of greening skills needs that has not yet been properly documented.

3.2.4 Skills response

There is no evidence of a systematic skills response by either the education or training systems to the skills needs identified for both new green jobs and occupations undergoing greening. The knowledge of the skills needs identified remains at the level of the implementing agencies and programs, which are usually responsible for responding to the identified skills through the provision of short-term courses to a limited number of beneficiaries.

In relation to the organic agriculture, at the level of higher education some initiatives are undertaken to respond to the need of the sector. For instance, the Faculty of Agriculture at Al-Azhar University established the Department of Environment and Organic Agriculture in 1997, and formal education started in 1999/2000 with the first students graduating in June 2001. Furthermore, the Faculty of Agriculture at Ain Shams University has approved the establishment of a Department of Organic Agriculture, with education having started in the winter semester 2005/06. In addition to this, there are several international programs that promote organic agriculture in Egypt and work on skills development, as well as a number of NGOs who are active in this field. More details will be provided in the case study on organic farming.

Skills response related to waste management can be detected on several fronts. On the one hand, a number of ministries are involved in training. The Ministry of Local Development conducts periodic training courses related to solid waste, while the Ministry of Health is involved in training related to health care waste management. EEAA, mostly, in collaboration with donor funded programs such as USAID (United States Agency for International Development), is conducting training programs on waste management. One of the largest, was the training program in relation to private sector participation in solid waste management. Finally, a number of NGOs are also heavily involved in training regarding community based solid waste management.

In the field of wind energy, training in relation to identified skills is undertaken in the form of on the job training either provided by the foreign suppliers of machinery or by NREA. An interview of one of NREA consultants confirmed that most of the training is undertaken in relation to operations and maintenance. There is no set curriculum for the training. Trainings are also undertaken by a number of donor's agencies funding the wind farms. In addition to this, the

[69] Ashour Abdelsalam Moussa. Wind resources assessment program. NREA, Egypt. Presentation at workshop for the Capacity Building in the Field of Wind Energy, Dec. 2009.

Regional Centre for Renewable Energy and Energy Efficiency[70], was established recently in Cairo. The centre provides capacity building in relation to Wind energy. In December 2009, the centre developed a comprehensive regional training workshop regarding wind parks**,** in collaboration with NREA. The workshop topics focused on the principles and basics for selecting locations, designing farms, operations and financial feasibility.[71]

A number of other general initiatives in the field of environmental education currently exist in Egypt and can be classified under the skills response. A number of universities are undertaking scattered initiatives to integrate environmental aspects within their programs. For example, Engineering Faculty of Cairo University is partnering with the Holding Company for Water and Wastewater (HCWW), to provide ten scholarships for the students who have successfully finished their junior year to study Water and Environment Engineering. The program aims to create engineers who are capable of monitoring of water projects at all levels, and are adequately familiar with appropriate technologies in this area. [72] Other initiatives include an environmental diploma provided by the Environmental Studies and Research Institute affiliated to the University of Menoufia. Finally, University of Ain Shams hosts the Institute of Environmental Research and Studies. The Institute offers an environmental diploma along with post graduate studies in various fields of the environment.

The inactive role of the formal education and training system in responding to the skills needs emerging as a result of greening of some sectors and processes, is partly due to the fact the these systems might not be aware of the emerging needs, and due to lack of formal communication and coordination channels between the implementing agencies and programs, and the formal education and training systems. In addition, there has not been any attempt to formally disseminate the skills needs to the formal education and training system.

In-company training or on-the-job training, provided by enterprises and donor initiatives, has so far been the main response to skill needs identified as a result of greening of certain processes. However, these responses are being undertaken at a relatively small scale.

3.2.5 Case studies on new green collar occupations

1. Skills related to wind farm operations

The primary source of energy in Egypt is fossil fuels, including oil and natural gas. Energy is considered the prime engine for the country's economic development. The annual consumption of primary energy in 2005-2006 was estimated at 50.97 million ton oil equivalent (TOE), of which 54.9 per cent was in the form of natural gas. The energy sector in Egypt is facing a number of challenges: firstly, large capital investments are needed to meet the continuous demand corresponding to economic growth and the increase in population; and secondly, the prices of fossil fuels, natural gas and electricity have been subsidized for a long time and kept stable, despite of leaps in production costs. The result has been "low cost recovery and deteriorating

[70] RCREEE is an independent regional think tank based in Cairo which is dedicated to the promotion of renewable energies (RE) and energy efficiency (EE). RCREEE formulates and disseminates policies in support of RE and EE and provides a platform for the regional exchange on policy issues and technological questions In addition, RCREEE encourages the participation of the private sector in order to promote the growth of a regional industry of RE and EE. RCREEE has ten founding members, including Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine, Syria, Tunisia, and Yemen. During the start up phase, RCREEE is sponsored by Egypt, also serving as host country for the Centre, as well as Germany, the EU and Denmark...(the development partners).

[71] http://www.rcreee.org/ViewLibraryArticle.aspx?article=26212501150131210533

[72] Holding Company for Water and Wastewater (HCWW). http://www.hcww.com.eg/En/News/News.aspx

financial performance of the sector".[73] Moreover, energy activities are one of the major sources of pollution in Egypt, which might represent a major threat to the ecosystem, including land, water and air. The total CO2 emissions were estimated at 137.11 million tons in 2004/2005, out of which more than 70 per cent was attributed to the energy sector. To face these challenges Egypt has adopted different measures to increase the role of energy efficiency and renewable energy in the energy supply.

Egypt has a great potential in the RE sector with abundance in wind and solar energy resources. The New and Renewable Energy Authority (NREA) was established in Egypt in 1986 as an affiliate of the Egyptian Ministry of Electricity and Energy. NREA is the national focal point for renewable energy in Egypt, including commercialization of technologies, as well as implementation of related energy conservation programs. It is working to achieve the objective set in the plan adopted by the Supreme Council for Energy to cover 20 per cent of the electric energy demand in Egypt through renewable energy applications by 2020 out of which 12 per cent will be satisfied through wind energy. A number of donor agencies in Egypt currently support large projects in the field of wind energy, among them is the German Development Bank (KFW), Danish Development Agency (Danida), and Governments of Spain and Japan. It is expected that during the coming years, Egypt will become among the leading countries worldwide in terms of wind-installed capacity. In general, other renewable energy technologies are generally underutilized commercially with few projects in solar water heating, photovoltaic applications and biomass.

The GoE has identified benefits associated with the use of renewable energy applications, including the potential of creating new job opportunities, protecting the environment by reducing GHG emissions, enhancing the local industrial capabilities, and increasing technology transfer opportunities in Egypt.

In terms of wind energy, Egypt enjoys a superior wind regime especially in the area of the Gulf of Suez where wind speed exceeds 10 m/sec. A wind atlas issued for Egypt in 2003 confirms that wind resources can be highly utilized in the Gulf of Suez, the western and eastern Egypt domain at the banks of the Nile, and the western desert, close to Kharga area and the Gulf of Aqaba area.[74]

To meet the goal of 20 per cent of renewable energy in 2020, Egypt is also targeting to have a total capacity of installed power of 7200 MW. A number of demonstration projects in relation to generating energy from wind have been put in place in Egypt since 1988. However, the first commercial wind farm was established in 1993 in Hurghada, with a capacity of 9 GWh/year. The first mega wind park in Egypt was established in the Zafarana site, which has been recognized as one of the best wind farm sites in world with outstanding wind characteristics. The farm produces annually about 850 million KWh, saving about 190,000 TOE, and reducing emissions of about 450,000 tons of CO2. Another mega project is the Gabal El-Zayt wind farm close to the Gulf of Suez.[75]

In addition, Egypt is starting a commercialization program to engage the private sector in the wind farm initiatives to design, finance, own and operate private wind power projects. The program has a number of objectives, including:[76]

[73] Plan Blue, Energy Efficiency and Renewable Energy Egypt - National study's summary, 2007.

[74] World Bank. Wind Energy Scale-Up Project in Egypt: Consultancy Services for Boo Wind Power Project, 2008 http://www.devex.com/projects/wind-energy-scale-up-project-in-egypt-consultancy-services-for-boo-wind-power-project

[75] Fathy Ameen Mohammed, Financing Wind Park Projects Experience, NREA Egypt, 2007

[76]World Bank, 2008. op. cit.

- to stimulate and encourage private investments, internationally and locally, into the power sector in Egypt.
- to enhance participation of the Egyptian industries through local manufacturing.
- to increase technology transfer in Egypt.

To date, the skills development related to wind farm design and construction solely relies on foreign expertise, while skills related to maintenance and operation of wind farms are left to Egyptian labour. NREA is the institution responsible for training workers on maintenance and operation of wind farms, and on-the-job training has been conducted for workers to undertake the required work. The information gathered by the study team, shows that training is undertaken on the job in the wind farms, and not in the form of a formal vocational training with certification. In an interview with one of NREA consultants he stresses on training as a critical requirement in this industry, however he also emphasizes that financial constraints are one of the main obstacles facing the adoption of proper training programs for workers within the field.[77]

Similarly, an interview conducted with one donor agency that is heavily involved in the wind energy financing in Egypt reveals the lack of skill identification and development reflected in the workers' poor performance and the need for technical and vocational training of workers to perform maintenance and operation in this field.[78] Initial discussions are currently underway to explore possible means of strengthening workers' capacity in this field.

To date a number of private local manufacturers are operating in this field. Their work comprises the following operations:

Production in this field includes the following operations:[79]

Construction work:

- Civil works
- Roads – turbine foundations –transformer foundations –
- Cable tranches
- Electrical works
- Cables – transformer – switch gears – kiosk
- Mechanical works
- Tower – rotor – nacelle
- Control works
- Panels – fiber optic cables – CMS system

Operation & Maintenance, including:

- Rewinding of generators
- Machinery for housing
- Machinery for some components of hydraulic units
- Manufacturing of display boards

[77] Interview with Eng. Ashraf Abdel Megid, NREA Consultant, Mar. 2010

[78] Interview, Mr. Andreas Holtkott, KfW, Oct. 2009

79 NREA. Slim, Abu Bakr. Wind Energy Local manufacturing, Presentation at workshop for the Capacity Building in the Field of Wind Energy, December 2009.

- Fixing of isolation cards
- Fixing of pressure boards
- Fixing of some components of control system

Egypt's plans for wind energy, especially with the intention to engage the private sector to take part in future design and construction, identifies a real current need in the field of maintenance and operation, and expands the future demand for building capacities in the areas of design and construction.

3.2.6 Case studies on greening existing occupations

1. Organic farmers

The FAO confirms that organic sustainable agricultural practices have direct benefits on mitigating climate change effects by working on two fronts. On the one hand, organic farming enables ecosystems to readjust to the negative impacts of climate change by restoring soil organic matter, limiting soil erosion, improving soil physical structure, and possessing a high capacity to hold water. These properties provide organic production with a natural resistance to endure sever climatic changes such as droughts and floods. [80]

On the other hand, organic farming reduces agricultural GHG emissions. The Intergovernmental Panel on Climate Change has estimated the contribution of the agricultural sector to GHG emissions at 11 per cent in 2005 worldwide. The total emissions amounted to 6.1Gt CO2 equivalents, made up from a majority of CH4 (3.3 Gt) and N2O (2.8Gt), while GHG emissions were calculated to be 48-66 per cent lower per hectare in organic farming systems in Europe. In addition, adopting organic farming techniques have proved better than conventional agriculture with respect to direct energy consumption, through fuel and oil consumption, and indirectly, through lower consumption of synthetic fertilizers and pesticides. Moreover, unsustainable farming practices are one of the major contributors to desertification. Conversion to organic farming has thus proven an effective mechanism in the fight against desertification.[81]

The agricultural sector contributes about 17 per cent of Egypt's GDP, 20 per cent of its exports and an additional 20 per cent of industrial exports, which directly rely on the agricultural sector. Almost one-third of Egyptian labour is engaged in farming activities, in addition to other workers who are employed in related jobs, such as food processing or trading of agricultural products. Egypt's total area of cultivable land is small, but highly concentrated along the River Nile and in the Delta. The small agricultural area has influenced the patterns of cultivation in Egypt, characterizing it with intensive cultivation and high usage of pesticides and fertilizers. The agriculture sector is also the largest user of water, accounting for 83 per cent of the total usage. This figure compares to municipal use, which amounts to 6.5 per cent and industrial use, which makes out 10.5 per cent.[82]

The sustainable development strategy of Egypt recognizes desertification as one of the main problems threatening the future of the agricultural sector in Egypt. While the strategy identifies the over-usage of fertilizers and pesticides as a key challenge, it does not include language that promotes the conversion to organic agriculture.[83]

[80] Institute of Science in Society: Mitigating Climate Change through Organic Agriculture and Localized Food Systems http://www.i-sis.org.uk/mitigatingClimateChange.php, 2008

[81] Ibid.

[82] International Trade Centre (UNCTAD/WTO) http://www.intracen.org/Organics/Country-Profile-Egypt.htm

[83]National Sustainable Development Strategy, 2007.

Currently, organic agriculture is a rapidly growing sector in Egypt. The driving factors for this trend are mainly the high export potential of the organic crops, which make it an economically attractive businesses. A growing health conscious and environmentally aware segment of the Egyptian society also contributes to increasing the demand on this line of business. To date, there is no official legislation to regulate the organic agriculture sector, however, a draft regulation on producing, processing and handling organic products is currently under development.[84]

There are some 500 organic farms in Egypt, cultivating approximately 24,500 hectares of land in Egypt and accounting for 0.72 per cent of the country's total agricultural area. Most of these farms are 'desert' farms, using irrigation from the Nile. Egyptian organic farmers grow a wide range of products, including fruits, vegetables, cereals and spices. Non-food crops, such as cotton and medicinal plants, are also cultivated organically. Organic certification in Egypt is provided locally by two organizations: the Egyptian Center for Organic Agriculture (ECOA) and the Center of Organic Agriculture in Egypt (COAE). Both organizations are registered at the International Federation of Organic Agriculture Movements (IFOAM) and accredited to certify for Euro-Retailer Produce Working Group for Good Agricultural Practices (EUREPGAP).[85]

There are several international programs that promote organic agriculture: the Italian Cooperation's technical support in Fayoum and Marsah Matrouh, which assists farmers with the establishment of farmers' associations and training on organic agriculture principles and application; CARE International is providing similar services for 750 farmers in the governorates Quena, Sohag and Fayoum; a USAID-funded project provides training for farmers in organic production in Egypt, in addition to organizing study tours for selected farmers to visit organic agriculture in some developed countries; and the United Nations Food and Agriculture Organization (FAO) provides technical assistance to the country to enhance organic development.

In addition to this, the development of skills needed in organic farms is also met through NGOs, which play a significant role in supporting the organic movement in Egypt. The Egyptian Biodynamic Association (EBA) is the leading NGO in this field. The association is a subsidiary of the SEKEM Group, the pioneer and leading group of the organic farming shift in the country. EBA was established in 1990 with the overall aim to promote organic agriculture in Egypt, and it provides an array of services including training, research, and advisory services in field of organic farming.[86] Moreover, EBA provides skill development, directly through training, or indirectly, through agricultural extension related activities. Agricultural extension was previously known as the application of scientific research and new knowledge to agricultural practices through farmer education. However, the notion of agricultural extension now covers a wider range of communication and learning activities organized for rural people by professionals from different fields, including agriculture, agricultural marketing, health, and business studies.

Training

EBA offers formal regular training seminars, workshops, farm visits and field trips to agricultural engineers, on various aspects of organic farming. Training courses are also offered internationally for participants from other developing countries. The training materials are

[84] Al Bitar, Lina. Mediterranean Agronomic Institute of Bari- Organic farming in the Mediterranean - towards further development, 2008 and -SMAP, Promoting sustainable use of agricultural land through the introduction of organic farming methods, 2000

[85] Organic Food and Farming in Egypt
http://orgprints.org/14743/1/Organic_food_and_farming_in_Egypt_Willer_2008

[86] IFAD Near East and North Africa Division. Egypt: Smallholder contract farming for high-value and organic agricultural exports.

prepared, planned and introduced by an array of national and international experts working in the field, and by researchers in universities and research centers.[87]

Agricultural extension

EBA also offers on-the-job training, by means of offering farmers technical assistance and expertise during different stages of cultivation, especially on means of implementing the biodynamic methods. The technical support also extends to cover farm management and documentation methods, which are essential for inspection and auditing and accreditation of the farms.

EBA is financially independent, and accordingly, farmers and companies pay fees in return for the different services they receive by the association.

2. Agricultural waste management: Reuse rice straw

Air pollution is one of the most pressing environmental issues in Egypt. In 1999, the air pollution problem became more visible when it manifested itself in a serious environmental phenomenon, later referred to as the so-called "black cloud". The black cloud constitutes high levels of pollutants during the months of October and November each year, and it invades the skies of Cairo and the Delta region, forming a smog-like cloud, which is both visible and has the distinct smell of burning. The black cloud has been attributed to many factors: on the one hand, climatic factors during this time of the year and the topography of the Delta region intensify the visibility and severity, of already existing air pollutants; and on the other hand, practices of burning agricultural waste, especially rice straw, has been identified as a major contributor to the elevated pollution levels during these episodes.[88]

A source attribution study, conducted by the Cairo Air Improvement Project in 2001, used "chemical fingerprints" of sources to define the percentage contribution of each pollutant to the overall pollution level. Through this technique, the EEAA could for the first time establish that disposing of agricultural waste through burning contributes significantly to the black cloud episode. According to a recent State of the Environment Report, the contribution of rice straw burning to air pollutants was estimated at 42 per cent, compared to 23 per cent of vehicle and industrial emissions and 12 per cent of open burning of solid waste.[89]

Egypt has become one of the major rice producer's worlds wide, with a total area under cultivation varying between 1.2 and 1.6 million feddan. Rice is primarily cultivated in the Northeast of the Nile Delta. In 2008, Government estimates show that level of rice production results into the generation of three million tons of rice straw annually. Farmers in Egypt are currently still disposing of a majority of the rice straw produced through burning in open fields. The underlying cause for this practice stems from a number of reasons, most importantly, the difficulty and cost of collecting rice straw because of its great bulk and the tight timeframe for removing it. In addition, alternative uses for rice straw are not yet cost-effective enough to deter farmers from the practice of burning. Finally, the practice of burning rice straw has also proved effective for farmers in pest and worm control of land before cultivating new crops.

In light of the above, the Government of Egypt has taken steps to develop regulations and mitigation measures to limit air pollution resulting from this practice, which, among others, include:

[87] Egyptian Biodynamic Association (EBA), http://www.sekem.com/english/cultural/EBDA.aspx?PageID=1

[88] EEAA. State of the Environment Report, 2008

[89] EcoConServ Environmental Solutions. Rice Straw study, 2009

- Environmental Law No. 4/1994, and amendments in Law No. 9/2009, stipulates that farmers who practice rice straw burning can be fined up to L.E. 20,000.
- EEAA has established a hotline for the public to report incidents of burning.
- Directive 63/2002 adopted by the Ministry of Agriculture in 2002 prohibits the growing and burning of rice in the Qualyoubia governorate because, in addition to contributing to the air-pollution problem, rice cultivation was consuming enormous amounts of water.

On another front, EEAA is promoting the recycling of rice straw as an alternative to open burning. Their plan includes a goal of generating around 100,000 new jobs, related to rice straw recycling and other cleaner production initiatives. The new jobs will primarily be associated with projects related to baling of rice straw and cultivation of mushrooms in 600 different locations in the Delta region.[90]

The above mentioned policies have led to the creation of an increasing demand in this area. The technologies promoted to dispose of rice straw to date are listed in the following section In addition to the skills needs related to their performance.

Recycling

Rice straw is recycled through baling. Loose straw is compressed in a compression chamber where it is compacted into bales. One feddan of rice produces about 65 bales. Baling is not considered recycling per se, as it only alters the form of the straw; however, it helps in removing straw from the fields to be stored and sold as non traditional fodder, cover for vegetables or bio-fuel in composting facilities. A major drawback of bailing is that it is time-consuming and not cost effective compared to burning. The Government plans to disseminate the use of 4,000 different types of bailers to compress the rice straw until the year 2012.

Biofuel

In cooperation with the Czech Republic, a factory producing bio-fuel from rice straw was established in Zagazig by the private sector, as the first of its kind in Egypt. The support provided by the Czech Republic included provision of equipment and technical expertise, and the factory has a capacity of 50,000 tons of rice straw annually. Rice straw pellets are manufactured using this technology by processing ground rice straw in a “disc pelletizer” with the aid of additive materials. The factory uses rice straw pellets for controlled burning in a fluidized bed. Initial studies show that using rice straw pellets appears as an effective technique to reduce NOx emissions, especially at higher degrees of temperature. The Zagazig project is expected to create 200 jobs. There are currently efforts to replicate the experience in the Sharqiya and Daqahliya governorates.

Composting

EEAA has launched a L.E. 32 million program to compost rice straw waste to be used as compost fertilizer. The Arab Organization for Industrialization is currently operating two factories in Qareen and Khatara in the Sharqiya governorate. Each factory has an overall capacity of 150,000 tons. In addition, a contract with the Armed Forces National Services Agency was signed to press and transfer the rice straw to the two composting plants. This set-up led to the fact that the majority of the rice straw produced by the Governorate was utilized.

The problem of rice straw burning can create a demand for different types of related businesses. Granted that enforcement remains low, primarily due to the fact that the burning

[90] EEAA Investment Plan

often takes place late at night and in the early morning, the disposing of rice straw through recycling and or reuse remains the main effective strategy in handling this problem. However, there is a need to assess, economically and technically, the recycling, biofuel and composting initiatives as a prerequisite in promoting their wide scale adoption.

An expert in the field of Agriculture Waste Management has confirmed that most of the training for labour in the rice straw composting and recycling factories is done in the form of on the job training. However, he classified the Labour qualifications needed for each process and its corresponding training needs as follows:

Box 8. Labour and training needs in agriculture waste management: Reuse of rice straw[91]

1. Drivers of tractors and trailers used in the field

Training focus on:

- Undertaking preventive maintenance for tractors and trailers
- Training on maneuvering driving skills within the site
- Training on occupational safety
- Communication skills

2. Technicians for the operation of compressors

Training focus on:

- Operation of the compressor
- Preventive maintenance of compressor
- Feeding process
- Occupational safety

3. Loading workers

Training focus on:

- Pilling straw on trailers
- Communication skills
- Occupational safety

4. Technicians working in rice straw recycling: They should be holders of an agriculture technical education certificate

Training focus on:

- Developing compost rows/lines
- Handling compost during the phases of both composting and maturity (measuring temperature, humidity and PH)
- Calculate the amount of catalysts that need to be added to compost rows/lines
- Communication skills
- Occupational health and safety measures

3. Hazardous waste management

Training Egyptian subcontractors on remediation of heavy metals contaminated sites

Hazardous substances are substances with properties that pose adverse health impacts on human health and the environment. They are divided into substances that are in use and others that are not or will not be used, and hence there is a need to dispose of them as hazardous waste. Sites contaminated with hazardous waste, are defined as sites with hazardous substances in

[91] Interview. Eng. Ahmed Shoman. Expert on Agriculture Waste Management, Apr. 2010.

quantities or concentrations exceeding acceptable predetermined levels, and thus posing serious health hazards to human health and the environment.[92]

Shoubra El Kheima is a densely polluted area in the Greater Cairo, hosting a large number of industries, which include operations of secondary lead smelters. The operation of theses industries has taken a heavy toll on air and soil quality at large. However, lead, as a hazardous substance, was tagged as one of the most serious pollutants associated with a number health hazards. The levels of lead in the air and soil exceeded acceptable world health standards, which manifested itself in elevated blood lead levels of both industry workers and residents of the area. High blood lead levels can lead to serious health impacts, most importantly, intellectual impairment in children.[93]

In the last decade, the Government of Egypt, with the aid of a number of donor-funded projects has minimized airborne lead emissions by closing down the smelters operations and undertaking remediation at eleven contaminated sites. The contaminated sites included both smelters and nearby public sites, such as schools or factories, which had high levels of lead contamination. In 2007, the economic benefits accrued, as a result of the closure, and the remediation of the lead smelters was estimated between L.E. 9-11 million.

The remediation of the lead contaminated sites required specialized training for engineering contractual companies. The Executive Regulations of Law No. 4/1994 contain general rules and procedures for the handling of hazardous substances and wastes including treatment and disposal.

In an effort to build the national capacities, the Lead Pollution in Qalyoubia Program, a USAID-funded project, in collaboration with EEAA which started in 2004 and ended in 2008, conducted a comprehensive training for local contractual engineering companies to undertake the remediation activities. The training was the first initiative in Egypt to build capacities in this area of environmental management. It targeted 60 engineers from 12 Egyptian sub-contracting construction companies. The prequalification criteria for the selected companies for the training included official registration of the company and years of experience in construction. Experience in the environmental field was considered an asset.

The training was a prerequisite for participating companies to tender for the remediation work at the eleven contaminated sites in Shoubra El-Kheima. It covered all aspects related to hazardous substances and waste management and was undertaken with special focus on remediation of contaminated sites. Within this context, the training covered a number of main themes, as follows:[94]

- Introduction on Hazardous substances and waste
- Legal framework on Hazardous Waste Management
- Hazardous waste site remediation
- Special Remediation Technology Selection
- Remediation Planning
- Project Management of contaminated sites: Execution Phases

The participants in the training were required to provide their technical workers with an initial training, by means of utilizing the main concepts of occupation and safety in contaminated

[92] USAID- LIFE Program, Remediation Training Material, 2005

[93] USAID- LIFE Program, Cost –Benefit Analysis for Lead Remediation, 2008

[94] USAID- LIFE Program, Remediation Training Material, 2005

sites, and the means of handling hazardous substances/waste and to provide a report on the results of these trainings.

The project team, together with EEAA as their counterpart, selected seven of the participating companies to undertake the remediation work on the contaminated sites. The engineers, who undertook the training, as well as their technical workers, were provided with complementary on-the-job training in each of the sites, before commencing on the work. The total number of people, including engineers and other technical labour, who participated in the remediation process, was 800 in total.[95]

The new skills acquired by these companies were unique in the Egyptian market and provided a chance to utilize these new skills in new business opportunities. One of the participating companies capitalized on their skills gained related to the remediation of hazardous material, and was awarded a two-year contract with a petroleum company in Egypt, Petrobel, to dismantle and transfer asbestos buildings.

4. Conclusions

The analysis in this country study points to an important finding, namely the lack of an official, structured skills response strategy to greening in Egypt. This finding stems from a number of factors, which are outlined in the following section.

4.1 Main 'greening' shifts in economies and labour markets

- The current inefficient enforcement of environmental regulations deters the establishments from investigating alternatives to improve their environmental performance.

The initiatives for mitigating and adapting to climate change in response to environmental degradation in Egypt are mostly implemented on relatively small scale and are largely in the form of donor-supported programmes.

Skills implications and development

4.2.1 Anticipation and identification of skills needs

- The current approaches to the anticipation and identification of green skills are almost negligible. On the one hand, there is no entity in the environmental field responsible for collecting systematic data on the skills and knowledge base of the workforce necessary to sustain the shift to a low carbon economy. On the other hand, the demand to address the issue of green skills and green jobs is not visible by those undertaking the responsibility to identify and forecast labour market needs.
- Possessing the right skills for green jobs is a prerequisite for making the transition to a greener economy happen and being able to capitalize on its opportunities. Presently, skills gaps has already been recognised as a major bottleneck in a number of sectors and activities, such as renewable energy, energy and energy efficiency and environmental services. This has been identified by those implementing some of the small scale initiatives
- The various mitigation measures for renewable energy, energy efficiency, cleaner production and organic agriculture and waste management have been implemented on relatively small scale, and therefore the skills identification, in terms of new jobs and greening of existing occupations, has been limited.

[95] Interview, Dr. Fatheya Soliman, Team Leader for Technical Component- LIFE Project

4.2.2 Response policies and programmes

- Most of the documentation for the adaptation and mitigation measures, policies, strategies, action plans and programmes initiated in response to climate change and environmental degradation, very briefly points to the skills implications of these mitigation measures. Moreover, they have either limited or no skills response component linked to them.
- Response to green skills needs is mainly limited to the initiatives implemented, delivered in the form of short term courses, and no attempt has been made to integrate them into the formal education and training systems.
- There are no skills response policies and programmes in place to respond to greening.
- The linkage between environmental policymaking and education and training policymaking is non-existent.
- There seems to be a lack of awareness and comprehension, on the part of the education and training systems, of the need to respond to the anticipated demand for green jobs, now and in the future.

4.2.3 Effective delivery mechanisms

- There is no evidence of a systematic skills response by the education and training systems to the skills needs identified for both new green jobs and occupations undergoing greening.
- Agencies and programs implementing and/or piloting different mitigation measures are undertaking the responsibility to responding to the identified skills, mainly through the provision of short-term courses to a limited number of beneficiaries.
- The effectiveness and quality of the existing “skills development” delivery mechanism, at the level of the implementing programs and agencies, is questionable. There is no evidence of existence of an assessment specification.

5. Recommendations

5.1 Policy recommendations

- There is a need for full environmental harmonization of laws and their implementation in Egypt. In addition, attention needs to be paid to differences in the levels of development of existing environmental legislation and variations in the degree of enforcement.
- Ensuring a representation of environmental issues in the exiting coordination's platforms at different levels (ministerial and operational) is crucial to ensure a higher level of awareness and knowledge of the skills needs in relation to environmental sustainability, and thus the inclusion and consideration of these needs.
- Improving the efficiency and effectiveness of enforcement activities is critical, which would ensure compliance with the legal requirements, and thus lead to a real structural change offering great potential for the creation of green jobs and a more visible demand for green jobs.
- There is also a need for urgent action to include the needs for green jobs within the formal education and training system. Currently, the GoE is undertaking a number of reform activities in education and training, such as the implementation of the Strategic Plan of Higher Education, the implementation of the National Strategic Plan for Education, and the development of a strategic plan for technical, vocational education and training.

5.2 Recommendations for education and training

- Different environmental agencies need to develop coordination mechanisms with higher education, both universities and colleges, technical education, including industrial, commercial and agricultural education, and vocational training within relevant line ministries, in order to promote the need for green skills.
- The creation of a coordination channel, for instance the establishment of a committee on "Skills for Greening," constituting members from different authorities, agencies and donor-supported programmes that would assume the responsibility of compiling the needs as identified by different activities and initiatives, as well as disseminating them to education and training.
- Although there are plenty of response policies, strategies and programs addressing environmental degradation, there is no real structural change. Donor-supported programmes that are working with different components of these policies and strategies remain the main driving force for promoting environmental change. Proper documentation of lessons learned and experiences gained through these initiatives is important.
- Technical skills are clearly needed at different levels. There is need to develop new accredited courses and curricula to meet the needs of various sectors and industries.

5.3 Recommendations for further research and data collection

- Immediate action is needed to compile the findings of different activities, as well as disseminating them to education and training stakeholders.
- Utilise existing infrastructures and capabilities, such as the Egyptian Education, Training and Employment Observatory (EETEO) to ensure that systematic approach to collecting data on green jobs and skills implications is operational.

- Scoping studies need to be conducted to determine the skills gaps and shortages; for instance, in the areas of renewable energy, cleaner production, and environmental management and services. In this respect the MSEA or other relevant institutions such as NREA could work closely with the various training councils in conducting these studies and inclusion of the findings in the formal education and training system.

6. Proposed short- and long-term actions

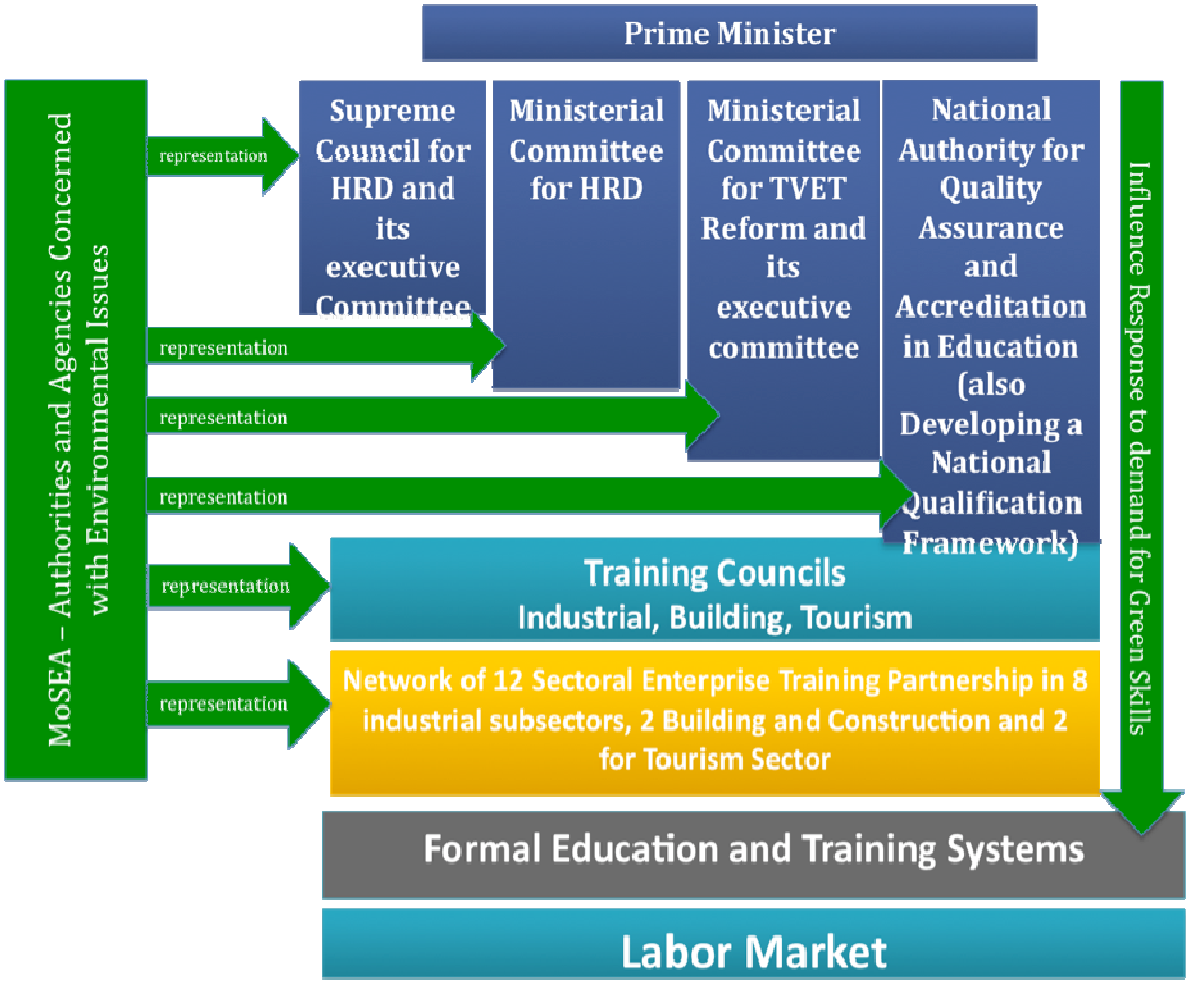
Egypt is facing a number of key environmental challenges and threats (section 2.1), which are the main drivers for the green policy responses in the country (section 2.2). However, there is a lack of proper enforcement of legislation already adopted, and sometimes a need for more detailed and elaborate legislation to protect the environment. Weak enforcement of environmental laws contributes to a lax implementation of environmental strategies, which, in turn, diminishes the need for a structured approach of skill identification and development in response to greening trends.

A number of, relatively small-scale, donor-led initiatives for mitigating environmental threats has been implemented mainly in close collaboration with the MSEA, Although these initiatives were successful in piloting mitigation measures they were not able to create adequate demand for green jobs and the corresponding response strategy.

On the short term

In order to respond to the current and future demand for green skills, there is a need to create a structured dialogue between environmental institutions, education and training authorities, and enterprises for the purpose of; creating awareness within the last two groups on the environmental challenges and threats; identification and inclusion of green skills standards in the formal training and education systems.

This can be achieved through injecting the various education and training coordination platforms (Sectoral Enterprise Training Partnerships, Executive Committee of the Supreme Council for Human Resources Development, Ministerial Committee for TVET Reform and its executive committee, Steering Committee of the Education and Training Observatory, Boards of the three sectoral training councils, etc.) with representation from MSEA and other relevant environmental institutions to ensure a high level of awareness and knowledge of the skills needs in relation to environmental sustainability, and thus influencing the provision of these skills through the formal education and training systems.



On the long term

On the other hand, enforcement of environmental legislations, through stronger legislations and enhanced capacities (in terms of number of inspectors, adequate equipments and advanced skills), would force companies to comply with environmental standards and thus creating higher and visible demand for green jobs.

References and bibliography

Abdelsalam Moussa, Ahour. *Wind resources assessment program*. NREA, Egypt. Presentation at workshop for the Capacity Building in the Field of Wind Energy, Dec. 2009.

Al Bitar, Lina. Mediterranean Agronomic Institute of Bari, *Organic farming in the Mediterranean - Towards further development*, 2008

CD4CDM (Capacity Development for Clean Development Mechanism) – Fourth Regional Workshop, Tunisia, 2004

Danida (Danish Development Agency). *Environmental Sector Programme, 2005*.

Egyptian Biodynamic Association (EBA), http://www.sekem.com/english/cultural/EBDA.aspx?PageID=1

EcoConServ Environmental Solutions, *Rice straw study, 2009*.

EcoConServ Environmental Solutions, *Global environmental benefits assessment paper*, 2009.

EcoConServ Environmental Solutions, *Sector review on environment and energy*, 2008.

EcoConServ. *Sector review on environment and energy - Business-to-Business (B2B) Programme*, 2008

Egyptian Environmental Affairs Agency (EEAA), *Status of the environment report*, 2008

EEAA, *The National Environmental Action Plan*, 2002

EEAA, *Cleaner Production Strategy*, 2002

EEAA, http://www.eeaa.gov.eg/English/main/env_ozone_ecc_neg.asp

EEAA Five Year Plan (2002-2005). http://www.eeaa.gov.eg/english/main/policies4.asp

Egyptian Ministry of Education (MoE), *The development of education in Egypt: A national report, 2004–2008*

Egypt National Capacity Self-Assessment (NCSA): *National strategy and action plan for capacity development*, 2007.

Egyptian National Competitiveness Council, *Egypt competitiveness reports* (Annual 2004 to 2008)

Energy Efficiency Improvement and Green House Gas Reduction Project, 2006

Energy Efficiency and Renewable Energy, *Egypt - National study's summary*, 2007

European Training Foundation (ETF), *Structures and mechanisms for information and needs forecast on training, qualification and employment, The Observatory Function Egypt*, 2003

European Union (EU), *Egypt Country Strategy Paper 2007-2013*.

Global Environment Benefit Assessment Analysis & Environmental Institutional, Legal and Policy Framework Analysis, 2007

Holding Company for Water and Wastewater (HCWW). http://www.hcww.com.eg/En/News/News.aspx

International Fund for Agricultural Development Near East and North Africa Division (IFAD). *Egypt: Smallholder contract farming for high-value and organic agricultural exports.*

Information and Decision Support Centre (IDSC) and European Training Foundation (ETF), *Egyptian Education, Training and Employment Observatory*, Nov. 2006

Institute of Science in Society: *Mitigating climate change through organic agriculture and localized food systems*. http://www.i-sis.org.uk/mitigatingClimateChange.php, 2008

International Labour Organization (ILO), *The social and decent work dimensions of a new agreement on climate change*, June 2009

International Institute for Sustainable Development, *Clean energy investment in developing countries: Wind power in Egypt*, Mar. 2009

International Trade Centre (UNCTAD/WTO) http://www.intracen.org/Organics/Country-Profile-Egypt.htm

IPS, Egypt: *Workers reeling under financial crisis* http://ipsnews.net/news.asp?idnews=47234, 16 June 2009

Ministry of Education (MoE), *Five year national strategic plan for education reform, 2007/2008-2011/12)*

Ministry of Higher Education, *Presentation of the strategic plan for higher education*, 2007

Ministry of State for Economic Development, *The sixth five-year plan*

Ministry of Trade and Industry (MoTI), *National industrial development strategy*

National Strategy for Sustainable Development, 2007

New and Renewable Energy Authority (NREA), *Implementation of renewable technology: Opportunities and barriers*, 2001.

New and Renewable Energy Authority (NREA), *Renewable energy strategies, Achievements and plans, 2008.* New Labour Law No. 12/2004

Regional Centre for Renewable Energy and Energy Efficiency (RCREEE). http://www.rcreee.org

Slim, Abu Bakr. *Wind energy local manufacturing*, Presentation at Workshop for the Capacity Building in the Field of Wind Energy, Dec. 2009.

SMAP, *Promoting sustainable use of agricultural land through the introduction of organic farming methods*, 2000

Plan Blue, *Energy efficiency and renewable energy Egypt - National study's summary*, 2007.

UNEP. *Economic crisis hits EU and US clean energy as emerging economy investments rise 27% to $36 billion.* http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=589&ArticleID=6201&l=en&t=long

United Nations Environment Programme (UNEP), *Financing of renewable energy in the Mediterranean Region Project: Baseline survey of the renewable energy sector in Egypt*, 2003.

World Bank (WB), *Country environmental analysis of Egypt*, 2005.

WB. *MENA Region – Economic developments and prospects*, 2008

WB. *Wind Energy Scale-up Project in Egypt: Consultancy services for Boo Wind Power Project, 2008* http://www.devex.com/projects/wind-energy-scale-up-project-in-egypt-consultancy-services-for-boo-wind-power-project

World Economic Forum (WEF), *Global competitiveness report 2007-2008*

Interviews and consultations

- Interview, Mr. Andreas Holtkott. German Development Bank- KFW, Oct. 2009
- Interview, Eng.Ahmed Shoman. Expert on Agriculture Waste Management, Apr. 2010.
- Interview, Eng. Ashraf Abdel Megid, NREA Consultant, Mar. 2010
- Interview, Eng. Mohammed ElSobky. Industrial Modernization Center, Oct. 2009
- Interview, Eng. Hanan El-Hadary, Egypt National Cleaner Production Centre
- Interview, Dr. Fatheya Soliman, Team leader – Technical component- Life project
- Interview, Ms. Yasmine Foaud - GEF Project Manager, EEAA
- Interview, Eng. Mohammed Kandil, EIA Consultant
- Education and Training Department, EEAA
- Union for Agriculture Producers and Exporters
- Supreme Council for Human Resource Development
- Industrial Training Council
- Egyptian Observatory Function, IDSC