



International  
Labour  
Organization

# Skills for Green Jobs in Egypt





# Skills for Green Jobs in **Egypt**

Copyright © International Labour Organization 2018  
First published 2018

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

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

---

*Skills for Green Jobs in Egypt*

ISBN 978-92-2-132911-4 (print)  
978-92-2-132912-1 (web pdf)

---

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

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

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

Information on ILO publications and digital products can be found at: [www.ilo.org/publns](http://www.ilo.org/publns).

# Table of Contents

Abbreviations and Acronyms .....	iv
Abstract .....	vi
Acknowledgment .....	vi
Executive summary .....	ix
1. Introduction.....	1
2. Context .....	3
2.1 Major changes in the economy and employment shifts in the green transition since 2009/10: Key mitigation responses to environmental challenges.....	3
2.2 Key challenges and priorities for the green economy .....	4
2.3 Key mitigation responses to environmental challenges .....	5
2.4 Employment shifts and growth.....	8
2.5 Gender employment in green economy .....	9
3. Skills development measures for the green economy .....	11
3.1 Green skills needs anticipation .....	11
3.2 TVET provision for new green occupations and for greening existing occupations .....	13
4. Analysis of case studies .....	23
5. Conclusions and Recommendations .....	25
5.1 First: Conclusions .....	25
5.2 Second: Recommendations.....	25
6. References.....	27
7. List of key resource persons .....	29
8. Annexes .....	31
8.1 Analysis of case studies .....	31
Case Study I. Renewable energy: A sustainable approach to green skills.....	31
Case Study II. Manufacturing: Robici environmentally friendly leather cluster .....	32
Case Study III. MoETE’s Response to Green Skills .....	33
Case Study IV. Different approaches for qualifying energy efficiency managers.....	34

## Abbreviations and Acronyms

<b>APC</b>	Agricultural Pesticides Committee
<b>CAPMAS</b>	Central Agency for Public Mobilization and Statistics
<b>CARE</b>	Cooperative for Assistance and Relief Everywhere
<b>CEDARE</b>	Centre for Environment and Development for the Arab Region and Europe
<b>CEMP</b>	Certified Energy Management Professionals
<b>Cedefop</b>	European Centre for the Development of Vocational Training
<b>COAE</b>	Centre of Organic Agriculture in Egypt
<b>CP</b>	Cleaner Production
<b>EBA</b>	Egyptian Biodynamic Association
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>EBDA</b>	Egyptian Bio-Dynamic Association
<b>ECO</b>	Environmental Compliance Office
<b>EOCA</b>	Egyptian Centre for Organic Agriculture
<b>EE</b>	Energy Efficiency
<b>EEAA</b>	Egyptian Environmental Affairs Agency
<b>EETEO</b>	Egyptian Education, Training and Employment Observatory
<b>ENCPC</b>	Egyptian National Cleaner Production Centre
<b>EnMS</b>	Energy management system
<b>EOS</b>	Egyptian Organisation for Standardization
<b>EPR</b>	Extended Producer Responsibility
<b>ETF</b>	European Training Foundation
<b>ETPs</b>	Enterprise TVET Partnerships
<b>EU</b>	European Union
<b>EUREPGAP</b>	EUREPGAP Integrated Farm Assurance
<b>FAO</b>	Food and Agriculture Organization
<b>FEI</b>	Federation of Egyptian Industries
<b>FIT</b>	Feed-in Tariff
<b>GCF</b>	Green Climate Fund
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse Gases
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
<b>GoE</b>	Government of Egypt

## Skills for Green Jobs in Egypt

<b>HVAC</b>	Heating Ventilation and Air Conditioning
<b>IAMC</b>	Innovative Approaches for the Sound Management of Chemicals and Chemical Waste
<b>ICT</b>	Information and Communication Technology
<b>IDSC</b>	Information and Decision Support Centre
<b>IEC</b>	Industrial education college
<b>IEE</b>	Industrial Energy Efficiency
<b>IEO</b>	International Employers Organisation
<b>IFOAM</b>	International Federation of Organic Agriculture Movements
<b>ILO</b>	International Labour Organization
<b>IMC</b>	Industrial Modernization Centre
<b>IPM</b>	Integrated Pest Management
<b>ISSPPRO</b>	International Support for Sustainable Products and Production
<b>ITC</b>	Industrial Training Council
<b>ITUC</b>	International Trade Union Confederation
<b>KfW</b>	German Development Bank
<b>LM</b>	Labour market
<b>MED TEST</b>	A project funded by the United Nation Industrial Development Organization
<b>MENA</b>	Middle East and North Africa
<b>MoETE</b>	Ministry of Education and Technical Education
<b>MoH</b>	Ministry of Housing, Utilities and Urban Development
<b>MoHE</b>	Ministry of Higher Education
<b>MoM</b>	Ministry of Manpower
<b>MoP</b>	Ministry of Planning
<b>MoTI</b>	Ministry of Trade and Industry
<b>MSEA</b>	Ministry of State for Environmental Affairs
<b>MSME</b>	Micro Small and Medium Enterprises
<b>NAQAAE</b>	National Authority for Quality Assurance and Accreditation in Education
<b>NCW</b>	National Council for Women
<b>NGO</b>	Non-governmental organization
<b>NREA</b>	New and Renewable Energy Authority
<b>NSSP</b>	National Skills Standards Project
<b>NSWMP</b>	National Solid Waste Management Programme
<b>OASIS</b>	Renewable Energy is a name
<b>ORE</b>	Oasis Renewable Energy

<b>PV System</b>	Photovoltaic system
<b>PVTD</b>	Productivity and Vocational Training Department
<b>RCREEE</b>	Regional Centre for Renewable Energy and Energy Efficiency
<b>RE</b>	Renewable Energy
<b>RENAC</b>	Renewables Academy
<b>ROSAE</b>	Is a merge between RENAC and OASIS - The Renewables Academy (RENAC), based in Germany, and Oasis Renewable Energy (ORE), from Cairo, have established the RENAC-OASIS Solar Academy Egypt (ROSAE)
<b>SCHRD</b>	Supreme Council for Human Resource Development
<b>SDG</b>	Sustainable Development Goal
<b>SDS</b>	Sustainable Development Strategy
<b>SEAM</b>	Support for Environmental Assessment and Management
<b>SECO</b>	Switzerland State Secretariat for Economic Affairs
<b>SEDA</b>	Solar Energy Development Association
<b>SEKEM</b>	Name of a company
<b>SFSD</b>	Sawiras Foundation for Social Development
<b>SGP</b>	Sustainable Growth Programme
<b>SIWA</b>	A name of a City in Egypt
<b>SMEs</b>	Small and medium enterprises
<b>SRI</b>	Sustainable Recycling Industries
<b>TASS</b>	Technical Agricultural Secondary Schools
<b>TOMO HAR</b>	Training Organisation of the Ministry of Housing and Reconstruction
<b>TVET</b>	Technical Vocational Education and Training
<b>UNEP</b>	United Nations Environment Programme
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>USAID</b>	United States Agency for International Development
<b>VET</b>	Vocational Education and Training
<b>VTC</b>	Vocational training centre
<b>WEF</b>	World Economic Forum
<b>WESO</b>	World Employment and Social Outlook
<b>WISE</b>	Workforce Development and Skills Enhancement
<b>WMRA</b>	Waste Management Regulatory Authority

## Abstract

This report is an updated version of the 2009/2010 “Egypt Country Study” on Skills for Green Jobs. Both versions were prepared in response to requests from ILO and the European Centre for the Development of Vocational Training (Cedefop) relating to the conduct of applied research into skills needs for greener economies. Egypt is one of 21 countries being considered for the development of country case studies with the objective of identifying countries’ strategic skills development responses in the light of environmental degradation, climate change and the global call for greening of economies.

The first version of the earlier report, prepared in 2009/2010 and published in 2011, shed light on the key challenges and priorities for the green economy in Egypt. It outlined the main environmental challenges facing Egypt in 2009/2010 as the main drivers of the green policy responses in the country, affecting the economy, employment and labour markets. It then analysed the skills development strategy corresponding to the greening process, highlighting the institutional framework guiding skills development in Egypt as a whole and examining the linkages - in terms of complementarity, relevance and coordination - between environmental policy-making and issues related to education and training. The study then investigated the obstacles to integration of green skills development into relevant policies and strategies and addressed the issue of anticipation of skills needs, including identification of economic sectors - energy, manufacturing, agriculture and waste management - that are 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.

The current version is an update of the “Egypt Country Study” on Skills for Green Jobs 2009/2010 to capture developments that occurred after 2010 and any planned initiative in the near future, for the purpose of inclusion in the 2018 ILO flagship report World Employment and Social Outlook (WESO 2018) on green economies and the world of work.

## Acknowledgment

This study was conducted by Ghada Amin, as a part of set of national studies on skills for green jobs conducted in some thirty countries globally. The set of studies is the result of collaboration between the ILO and the European Centre for the Development of Vocational Training (Cedefop). Overall methodological guidance was provided by Olga Strietska-Ilina (ILO Employment Policy Department, Skills and Employability Branch). Coordination of country studies and technical backstopping was provided by a team led by Catherine Saget (ILO Research Department), Tahmina Mahmud (ILO Skills and Employability Branch) and Takaaki Kizu (ILO Research Department). Moustapha Kamal Gueye and Marek Harsdorff (ILO Enterprises Department) contributed to the studies’ implementation on behalf of the ILO Green Jobs Programme. Alena Zukersteinova and Stelina Chatzichristou from Cedefop’s Department for Skills and Labour Market coordinated studies among the participating EU countries. Valuable inputs were provided by the ILO colleagues: Christine Hoffmann, Laura Brewer, Maria Ilca Lima Webster, Alvaro Ramirez Bogantes, Hassan Ndahi, Fernando Vargas Zuñiga, Patrick Daru, Akiko Sakamoto, Mikhail Pouchkin, Gabriel Bordado, Julien Magnat, Kanae Tada, Tendy Gunawan, Bolotbek Orokov, Gwyneth Anne Palmos, Georginia Pascual, Badiane Cheickh and Kishore Kumar Singh. Massimiliano Leone, Ana Buzdugan (International Training Centre ILO Turin), Mariela Dyrberg and Annette Brandstätter (ILO Employment Policy Department) Solveig Boyer (ILO Green Jobs Programme) and Manuela Flamini (Edizioni Retrò s.r.l.) were responsible for editing and design.



## Executive summary

In 2008 the International Labour Organisation (ILO), in partnership with the United Nations Environment Programme (UNEP), the International Trade Union Confederation (ITUC) and the International Employers Organisation (IEO) established the Green Jobs Initiative. The initiative was launched to assess, analyze and promote the creation of decent jobs as in the light of current policies for addressing the global environmental challenges. Against this background, in 2010 the ILO, in cooperation with the European Centre for the Development of Vocational Training (Cedefop) conducted applied research into skills needs for greener economies, the outcome of which was published in 2011. Within this context Egypt was identified as one of 21 countries for the development of country case studies with the objective of identifying strategic skills development responses in light of environmental degradation, climate change and the global call for greening economies.

The report, which was published in 2011, concluded that linkage between environmental policymaking and education and training policymaking is non-existent. It followed from this that green skills identification and anticipation were almost non-existent, and therefore the environmental mitigation measures had very limited impact on creation of new jobs and greening of existing occupations. The main recommendation was therefore to achieve better coordination and linkages between environment and education and training policymaking to ensure that a better mechanism was in place for identifying, anticipating and responding to green skills needs.

The current version is an update of the “Egypt Country Study” on Skills for Green Jobs 2009/2010 to capture developments that have occurred since 2010 and any planned initiative in the near future, with a view to their inclusion in the 2018 ILO flagship report World Employment and Social Outlook (WESO 2018) on green economies and the world of work.

Section 2 of the study briefly describes the context in which the study was conducted, including the major changes in the economy and employment shifts in the green transition since the first report in 2009/2010, the environmental challenges facing Egypt, and the main policies, strategies and initiatives adopted to mitigate these challenges and their effect on employment and labour markets. The Egyptian economy was adversely affected by the political turmoil in January 2011 as well as by the global financial crisis that started in 2008, which is reflected in its international ranking in different categories.

As environmental challenges still continue to threaten Egypt’s welfare, a number of key mitigation responses to environmental challenges to sustainable economic growth and development have been adopted by various stakeholders. The most important of these include a constitutional commitment to protect the environment and utilize resources wisely; a focus on the SDS Vision 2030 and the corresponding strategies, policies and programmes on green economy; the TRADE AND INDUSTRY STRATEGY 2016-2020 adopting a number of initiatives that emphasise and promote greening of several sectors; regulation of the renewable energy sector; and establishment of the Waste Management Regulatory Authority.

Section 3 highlights the institutional framework guiding green skills anticipation and provision in Egypt as a whole, while trying to capture developments since 2009/2010, both negative and positive. It also investigates the existence of a 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 policies related to education and training. Finally this section provides feedback on TVET provision in response to green skills needs, focusing on four main sectors; energy, manufacturing, waste management and agriculture.

Furthermore, the study has investigated three models with the potential for skills identification and anticipation, namely labour market information systems, enterprise training partnerships, and social dialogue, emphasising that not working closely with agencies concerned with promoting and implementing greening activities and initiatives makes it very difficult to have a comprehensive and integrated response to greening within the formal education and training systems.

Lastly this section also describes the on-going TVET provision for new green occupation and for greening of existing occupations. In this respect the study focuses on the four sectors (renewable energy, manufacturing, waste management and agriculture), providing a brief review of the main players in the Egyptian TVET sector, followed by elaboration on employment trends and skills response initiatives.

To demonstrate some of the observations, the study has included, as an attachment, four case studies;

- Renewable Energy: A Sustainable Approach to Green Skills;
- Manufacturing: Robici Environmentally-Friendly Leather Cluster;
- MoETE's Response to Green Skills;
- Different approaches for Qualifying Energy Management.

Section 4 of the study highlights the main observations from these case studies. Finally, in Section 5 the study draws a number of conclusions and makes some recommendations that should enhance identification, anticipation and provision of green skills for greening and sustainable development.

# 1. Introduction

The ILO's International Labour Conference of June 2008 stated that skills development should form part of an effective response to changing conditions, climate change among them.

Identifying skills requirements for adaptation to climate change and mitigation measures via a reduction in greenhouse gas emissions has therefore an important role to play in policy development. Meeting skills needs is a critical factor for productivity, employment growth and development. Appropriate skills for green jobs are the prerequisite for making the transition to a greener economy happen. Today skills gaps are already recognized as a major bottleneck in a number of sectors such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services, and manufacturing. The adoption and dissemination of clean technologies requires skills in technology application, adaptation and maintenance. Skills are also crucial for economies and businesses, workers and entrepreneurs, as well as for enabling livelihoods to adapt rapidly to changes arising from environmental policies or climate change.

Given the challenges, ILO joined forces with the European Centre for the Development of Vocational Training (Cedefop) and produced a Report entitled *Skills for Green Jobs: A Global View* (2011). The research was based on 21 country studies with a primary focus on good practice examples of how national policies for greening economies are complemented by identification of skills needs and efficient skills response strategies. The 21 country studies, including Egypt's "Country Study – Skills for Green Jobs" were conducted in 2009/2010 and published in 2011. Cedefop covered country studies in six EU Member States,<sup>1</sup> and the remainder were covered by ILO.<sup>2</sup>

This study is an updated version of the Egypt Country Study and is intended to be used for

the 2018 ILO flagship report entitled "World Employment and Social Outlook (WESO 2018)" on green economies and the world of work, which should be published in May 2018. The content of the report is directly linked to Sustainable Development Goal (SDG) 8 on promoting inclusive and sustainable economic growth, employment and decent work for all, as well as SDGs 4, 6, 7, 11, 12, 13, 14 and 15 which target different aspects of environmental sustainability. The objective of the report is to analyse the trends towards decent work and environmental sustainability and assess the impact on the world of work of a transition towards a low-carbon, resource-efficient economy.

<sup>1</sup> Denmark, Estonia, France, Germany, Spain and the UK.

<sup>2</sup> Australia, Bangladesh, Brazil, China, Costa Rica, Egypt, India, Indonesia, Mali, the Philippines, Republic of Korea, South Africa, Thailand, Uganda, the US.



## 2. Context

The 2009/2010 Egypt Country Study had identified Egypt's environmental challenges as well as an intense response by policy-makers and implementation agencies to these environmental challenges in the form of projects with the potential to generate new green or greened occupations. However, the study also identified that the lack of coordination between the various stakeholders, and the weak enforcement of environmental policies and regulations, has minimised the impact of these measures.

This section attempts to identify the context of the major changes in the economy, the employment shift in the green transition since 2009/2010, the key challenges and priorities for the green economy, and key mitigation responses to environmental challenges.

### 2.1 Major changes in the economy and employment shifts in the green transition since 2009/10

#### key mitigation responses to environmental challenges

The Egyptian economy was adversely affected by the political turmoil in January 2011, as well as the global financial crisis that started in 2008, affecting all its macroeconomic indicators, including a significant drop in the economic growth rate from an average of five per cent during the five years preceding 2011 to about two per cent during the four following years,<sup>3</sup> a massive reduction in tourist numbers and revenues, and high inflation rates (reaching 12.3 per cent in May 2016) due to the rise in value and scarcity of US dollars, along with falls in production and a rising unemployment rate to 13 per cent compared to eight per cent prior

to 2011. The reduction in tourist numbers was accompanied by a fall in foreign and domestic investment which signalled a period of recession. A budget deficit, inflation and an unfavourable balance of payments are the main economic problems that the country is facing now, along with the growth in unemployment.

Internationally, according to the World Economic Forum's Global Competitiveness Index 2016/2017, Egypt ranks 115 out of 138 participating countries (with a score of 3.67) compared to a ranking of 116 and a score of 3.66 in 2015/2016. Critical categories include the macroeconomic environment, innovation and labour market efficiency<sup>4</sup>, in which Egypt ranks respectively 134, 122 and 135 out of 138 countries. Moreover the UNDP Human Development Index ranked Egypt at 111 out of 188 countries in 2015, in the medium human development category.<sup>5</sup> In addition, Egypt scored very poorly in the GII (Gender Inequality Index), ranking 110 out of 187 countries.

Over the 2010-2015 period the total formal labour force increased from 26.2 million to 28.4 million. Unemployment was high over the same period, and the difference in unemployment rates between men and women is significant. In 2010 the overall unemployment rate was nine per cent<sup>6</sup> while in 2015 it reached 13 per cent.<sup>7</sup> The unemployment rate for men was about ten per cent while that for women was over 24 per cent. 80 per cent of employed workers but only 57 per cent of the unemployed were men, whereas 43 per cent of the unemployed but only 20 per cent of employed workers were women. Workers with a university

<sup>3</sup> Although the economic growth indicators started to increase, as the real growth rate rose to 4.2 per cent during FY 2014/2015 compared to a growth rate of 2.3 per cent during FY 2013/2014, such an improvement did not continue during FY 2015/2016. To note, the growth rate in the H1 FY amounted to 3.5 per cent compared to 4.8 per cent for the same period in the preceding year.

<sup>4</sup> Labour market efficiencies reflects to what extent workers are matched with the most suitable jobs for their skillset, incentives to both employees and employers to act in ways that promote the productivity of human capital, allocating a country's human resources to its most productive sectors, the importance of labour market flexibility, employment protection policies, flexibility and ability of a country to reallocate production to emerging segments and adapt the workforce to the new needs of high-tech sectors, unemployment insurance.

<sup>5</sup> UNDP Human Development Index: <http://hdr.undp.org/en/statistics/>.

<sup>6</sup> CAPMAS: Egypt in Figures 2015.

<sup>7</sup> CAPMAS: Egypt in Figures 2016.

degree or higher accounted for about 19 per cent of the total formal workforce but 31 per cent of the unemployed. Women with a university degree or higher accounted for 29 per cent of all female workers in the formal labour force but 40 per cent of all unemployed women. Men with a university education or higher accounted for 16 per cent of all male workers but 24 per cent of all unemployed men. The unemployment rate among highly-educated women was 34 per cent, compared with 24 per cent for all women; among highly-educated men it was 15 per cent compared with ten per cent for all men. These very high unemployment rates among highly-educated Egyptian workers represent a significant waste of human resources, as well as creating potential social and political problems. They suggest that there is a serious mismatch between the skills that university graduates possess and the skills needed in the marketplace.

Unemployment rates of less educated workers are much lower. Among workers who did not complete primary school and could only read and write, 5.2 per cent were unemployed, and among the illiterate 5.4 per cent. Among illiterate female workers, 4.5 per cent were unemployed. Workers with lower levels of education more easily move into the informal sector and engage in subsistence, casual, or household economic activities.

## 2.2 Key challenges and priorities for the green economy

Deterioration in the quality of air (particularly in Cairo and Alexandria owing to concentration of industrial activities) is caused by energy-inefficient production techniques, smelters and solid waste dumps, along with congested roads and natural environmental hazards such as dust, seasonal sandstorms and air emissions from heavy metallurgical industries, refineries, cement plants and power plants.<sup>8</sup>

Water quantity and quality are both negatively impacted by unsustainable irrigation techniques, high network losses of potable water or poor

services in relation to water coverage in rural areas and disposal of municipal and industrial solid and liquid waste.

Egypt is well below the water scarcity threshold with an annual *per capita* water share of 650 m<sup>3</sup>. Limited water availability coupled with escalating demand from various sectors necessitates efficient water use in agriculture which accounts for 85 per cent of Egypt's annual water use. Climate-change-induced temperature rises and more frequent and severe heat waves will probably reduce the productivity of major crops and increase their water requirements, thereby directly decreasing water-use efficiency. The current increase in water productivity is not high enough to mitigate the impact of climate change on farmers' livelihoods and food security.<sup>9</sup>

Until a few years ago Egypt's long-term energy supply seemed secure. However, owing to rapidly growing demand and inefficient use of its dwindling resources, Egypt has changed from being a net exporter of energy to a net importer. Therefore the government is currently introducing socially-sustainable reforms to its subsidy policy for energy. Even so, Egypt has enormous resources of renewable energy such as wind and solar energy which could reduce its current dependence on fossil fuels. Plans have been put in place to increase the share of renewable energies in electricity supply from the current nine per cent to 20 per cent by 2022. In May 2012 the government adopted a strategic energy efficiency road map.

An inefficient waste management system is evident in several fields, including municipal solid waste, industrial and hazardous waste, medical waste, green and agricultural waste, packaging waste, construction and demolition waste, waste tyres, oil and lubricant waste, and e-waste. In 2012 Egypt generated 89 million tons of solid waste, including 21 million tons of municipal solid waste,<sup>10</sup> 30 million tons of agricultural waste, six million tons of industrial waste, 28,300 tons of hazardous medical waste,

<sup>9</sup> GIZ - The Agricultural Water Productivity for Adaptation to Climate.

<sup>10</sup> Compared to 15.3 million tons around 2005 as indicated in the World Bank Report; Country Environmental Analysis of Egypt 2005.

## Skills for Green Jobs in Egypt

4 million tons of construction and demolition waste, 25 million tons of waterway cleansing waste, and 3 million tons of sludge.<sup>11</sup>

**Carbon dioxide (CO<sub>2</sub>) emissions** in 2017 reached 217.30M, up from 212.07M in 2015 and 209.77M in 2014, 195.5m in 2010 and 156.72mt in 2005. Several 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 emissions (nine per cent), non-combustion emissions in industry (nine per cent), and waste (five per cent).<sup>12</sup>

The above environmental challenges, in addition to weak enforcement of environmental legislation,<sup>13</sup> 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 is negatively affected 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.<sup>14</sup>

## 2.3 Key mitigation responses to environmental challenges

The will to address Egypt's environmental challenges and efforts towards sustainable economic growth and development has been clearly communicated through the Egyptian constitution (2014), which commits the State to protecting the environment and utilizing the country's natural resources in a way that ensures

sustainable development and guarantees the rights of future generations (Article 46). It adds further commitment to the State to support scientific research and water security to maintain Egypt's historic rights in the Nile River (Article 44) and commits the State to protect natural resources from exploitation and prevent their depletion (Article 32).

This was further reflected in the "Vision 2030" Sustainable Development Strategy (SDS) and the corresponding strategies, policies and regulations in which the Ministry of Planning took the lead in adopting a participatory approach involving various stakeholders (civil society, investors, national and international development partners and government agencies). At the end of the formulation process the vision was presented to the president and parliament for endorsement.

The SDS is a five-year strategy following the sustainable development principles as a general framework for improving the quality of lives and welfare, taking into consideration the rights of new generations to a prosperous life in three main dimensions - economic, social, and environmental - under which a number of policies, programmes and projects are specified. The SDS proposes a regulatory framework for following up its implementation, consisting of a ministerial committee headed by the Prime Minister; a technical secretariat with the Minister of Planning as its rapporteur overseeing three subcommittees (one for each dimension); the Economic Subcommittee comprising representatives of the Central Bank and Ministries of Finance, International Cooperation and Investment; the Social Subcommittee comprising representatives of the Ministries of Social Solidarity, Education, Higher Education and Scientific Research, Culture and Health; and the Environmental Subcommittee comprising the Ministries of Environment, Housing and Local Development. In addition working groups have been set up to pursue specific objectives, comprised of representatives from relevant ministries, the People's Assembly, CAPMAS, monitoring and evaluation experts, National Councils (NCW, Population, Special Needs), and private sector and civil society representatives. The policies, programmes and projects specified within the economic development dimension

<sup>11</sup> GIZ, Country report on the solid waste management in Egypt, 2014.

<sup>12</sup> Source: [https://ycharts.com/indicators/egypt\\_carbon\\_dioxide\\_emissions](https://ycharts.com/indicators/egypt_carbon_dioxide_emissions).

<sup>13</sup> Attributed to limited human and financial resources, unclear legislations. This weak enforcement of environmental laws contributes to a lax implementation of environmental strategies, which, in turn, diminishes the need for a structural approach of skills identification and development.

<sup>14</sup> Ibid.

include a number of initiatives such as a green economy project for sustainable development, rationalization of water usage, water resources development, water quality improvement, establishment of green resorts in the western desert, establishing eco-friendly health resorts, encouraging green tourism, and reviewing and applying sustainability regulations.

The environmental dimension of the SDS includes a number of policies, programmes and projects<sup>15</sup> with the potential to mitigate the effects of climate change on Egypt, to enhance both the quantity and quality of water resources, to introduce an efficient solid-waste management system, and to reduce air pollution. The Ministry of State for Environmental Affairs (MSEA) chairs the committee responsible for this dimension.

It is worth noting that the SDS addresses education (and skills development) within its social dimension (together with innovation and scientific research, health care, culture and social justice). However, neither the economic nor the environmental dimensions explain how the specific skills needed for their implementation will be supplied.

The Ministry of Trade and Industry (MoTI) in its 2016-2020 strategy has also adopted both the economic and the environmental dimension objectives of Vision 2030 and emphasised the development of a green economy by introducing an initiative of “Environmentally Friendly Industrial Clusters” aiming to establishment 22 “integrated industrial clusters”, as “a developmental solution to enhancing industrial integration between large corporate factories from one side and MSME's from another side”, while emphasising the concepts of cleaner production processes. The first of these clusters is the Robici leather cluster.

The MoTI strategy also put forward the “Green Economy Development Project” which, as described in the 2020 strategy, will support industries contributing to green economy, industries with low emissions, and industries based on environmental dimensions such as waste recycling, whether of industrial or agricultural waste, focusing on enhancing exports that comply with environmental standards, which is now a primary pre-condition for exporting.

In the last six years the government has taken solid steps towards regulating the renewable energy sector through a number of initiatives, including the following; formulating the Supreme Council for Energy (chaired by the PM) by Prime Ministerial Decree 317 in 2014; authorising NREA to operate renewable energy plants by the Presidential Decree 135 in 2014, allowing investors to operate renewable energy plants and sell electricity to end-users and government by Presidential Decree 203 in 2010; and announcing the new Feed-in Tariff (FIT) in September 2014 to encourage investment in renewable energy through long-term contracts with long-term power purchase agreements with the Egyptian Electricity Transmission Company.

Egypt has also moved forward towards addressing its waste management challenges. This is reflected in the establishment of the Waste Management Regulatory Authority (WMRA) by prime ministerial decree number 3005 in 2015, extending to it *the responsibility* for projecting the environmental challenges Egypt encounters, and accordingly for enforcing laws and regulations that govern waste management in the country as well as overseeing the solid waste management ecosystem in Egypt, including collection, transport, treatment, storage and the disposal of solid waste in all governorates and municipals. The WMRA is steered by a board chaired by the Minister of State for Environmental Affairs and includes representatives from a number of Ministries (Local Development, Agriculture and Land Reclamation, Trade and Industry, Housing, Health and Population, Interior, Defence, Military Production) in addition to the WMRA Executive Manager (as deputy to the chairman) and the executive manager of the

<sup>15</sup> “Expand infrastructure for supporting a sustainable water system”, “adopt fiscal policy reforms to encourage sustainable consumption patterns of water and natural resources”, “raise the awareness to reserve environment and natural resources”, “provide incentives for more advanced alternatives and technologies for water conservation and natural resources protection”, “develop a system for disposal of hazardous wastes”, “develop infrastructure to reduce air pollution and face climate changes”, “enhance the efficiency of solid-waste management system and support its sustainability”, “enhance the efficiency of protecting coastal and marine areas”, and “adopt policies to reduce air pollution”.

**Box 1: MoTI Strategy 2016 – 2020: Industrial Development; Environmentally Friendly Industrial Clusters\***

Roubiky Leather Cluster - Furniture cluster in Damietta - Golden Triangle Clusters - Plastic Industry Cluster in Alexandria - Plastic Industry Clusters in Qalubiya and Behira.- Russian Industrial Cluster in East Port Said - Textile City Clusters in Menya, Daqahleya, Sohag and Asyut.- Ready-made Garments Cluster in Delta.- Industrial Cluster for Medical, Pharmaceutical, and Aromatic Industries in Fayoum and Beni Suef - Industrial clusters in Qena and Sohag - Waste Recycling Cluster for Producing Alternative Energy in Luxor.- Electronic, programming, Engineering Industries, Feeding Industries for Engineering Industries and especially for Home Device Industries in Asyut and Beni Suef - Craft, Heritage, and Design Industrial Cluster in Cairo - Industrial Cluster for Fish Manufacturing in Kafr El Sheikh - Carpet Industrial Cluster in Menoufiya - Marble and Construction Materials Cluster in Beni Suef, Golden Triangle region and Suez - Car Components Cluster and the Feeding Industries (Spare parts industry and equipment for heavy transport) in 6th of October and the Suez Canal Axis - Technological Industrial Clusters in Giza and Alexandria - Feeding Industrial Cluster in Qalubiya - Aluminium and House-ware Industrial Cluster in Naj Hammadi - Industrial Cluster for Manufacturing Machines and Equipment in Suez Canal Axis and 6th of October.

\* *MoTI Industrial and Trade Strategy 2016-2020.*

Environmental Affairs Agency, in addition to Civil Society representatives (two specialised NGOs). Furthermore, in 2016 the GoE signed an agreement with the Swiss Government to join the International Programme for “Sustainable Recycling Industries SRI”, with the objective of supporting the sustainable integration and participation of small and medium enterprises in the recycling of electronic waste in Egypt and improving the local capacity of the formal and informal sectors to ensure sustainable e-waste recycling and job creation.<sup>16</sup> The SRI Programme extends legal, administrative and technical backstopping through capacity-building and training. The project is implemented by the Centre for Environment and Development for the Arab Region and Europe CEDARE<sup>17</sup> as part of its Sustainable Growth Programme SGP, a programme that collaborates globally, regionally and nationally in addressing such issues as poverty alleviation, health, waste reduction, green jobs, green ICT, pollution, and energy security, through the implementation of projects, the conduct of research and studies,

and provision of training and knowledge dissemination.

The “Egypt National Cleaner Production Centre”, the ENPC, which was established in 2005 by the Ministry of Trade and Industry, originally to coordinate and sustain all initiatives addressing issues related to cleaner production and energy efficiency (such as SEAM),<sup>18</sup> has been strengthened to become a service provider for Egyptian industry in cleaner production and energy efficiency. The ENPC is currently a fully operational unit, adopting a long-term vision to “become a centre of excellence for Green Industries & Resource Efficiency and Cleaner Production” in Egypt. The ENPC operates through a steering committee chaired by the Minister of Trade and Industry and includes representatives from sectoral chambers of industry, a UNIDO representative, and donor representatives (Swiss and Austrian Governments and GIZ).

Another important development is the hosting of the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) within the Ministry of Electricity and Renewable Energy.

<sup>16</sup> The programme started in Egypt in 2016 and will be effective until end of 2017.

<sup>17</sup> CEDARE was established in 1992 as an international inter-governmental Organization with diplomatic status, in response to the convention adopted by the Council of Arab Ministers Responsible for the Environment (CAMRE), in 1991 and upon the initiative of the Arab Republic of Egypt, the United Nations Development Programme (UNDP) and the Arab fund for Economic and Social Development (AFESD).

<sup>18</sup> SEAM, financed the UK Department for International Development (DfID), for implementing cleaner production (CP) projects, ended before 2010, targeting the industrial sector, having the objective of enhancing competitiveness and reducing pollution.

RCREEE is an intergovernmental organization with diplomatic status, operating under the Arab League with 17 Arab member countries to facilitate and increase the adoption of renewable energy and energy-efficiency practices in the Arab region. RCREEE teams up with regional governments and global organizations to initiate and lead clean energy policy dialogue, strategies, technologies and capacity development with a view to increasing the Arab States' share of tomorrow's energy.

In 2016 the GoE established the "Egyptian Countryside Development Company- El Reef Elmasry" with the objective of developing four million acres sustainably. The company is a 100 per cent Egyptian joint Stock Company, established under law no.8, with three government shareholders: Ministry of Finance, Ministry of Agriculture, and Ministry of Housing. The company has two main objectives; reclamation of desert land in Egypt and provision of decent job opportunities for Egyptian youth. The land is offered to both small farmers and large investors, aiming at creating jobs through expansion of value chains for intensive agricultural production in all types of economic activity, pre-harvest and post-harvest agricultural activities, logistics, manufacturing, services, and so forth, as well as promoting green jobs in areas such as recycling, biofuels and solar energy. One of the main support activities provided by El Reef Elmasry Company is the provision of training for newly-generated jobs. The initiative will be implemented in phases, the first phase including 1.5 million acres in five main governorates.<sup>19</sup>

Through its SDS Vision 2030, industrial strategy, agricultural aspirations and other ongoing initiatives, the government of Egypt is directing a considerable amount of its resources - as well as encouraging local and international investments - towards a number of national initiatives that would contribute to mitigating the effects of climate change; 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, including both solar and wind energy.<sup>20</sup>

## 2.4 Employment shifts and growth

Sectors and economic activities with high environmental impact such as agriculture, energy, construction, tourism, waste management and transportation are experiencing employment shifts as they strive to eliminate their negative impact on the environment through new green occupations and greening of existing occupations. However, no attempt was undertaken to collect data and analyse it for forecasting future needs. None of the organisations with labour market information system perceives this as a task to undertake.

However, as an indication, some of the reports addressing greening in Egypt - such as the UNEP 2014 Green Economy Scoping Study for Egypt and the German Development Institute's 2012 Report "Building Domestic Capabilities in Renewable Energy" - have made some estimates, viz.:

- Waste collection activities will create an additional 24,000 jobs in Egypt, in addition to jobs created in recycling, composting, and production of biofuels;
- In sustainable agriculture an estimated 8 million additional jobs will be created by 2050;
- Solar photovoltaic energy, which can generate 7-11 jobs per megawatt for a plant with average capacity, is estimated to create more than 21,000 additional new jobs by 2020 (3,025 MW X 7 jobs);
- Wind energy is estimated to create 75,000 jobs by 2020.

<sup>20</sup> According to the World Bank report. Wind Energy Scale - Up Project in Egypt: Consultancy Services for Boo Wind Power Project, 2008, 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.

<sup>19</sup> PPP by El Reef El Masry, Director, Academy on Rural Development, October 2016.

There is a need to collect, analyse and disseminate data on the current and future workforce and skills needed for greening. Without this information it would be difficult for the formal education and training systems to respond efficiently and effectively.

## 2.5 Gender employment in green economy

In addition to low levels of participation by women in the labour market (23.6 per cent), women also have low participation rates in certain sectors (manufacturing eight per cent, construction (13 per cent), electricity, gas, steam and air (seven per cent), professional scientific & technical activities (11 per cent), and water supply (one per cent), which may eventually limit women's opportunities to participate in a growing green labour market.<sup>21</sup> There is a need for inclusive green-specific labour market and skill policies to ensure that women are equally prepared for the shift to a greener economy.

<sup>21</sup> Source: CAPMAS - Egypt in Figure 2016



## 3. Skills development measures for the green economy

It is expected that both government- and donor-supported initiatives will eventually generate a massive amount of job opportunities that will have implications for skills provision which needs to be accurately anticipated and channelled through the relevant education and training organisations.

This section aims to highlight the institutional framework guiding green skills anticipation and provision in Egypt as a whole. It also investigates the existence of a 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 to the integration of skills related to greening in relevant policies and strategies.

### 3.1 Green skills needs anticipation

This section looks at the various institutional arrangements for skills identification and anticipation in general and specifically for green skills, in an attempt to identify to what extent they are positioned to fulfill the need for green transition.

In the first version of the green jobs study for Egypt 2009/2010, a number of organisations were identified that had the potential to anticipate green skills needs and the mandate to translate skill needs into curricula and training material. They included the Central Agency for Public Mobilization and Statistics (CAPMAS); Ministry of Manpower (MoM); the Egyptian Education, Training and Employment Observatory (EETEO); Ministry of Education and Technical Education (and its affiliated units); Productivity and Vocational Training Department; Training Organisation of the Ministry of Housing and

Reconstruction TOMOHAR, the Training Councils and the Enterprise TVET Partnerships (12 ETPs, one per subsector).

Since 2010, some of these organizations have become static; this includes the EETEO, which is not receiving funds for studies since funding by ETF came to an end in 2010; the ITC (one of the most active training councils) which in 2017 was merged into the “Micro, Small, Medium Enterprise Authority”, which might affect its mandate;<sup>22</sup> and last, the ETPs, which are currently facing a challenge in positioning themselves within the TVET sector and in securing financing of their activities (especially after the closure of the TVET Reform I programme). Since the closure of TVET I, ETPs turned to training provision, which totally contradicts and limits their original mandate. ETPs have also been subject to changes in their affiliation, ending up in 2017 being affiliated to their relevant chambers; what will happen to them beyond this point is a matter for the individual chambers to decide. It is expected that less active ETPs may prove to be a burden to their relevant chambers and will cease activities and close.

Skills identification and anticipation may happen through any of the following models: agencies responsible for collecting, analysing and disseminating labour market information; enterprise training partnerships; and social dialogue. Below the three possibilities are reviewed.

**Labour Market Information System:** there are numerous institutions involved in either gathering, analysing or generating labour market information. This includes CAPMAS, Information and Decision Support Centre IDSC, Ministry of Manpower (MoM), Ministry of Planning, Ministry of Education and Technical Education, and others. However, there is still no structured and coordinated labour market information system in place which could analyse

<sup>22</sup> May be clarified in the authority's executive legislations.

labour market needs and skills demand on a regular and national basis. In addition, serious problems with the consistency, coherence and co-ordination of data for policy purposes persist among the organisations.<sup>23</sup> Realizing that these institutions are mainly concerned with and structured for generating information relating to previous and current situations, there was a need to support the development of a labour market forecasting function.

Therefore, the European Training Foundation ETF initiated and, together with other players such as the ILO, supported an initiative to develop the Egyptian Education Training and Employment Observatory EETEO<sup>24</sup> (within the IDSC), steered by a committee that included representatives of a variety of public and private education, training and labour market institutions, and employer organizations, allowing maximum sharing of information. The main objective of the EETEO is to contribute to well-informed decision-making through quality data, analysis and policy advice. Among other things EETEO was prepared to offer a comprehensive information system for identification and anticipation of skills needs. Unfortunately political changes, lack of funds and the limited institutional back-up have prevented this body from meeting its ambitious objective. The observatory still exists in the organizational structure of IDSC but is virtually inactive.<sup>25</sup>

**Enterprise TVET Partnerships ETP** is one of the institutional arrangements that have the potential to play an important role in skills needs anticipation (including green skills) as well as to put the findings into practice. The institutional framework of the ETPs can be described as a Sectoral Public-Private Partnership between the employers (with specialized knowledge in the sector) and the TVET institutions, led by employer organisations<sup>26</sup> with the mandate to meet the skills needs of employers in terms of quantity and quality through enhancing the quality of TVET provision within TVET institutions. Egypt has 12 ETPs that have been established

within the framework of the EU-supported TVET Reform I Programme for 12 strategic economic sectors. With the establishment of the ETPs, the role of social partners has become stronger at sectoral level. These ETPs have managed to remain sustainable over the years with a mixture of public funds and income generated through provision of training.<sup>27</sup> Since 2011 the ETPs' institutional hub has changed several times and this has prevented the establishment of a clear mandate. Currently the ETPs have no income and have unclear legal status.<sup>28</sup> Around half of ETPs have run out of funds and cannot pay salaries. They have recently been placed under the relevant Chambers or Federations. What will happen to them beyond this point is a matter for the individual chambers to decide, unless the relevant line ministries intervene once more. It should be noted that the lack of clarity on their role and the tendency to focus on training provision is preventing them from bringing real added value to their sectors.

It should be noted that most TVET stakeholders are convinced that ETPs should become sector skills councils, abandoning their VET provision function to concentrate on bringing real added value in reform and management of the TVET sector, along with linking VET supply and demand, ensuring the quality and relevance of qualifications, and having a role in the assessment process. It is also envisaged that more ETPs, for other economic sectors, should be created once the mandate of the existing ETPs becomes clearer and has been agreed by all stakeholders,<sup>29</sup> which could serve as an opportunity for formulating ETPs that can address the needs of a green economy.

**Social dialogue** is also a mechanism for identification and anticipation of skills needs, in which workers and employers become the sources of informed opinion and expertise. This was demonstrated by WISE and the MoETE, in which employers and workers played an

23 ETF, Torino Process 2014 Egypt.

24 The ETF funded the initiative and extended the technical support to the steering committee from 2005 till 2010.

25 ETF, Torino Process 2016-2017 Egypt.

26 Private sector companies.

27 Some examples of training programmes offered by ETPs; RMG (sewing, pattern making, cutting, manufacturing shirts, trousers), food (bakery, HACCP), Wood (finishing, cabinet making, upholstery).

28 ETF, Torino Process 2016-2017 Egypt.

29 Torino Process 2016-2017 Egypt.

## Skills for Green Jobs in Egypt

important role in identifying occupational standards for wind and solar energy, which fed into a new technical secondary education curriculum, as will be elaborated in Annex 1, case 1.

It should be noted that organizations concerned with implementing greening activities and initiatives, such as the Ministry of State for Environmental Affairs (and its affiliated authorities), the ENCPC, the RCREEE, NREA, WRNA and others do not have formal representation within, nor a working relationship with, the labour market information systems presented above, nor with the ETP. For the social dialogue model, although not an institutional model, NREA experts were involved in the case study for renewable energy. This lack of collaboration makes it very difficult to have a comprehensive and integrated response to greening within the formal education and training systems.

### 3.2 TVET provision for new green occupations and for greening existing occupations

The responsibility for responding to new green occupations and for greening of existing occupations falls within the country's education and training systems, for this report more specifically the Technical Education and Vocational Training system and the faculties of engineering and science, among others.

The Egyptian TVET system remains one of the largest TVET systems in the MENA Region and the main generator of the skilled workforce needed for Egypt's economic and sustainable development, with more than 1,800 technical secondary schools (industrial, agricultural, hospitality and commercial) administered by the Ministry of Education and Technical Education (MoETE), eight regional technical colleges (comprising 45 middle-level technical institutes) administered by the Ministry of Higher Education (MOHE), a number of industrial education colleges (IECs) supervised by the

MOHE offering four-year programmes, middle-level technical institutions affiliated to ministries such as Defence, Health and Communications, and more than 900 vocational training centres (VTCs) affiliated to a number of line ministries (Ministry of Trade and Industry, Ministry of Housing and Urban Development, Ministry of Manpower and Migration, Ministry of Agriculture, Ministry of Health, Ministry of Culture, Ministry of Youth, Ministry of Investment, Ministry of Social Solidarity, Ministry of Religious Endowments, etc.).<sup>30</sup> Other forms of training include apprenticeship training governed by the MoM, the MoTI, and the MoETE. This is in addition to a limited number of private sector VET providers and informal apprenticeships outside the formal sectors of the labour market.

In this section we shall try to reflect to what extent the Egyptian education and training systems are involved in part of the ongoing sustainable development efforts, while focusing on four main sectors, namely energy, manufacturing, agriculture and waste management.

#### First: The energy sector - renewable energy

In the last six years, since the production of the first green skills report in 2011, the GoE has been further challenged by the growing inability to meet the country's industrial and household energy needs,<sup>31</sup> which has encouraged it to progress with its renewable energy plans. This is reflected in its attempts to regulate the renewable energy sector, viz.: formulating the Supreme Council for Energy (chaired by the PM) by Prime Ministerial Decree 317 in 2014; authorising NREA to operate renewable energy plants by Presidential Decree 135 in 2014; allowing investors to operate renewable energy plants and sell electricity to end-users and government by Presidential Decree 203 in 2014; and announcing the new Feed-in Tariff (FIT) in September 2014 to encourage investment in renewable energy through long-term contracts

<sup>30</sup> Egypt Human Development Report, 2010.

<sup>31</sup> According to the Egyptian Energy strategy for 2030 and its update to 2035, it is expected that Egypt will be a net importer of oil and natural gas in the next decade.

with the Egyptian Electricity Transmission Company for long-term power purchase agreements.

Article 32 of the 2014 Constitution commits the GoE to efforts to “make the best use of renewable energy sources, motivate investment therein, and encourage relevant scientific research”, as well as “encourage the manufacture of raw materials and increase their added value as per economic feasibility”.

In addition, a number of Presidential and Prime Ministerial Decrees<sup>32</sup> were issued to allocate land for renewable energy plants and projects in different governorates including the Red Sea, Aswan, South Sinai, Cairo and Giza. The land is allocated to NREA, which will assign it to local and international investors.

These measures have already impelled local and international investors, developers and international donor organizations to intervene and a number of initiatives are already under development, especially Aswan (Benban) and Giza (SIWA) for solar energy plants and the Red Sea for wind energy plants.

International donor organizations are also supporting the GoE in developing its renewable energy capacity through large projects in the field of wind energy, among them the German Development Bank (KfW), the Danish Development Agency, and the Governments of Spain and Japan. It is expected that during the coming years Egypt will become among the leading countries worldwide in terms of installed wind-energy capacity. On the other hand the Green Climate Fund (GCF) and the European Bank for Reconstruction and Development (EBRD) will join forces to make major contribution to a US\$1 billion renewable energy project in Egypt. The funding will support the Egyptian Government’s Sustainable Energy Strategy which aims to source 20 per cent of Egypt’s energy from low-emission renewable sources by 2022. The financing will allow independent power producers to invest in

the first wave of private renewable energy production units in Egypt.<sup>33</sup>

Last but not least, there is a growing trend in the use of solar panels for residential and small industrial applications, especially after the GoE announced its plan to gradually phase out fuel subsidies over the period 2015-2020. In this respect there is the ENCPC’s initiative “SHIP - Solar Heat for Industrial Process” to support the industrial sector in implementing renewable energy technologies to reduce their energy consumption.

Consequently the renewable energy sector is generating, and will further generate, employment opportunities in new green-collar jobs as well as in greened occupations.

### Employment trends in renewable energy (wind and solar energy):

In view of the above initiatives, it is expected that both solar and wind energy will generate considerable numbers of decent job opportunities in various phases, namely component manufacturing, project design, site preparation, construction, installation, operation and maintenance. For energy-sector-related occupations we could identify a set of new green occupations as well as new skills for greening existing occupations for both solar and wind energy plants.

For Solar Energy the need for new green occupations includes:

- Solar installers to set up, install, assemble and maintain solar modules, panels, or support structures and wiring that connect a solar energy system to the electrical grid in compliance with system design;
- Solar Service Technicians, that is quality assurance professionals to monitor, diagnose, optimize and repair underperforming panels;
- Solar Plant Managers to coordinate the day-to-day work including the workers and materials involved in a solar installation, management of time and budgets, and coordination of engineers, system designers and installers in

<sup>32</sup> PR Decree 371 for 2012, PR decree 274 for 2014, PR decree 2109 for 2014, PR decree 2088 for 2014, PR decree 2108 for 2014, PR decree 412 for 2016, PR decree 229 for 2017, PR decree 546 for 2015, PM decree Prime 1418 for 2015, PM decree 1483 for 2015, PM decree 2215 for 2015.

<sup>33</sup> <http://www.greenclimate.fund>.

### Skills for Green Jobs in Egypt

the field;

On the other hand there are new skills for greening existing occupations such as:

- Electricians with Solar Expertise, to install, maintain and repair electrical wiring, equipment and fixtures for PV systems, and ensure that work complies with electrical and building codes;
- Plumbers with Solar Expertise, to install or repair tanks, piping, and other components of solar thermal systems, issue permits and ensure that the work complies with plumbing and building codes; they may also sell related equipment and systems;
- HVAC Technicians with Solar Expertise to install, service, and repair commercial solar thermal systems.

For Wind Energy the need for new green occupations includes:

- Wind turbine technicians to install, inspect, operate, maintain and repair wind turbines;
- Wind plant managers to oversee the systems that generate and distribute electric power, overseeing operation, maintenance and repair, safety, performance, and profitability;
- Quality Engineers to develop processes, test procedures and implement systems that ensure that the products and processes fulfil quality standards and conform to safety regulations.

### Skills response to opportunities in the energy sector

In spite of the outstanding employment opportunities that the energy sector is producing and will be producing in the near and distant future through local and international investments, there still has been no attempt to develop a complete skills response strategy or plan to qualify and equip the labour force with the necessary skills.

In one of the meetings conducted, the interviewee mentioned that the lack of skilled workforce for energy plants has forced investors to seek foreign employment for different phases including construction, installation and

operation, which has increased their investment costs. However, there have been a number of individual responses to the skills needs for renewable energy sector, viz.:

#### Introducing new specializations in technical education:

the MoETE, supported by WISE (a USAID-funded project) is developing a 3-year programme for solar and wind energy technicians. The programme will be delivered through 3-year industrial technical schools in Aswan and the Red Sea area. The first batch of students were admitted to the programme in academic year 2017/2018 (more details under Case 1).

**NREA**, through its two training facilities,<sup>34</sup> is offering short-term training programmes that aim to create awareness and knowledge among various groups. The package of programmes includes the following: general programmes (for one or two weeks) focusing on renewable energy sources and their applications; specialized programmes directed at engineers and technicians working in the field, including theoretical and practical training and visits to project sites; and training programmes to enable NREA staff to improve their professional skills.

#### Civil Society contribution to green skills

**development:** The Solar Energy Development Association (SEDA) is a non-profit association (NGO) and a pioneer institution advocating the development of the solar energy (heat and power) market in Egypt by (i) developing the competencies of the people in utilizing nature's gift of abundant solar energy to improve their quality of life, (ii) introducing innovative and creative solutions for developing the market, and (iii) guaranteeing the quality of supply and being the point of reference. SEDA offers a number of short-term training programmes such as: "Photovoltaic Grid Connected (On-Grid) System", "Solar Water Pumping" and "Comprehensive Photovoltaic Systems Training".

**Capacity Development Programme:** RCREEE, through its capacity development programme, responds to specific training needs and demands from its Member States, to build and

<sup>34</sup> One is located at NREA's premises and the other is in NREA's site at Hurghada.

strengthen Arab qualifications, competencies and expertise in renewable energy and energy-efficiency, covering the whole value chain of RE technologies including energy pricing and trading, large-scale renewable energy projects assessment and planning, integration into the grid, energy audit, certification and standards, and energy management software tools.

#### Private sector participation in skills

**development:** RENAC-OASIS Solar Academy Egypt ROSAE is the outcome of a partnership between the Renewables Academy (RENAC), Germany, and Oasis Renewable Energy (ORE), Egypt. ORE is based in Cairo and since 2010 has provided education and training in the field of renewable energy, covering subjects for decision-makers, consultants, engineers, installers, technicians, undergraduates and schools. ROSAE provides practical-orientated short training courses (2-3 days) and capacity-building services to develop the capacities of the solar energy industry in Egypt. ROSAE offers courses for engineers, installers, investors and other professionals with an interest in solar electricity (off-grid and grid-linked) and solar thermal energy.<sup>35</sup> Examples of training courses include: introduction to solar energy; PV on-grid and off-grid design; solar pumping; and solar thermal technology.<sup>36</sup>

With the exception of the initiative adopted by the MoETE on introducing the skills needed for both solar energy and wind energy activities into the formal technical education system, all other skills response activities lack the potential to meet the needs of the labour market in terms of scope and quantity. In contrast the MoETE has the potential to scale up to other schools and governorates.

### Second: The manufacturing sector – energy efficiency and cleaner production

To mitigate the impact of the manufacturing

sector on the environment, the GoE, through a number of governmental and donor agencies, has adopted a number of initiatives including strategies, policies and programmes that would eventually decrease the manufacturing sectors' consumption of energy as well as eliminate its polluting effect. Some of the most important initiatives are:

Organisations with more than 500 kw of contracted capacity are required to appoint an energy efficiency manager, in compliance with Article 64 of decree number 230 for year 2016 (the executive regulations of the electricity law number 87 for year 2015).

Emphasising and committing to adopting cleaner production and energy efficiency measures at the highest strategic level, i.e. in the Constitution, in Egypt Vision 2030, and in the MoTI strategy 2016-2020.

Progressing with an initiative to develop “Environmentally Friendly Industrial Clusters” aiming to establish 22 “integrated industrial clusters”, as “a developmental solution to enhancing industrial integration between large corporate factories from one side and MSME's from another side”, while emphasising the need for cleaner production processes. The first of these clusters is the Robici leather cluster.

Extending technical support in CP and EE to the industrial sector through the “Egypt National Cleaner Production Centre”, the ENPCPC. The ENPCPC is currently a fully operational unit, adopting a long-term vision to “become a centre of excellence for Green Industries & Resource Efficiency and Cleaner Production in Egypt”. Its mission is “to act as a vehicle for enhancing productivity and competitiveness of Egyptian industry through promoting the transfer of clean and innovative technologies and resource efficiency & cleaner production methods, tools and practices”. The Centre operates through a steering committee chaired by the Minister of Trade and Industry and includes representatives from sectoral chambers of industry, UNIDO, and national donors (the Swiss and Austrian Governments and GIZ).

A number of organisations are extending

<sup>35</sup> Regional Centre for Renewable Energy and Energy Efficiency RCREEE, “International Quality Standards and Quality Assurance Mechanisms for RE and EE Training: Benchmarks and Good Practices”, 2015.

<sup>36</sup> <http://www.renac.de/en/current-projects/solar-academy-egypt-rosae.html>.

### Skills for Green Jobs in Egypt

technical support to introduce the application of solar energy to industrial establishments, including “Solar Heat for Industrial Process” (SHIP) implemented by ENCPC.

ENCPC is also introducing Innovative Approaches for the Sound Management of Chemicals and Low Carbon and Climate-Resilient Industrial Development in Egypt, Transfer of Environmentally Sound Technologies, and Green Chemistry.

The MSEA, supported by UNIDO and working closely with the IMC, EOS and FEI, is implementing the “Industrial Energy Efficiency (IEE)” project, running from 2013 till 2018, aiming at energy savings of 1,277 gigawatt-hours annually (and corresponding GHG emission reductions of 2.9 million tonnes CO<sub>2</sub> annually), through the development of a national programme to implement the International Organization for Standardization (ISO) energy management standard (ISO 50001), which helps organizations use energy more efficiently through the development of an energy management system (EnMS), including the purchase and use of energy and energy-consuming equipment and systems in order to reduce operating and energy costs and energy-related GHG emissions, and foster environmental performance.

#### Employment trends related to manufacturing – Cleaner production and energy efficiency

The adoption of proactive environmental measures in response to the demand for greener economy is changing skills requirements in the industrial sector, and workers in various industries need training and up-grading of their skills so that they can adapt to new technology and new ways of working.

For energy efficiency, two new skills for greening existing occupations have been identified as listed below and reflected in the response to skills needs by the main stakeholders:

- **Energy Efficiency (EE) Auditors** that can assist industrial establishments in measuring energy consumption, assessing and

identifying areas for improvements, analyzing options and developing energy efficiency plans.

- **Energy Efficiency Managers**, to measure and monitor energy consumption, as well as plan and implement energy efficiency measures within the production establishment.

For cleaner production (CP) there is also a need for new skills for greening existing occupations. As a result of policy implementation and introduction of greening technologies and practices, the industrial sector is introducing the need to qualify engineers, production managers and plant managers in such a way as to enable them to assess, plan and implement pollution reduction measures in industrial establishments, which is crucial for the conversion to CP. This requires:

- **Plant Managers for Cleaner Production** capable of investigating and applying cleaner production and waste management techniques, processes, products and services to reduce risks to the environment and to human health, while focusing on conservation of resources such as water, energy, and materials.
- **CP auditors** for industrial processes, capable of determining the proper options for CP, extending technical support and conducting in-plant assessments to increase the overall efficiency of industrial processes in reducing their impact on the environment and also reducing operating costs.
- **Technicians and Technicians' Supervisors**, trained to undertake the responsibility of “merging the CP in operation by supplying them with necessary information and skills related to the CP as well as the different field of its application such as conservation of raw materials, water and energy, reducing waste generation, good housekeeping, contingency plans, etc.”<sup>37</sup>

<sup>37</sup> <http://www.eeaa.gov.eg/portals/0/eeaaReports/IndUnit/CP.pdf>.

### Skills response to opportunities in the manufacturing sector: Cleaner production and energy efficiency

Most of the training in response to skills needs has been provided by agencies and programmes implementing or piloting different mitigation measures and accordingly responding to the skills needs identified, mainly through the provision of short-term courses for a limited number of beneficiaries, the sustainability of which is not guaranteed. Examples are:

- **Introducing green concepts into existing curricula:** ENPCPC realised that preparing human resources for adopting cleaner production processes within a production facility does not require establishing specific specialisation. Rather, it requires introducing the concepts of cleaner production to specialised academic faculties (engineering, science and others). Therefore the ENPCPC management is conducting informal meetings with university faculties in an attempt to encourage them to respond to the skills needs for CP within their educational curricula, or through universities' training centres.
- **Certified continuing training course:** RCREEE is developing and implementing the Certified Energy Management Professionals (CEMP) programme, which is a standardized in-depth professional certification programme for energy managers tailored to the needs of Egypt (and other Arab Member States). It aims to assist EE policy-makers and programme administrators in planning and implementing energy efficiency plans and related measures and achieve energy targets.<sup>38</sup> The technical content of the CEMP has been developed by Econoler Inc, covering four modules (electrical, thermal, energy management and local case studies). Attending the preparatory training is optional, however; applicants must sit a written exam without attending the preparatory course, and are certified by RCREEE only if they pass by 70 per cent or more. Certificates need to be renewed every two years.

- **Upgrading skills of the current workforce:** the MSEA, supported by UNIDO, and working closely with the IMC, EOS and FEI, implemented the "Industrial Energy Efficiency IEE" project and has trained industry representatives from the cement, metallurgy, ceramics, paper, chemicals and fertilizer sectors, as well as governmental agency personnel. This created a cadre of specialized energy management experts, enabling them to implement EnMS in their factories. The IEE project has trained up to 400 beneficiaries.<sup>39</sup>

### Third: Waste management

Since 2011 Egypt has moved forward towards addressing its waste management challenges. This is reflected in a number of initiatives which should lead to a reduction in pollution intensity and the positioning of waste management as a new niche market for innovative small businesses. The initiatives include the following:

The establishment of "The Waste Management Regulatory Authority (WMRA) by the prime ministerial decree 3005 for 2015, extending to it *the responsibility of projecting the environmental challenges Egypt encounters, and accordingly enforces laws and regulations that govern the waste management in the country as well as governing the solid waste management ecosystem in Egypt, including collection, transport, treatment, storage and the disposal of solid waste in all governorates and municipals. The WMRA was established to work along the following main activities; regulating and determining the roles and responsibilities of all stakeholders in waste management system; making proposals for developing and updating legislations, laws and regulations, especially for joining international agreement, and coordinating donor supported waste management initiatives; making waste sector data and information available; issuing guidelines on the implementation of strategic plants at governorates level; developing controls, standards and guiding forms for all contracting phases; providing technical support to public awareness and societal commitment programs; proposing the economic and financial*

<sup>38</sup> In line with Article 7 of the Arab EE Guideline. The guideline was adapted from the EU Directive 2006/32/EC 2006, and adopted by the council of Ministers in in the decision no. 195 taken in the 26th meeting held in 23 November 2010.

<sup>39</sup> UNIDO activities in Egypt 2015-2016.

## Skills for Green Jobs in Egypt

mechanisms; conducting technical studies and propose mechanisms for determining tariffs on integrated waste management services; creating investment opportunities in the arena of waste management; developing the key performance indicators for monitoring; developing training and capacity-building plans for waste management; Following and evaluate waste management activities".<sup>40</sup>

Implementing the "Industrial Waste Management and SME Entrepreneurship Hub in Egypt-IWEX Egypt", funded by the MENA Transition Fund through the African Development Bank (AfDB), and implemented by the ENPC from 2014 to 2017, in partnership with investors' associations in 10<sup>th</sup> of Ramadan and 6<sup>th</sup> of October. The project aims at developing a sustainable and integrated industrial waste exchange system (piloting in 10<sup>th</sup> of Ramadan and 6<sup>th</sup> of October) positioning it as a "Green Entrepreneurship Hub", linking industrial waste generators, potential users and recyclers so as to improve cross-industry resource efficiency, promote the development of new innovative SMEs, create green job opportunities, reduce the environmental impact of industrial waste, and improve the lives of Egyptian citizens. Training services were extended to university students and teams of entrepreneurs who have experienced initiatives implemented by other programmes<sup>41</sup>, through subcontracting to external consultants for the provision of training in entrepreneurship and industrial management, in addition to mentoring and coaching. To date 88 university students and 45 trained teams have benefited from the training services resulting in 45 prototypes. However, the creation of a "Green Entrepreneurship Training Hub" for the provision of entrepreneurship and industrial waste management training is in the pipeline. Selecting "Waste Recycling Cluster for Producing Alternative Energy in Luxor" as one of the 22 "Environmentally-Friendly Industrial Clusters" ("integrated industrial clusters") is "a developmental solution to enhancing industrial integration between large corporate factories

from one side and MSME's from another side", while emphasising the concepts of cleaner production processes.

Addressing chemical waste through the "Innovative Approaches for the Sound Management of Chemicals and Chemical Waste IAMC" project, financed by SECO through UNIDO and implemented in partnership with ISSPPRO and extended from 2015 to 2016. The objective of the initiative was to support the use of innovation to improve sustainable management of chemicals while improving business performance.

Addressing waste tyres through, the "Value Chain Analysis of Waste Tyres Recycling in Egypt", financed by the GIZ and implemented in partnership with the Ministry of Environment, the National Solid Waste Management Programme (NSWMP), GIZ, the Ministry of Trade & Industry and tyre producers, importers, recycling companies and worn tyre sellers. The purpose is to conduct a baseline assessment of the tyres sector in Egypt, identify waste tyre management processes and value chains and recycling, in both the formal and informal sectors. It also aims at engaging producers and importers of tyres in a systematic and strategic way to gauge their views on Extended Producer Responsibility EPR and how a sustainable and functional scheme would look.<sup>42</sup> EPR ensures that those who produce and market products bear responsibility for the collection and processing of the resulting waste.

Joining the international initiative "Sustainable Recycling Industries SRI", for supporting the sustainable integration and participation of small and medium enterprises in the recycling of the electronic waste in Egypt and improving local capacity of formal and informal sectors to ensure sustainable e-waste recycling and job creation. SRI Egypt is extending its services to both start-ups and existing enterprises, based on a Technical Needs Assessment designed for e-waste recyclers that was conducted in February 2017, in line with the project's "Training and Technical Support" component.

40 Prime Ministerial Decree number 3005 for the year 2015 for establishment of the Waste Management Regulatory Authority.

41 Such as the AUC Venture and Nahdet El Mahrousa.

42 <http://www.enpc.org/projects/15>.

## Employment trends in waste management

Employment in the waste management sector has greatly expanded world-wide in recent years as a result of new regulations and or programmes aiming to regulate this service and to combat its impacts on the environment and on occupational health and safety. An expansion of the waste management workforce is expected to occur in response to the ongoing activities, albeit without having put in place the required skills development programmes.

These above-mentioned initiatives have highlighted the need for “waste management specialists” who would be responsible for planning, implementing, and coordinating comprehensive waste management systems designed to maximize waste prevention, reuse, and recycling opportunities; establishing companies’ waste management goals and objectives; introducing technologies for recycling, working with employees to help implement waste management policies; and evaluating the success of management plans. Waste management specialists play a key role in minimizing the impact of waste and protecting the environment.

In addition, it should be noted that many industrial processes have the potential to produce hazardous waste and each stage of the production process may generate a specific type of waste, with each waste product requires a specific management solution, a specific technology, specific handling and therefore special skills.

## Skills response to opportunities in the waste management sector

The skills response to the waste management needs are as follows:

- **Continuing training courses:** the WMRA is offering training in a number of areas including: Waste Management, Hazardous Waste Management, a Hazardous Waste Compliance Programme, Handling and Disposal of Waste, Operating a Waste Facility, Conversion of Waste to Energy, Management of Chemical Waste, Waste Management

Regulations, Healthcare Waste Management, Tracking and Transporting of Waste. The training is offered to interested individuals and companies who can apply through the WMRA website.

- **Skills upgrading of the current workforce:** IAMC aims at reducing pollution intensity and chemical waste and at eliminating hazardous chemicals and processes or replacing them with safer and economically feasible ones. The initiative works directly with companies and employees to enhance their knowledge and skills through provision of training workshops on chemicals management and toolkits for chemicals companies and stakeholders, along with a concept note for the training and dissemination activities.
- **On the job training:** ENCPC, through its “Value Chain Analysis of Waste Tyres Recycling in Egypt”, is conducting on-the-job training in waste tyre management processes and recycling.

The SRI Project, implemented by CEDARE<sup>43</sup> as part of its Sustainable Growth Programme (SGP), from 2017 offered short-term (3-day) training containing various modules; E-waste Entrepreneurs & Recyclers trained in Environmental Registry Content by SRI, “EWaste Sustainable Management”, “E-Waste Recycling Technologies”, “E-waste Recycling Chain”, business models, opportunities and challenges in the Egyptian market, recycling in formal and informal sectors, adaptation, health and environmental impact of sound recycling, conformity and accreditation, legislation and its applications.<sup>44</sup> Training is offered to groups of 20 participants with different backgrounds: existing recyclers, start-ups and entrepreneurs from the private sector (both formal and informal); government officials from the Waste Management Regulatory Authority and Ministry of Environment; entrepreneurs

<sup>43</sup> CEDARE was established in 1992 as an international inter-governmental Organization with diplomatic status, in response to the convention adopted by the Council of Arab Ministers Responsible for the Environment (CAMRE), in 1991 and upon the initiative of the Arab Republic of Egypt, the United Nations Development Programme (UNDP) and the Arab fund for Economic and Social Development (AFESD).

<sup>44</sup> <http://web.cedare.org/category/sgp/projects/sustainable-recycling-industries-sri/>.

## Skills for Green Jobs in Egypt

receiving incubators<sup>45</sup> services; relevant NGOs; along with *members of the technical committees and advisory boards of the SRI* and inspectors from the Central Department for Inspection and Environmental Conformity of the Ministry of Environment.

#### Fourth: Agriculture sector - organic farming

**The agriculture sector** in Egypt continues to face a number of key environmental challenges, such as water contamination; extensive use of fertilisers; water scarcity; impact of climate change on production practices and quantity; more extreme fluctuations in weather conditions witnessed over the past 3-4 years adversely affecting crop yields; inefficient use of resources and widespread reliance on unsustainable practices; and limited fertile land, which has been subject to continuous degradation including salinization and soil pollution from inefficient use of agrochemicals. In addition, owing to having intensive cultivation on a relatively small agricultural area, the rates of pesticides and fertilizer use are high.

All this has stimulated the need for organic farming, which commenced in the 1970s; today Egypt has more than 33,000 hectares of land (compared to 25,000 in 2006) of organic farms, mostly deserts irrigated from the Nile.

In its 2014 constitution, Article 29, the GoE has committed itself to “protect and expand agricultural land, and criminalize encroachments ..., ..... and protect them from environmental risks”. One of the most important measures used to mitigate these environmental challenges is promoting organic agriculture. The FAO confirms that organic agricultural practices have direct benefits on mitigating climate change effects, enable ecosystems to readjust to the negative impacts of climate change by restoring soil organic matter, limit soil erosion, improve soil physical structure, reduce agricultural GHG emissions, and improve energy consumption (fuel and oil consumption and lower consumption of synthetic fertilizers), in addition

to being an effective mechanism in the fight against desertification.<sup>46</sup>

In February 2017 the cabinet of ministers reviewed and approved the draft Law for Organic Agriculture, which will be issued in the near future. The Agricultural Law aims at activating the role of the Ministry of Agriculture and Land Reclamation in the full supervision of all organic agriculture in accordance with ISO standards.

The GoE is, at the highest strategic level, currently supporting a national initiative to reclaim four million acres of desert, presenting an opportunity for sustainable agriculture to contribute to the Egyptian green economy.

A number of organisations are playing an important role in supporting implementation of organic farming techniques in Egypt, including the following: , a leading private sector company, a number of NGOs (Egyptian Biodynamic Association EBA, the Egyptian Centre for Organic Agriculture (ECO), and the Centre of Organic Agriculture (COAE), in addition to international programmes (Italian Cooperation, CARE International, USAID, the United Nations Food and Agriculture Organization (FAO), the EU, and others). Organic certification in Egypt is mainly provided by two local organisations, ECO and COAE (see above), both members of IFOAM and accredited to certify for EUREPGAP.

#### Employment trends in the agricultural sector

Farmers adopting organic farming techniques need to demonstrate their continuous compliance with international standards, especially if they are targeting the export market which has introduced the need to qualify Organic Farm Auditors and Certifiers (new green occupations).

On the other hand, Organic Farming has introduced new skills to existing occupations including: pesticide operators, modern irrigation system technicians and operators, natural land management operators implementing safe pesticide programmes (and operating machines such as bio-fuel generators).

<sup>45</sup> SRI incubation programme providing technical assistance to start-ups in the e-waste recycling field and to help build operational e-waste companies.

<sup>46</sup> Egyptian Constitution 2014.

## Skills response to opportunities in the agricultural sector

NGOs continue to play an important role in supporting the organic movement in Egypt, viz.:

### › Non-formal training courses for small

**landowners:** Sawiras Foundation for Social Development (SFSD), one of the leading civil society organisations in Egypt, has been concerned with organic farming techniques. Since 2010 SFSD has financed two initiatives. The first commenced in 2010, targeting the “economically active poor” to create employment and generate income. The training focused on topics such as “implementing new organic farming methods based on drip irrigation” as well as “raised awareness of food safety and environmental protection” in the New Valley. The programme was delivered through the Desert Research Centre of the Agricultural Research Centre and the Egyptian Centre for Organic Agriculture (ECO). Through the project 200 trainees, mainly small landowners, were trained. The project reported that the trainees established organic greenhouses and organic nurseries to sell seedlings suitable for organic farming. Later the SFSD implemented another initiative to promote organic farming methods among young farmers, in which 310 individuals were trained, focusing on certain crops as well as livestock, and production of organic manure (compost).

### › Civil Society contribution to skills

**development:** the Egyptian Bio-Dynamic Association (EBDA) is another NGO that runs short-term training courses offered to engineers and farmers (mainly from employees of the SEKEM group) on a range of organic farming subjects such as: “Basic concepts of organic production”, “Organic certification”, “Organic crops production”, “Organic livestock”, “Organic herbs vegetables and horticulture”, “Conversion to organic production”, “Organic Farming scheme”, “*Production of improved seeds for medicinal crops and herbs organically certified*”, and “*Sustainable use of agricultural land through the introduction of organic farming methods*”.

### › New higher education degree:

at a different level universities, through their faculties of agriculture, responded by introducing a two-year, four-semester programme, “Professional

Master’s Degree in Organic Agriculture”, as a postgraduate degree in organic agriculture. The objective of this programme is to increase the scientific knowledge, background and professional abilities of graduates in organic agriculture, qualifying them for the highest positions in the productive labour market.

### › Non-formal training programme for youth:

pesticide operators are trained through the “Pesticides Applicators Programme” to prepare, qualify and license specialists in the field of agricultural pesticides application. The initiative aims at providing job opportunities as a Pesticide Operator. The initiative aims at training 37,000 youths in Luxor, Menia and Behaira governorates. The initiative is implemented by the Agricultural Pesticides Committee (APC, Egyptian Ministry of Agriculture and Land Reclamation), supported by the Green Trade Initiative GTI (UNIDO). By October 2016 the programme had already trained 150 participants. The licensing is awarded based on a pre- and post-training assessment.

### › Upgrading training delivered in agricultural technical schools:

the programme for training modern irrigation systems technicians is delivered by Shoura Foundation for Development, an NGO active in training graduates and students of technical secondary schools, preparing them to compete for decent working opportunities in the agricultural sector. The programme is delivered through a cascading training programme, in which teachers of Technical Agricultural Secondary Schools (TASS) are trained and practical training equipment is provided to schools. Teachers would then train students enrolled in the third secondary year, each teacher being required to train one group every term. Finally the assessment of students is conducted by Shoura and consists of two exams, one theoretical and one practical. In the first round (2<sup>nd</sup> term 2016/2017) 245 students were trained, but only about 50 per cent of them passed the assessment.

Organic farming measures have clearly identified the need for a workforce capable of land management, modern irrigation techniques (building, operating and maintaining them), implementing safe pesticide programmes, and operating machines (bio-fuels generators).

## 4. Analysis of case studies

The four case studies, included as attachments, are used to illustrate some of the main findings, as follows:

**The first case study** demonstrates a response by the MoETE to the anticipated skills needs for nationally supported, renewable energy projects (both solar and wind energy plants). The skills needs were identified through social dialogue and consultation groups, in which employers and technicians acted as sources of informed opinion and expertise to identify skills for green jobs, anticipating demand for green skills at occupational level, along with working with educational and curriculum experts to transform the skills requirement into educational programmes.

The process was initiated at the request of the Ministry of Education and Technical Education, supported and financed by WISE (a USAID initiative), and led by an NGO.

This model might be one of few sustainable skills responses and provisions, but the process of skills identification and the associated consultation process remains un-institutionalized.

**The second case study:** the MoTI is aiming to establish 22 “integrated environmentally-friendly industrial clusters” under its 2016-2020 strategy as “a developmental solution to enhancing industrial integration between large corporate factories from one side and MSME’s from another side”, while emphasising the concepts of cleaner production processes. The first of these clusters is the Robici leather cluster.

The case study demonstrates how the response to the green skills needs is based on actual needs, as the cluster had already been operational when the decision was taken to establish training units. The response to skills needs is also based on qualifications acquired from international skills standards, Siemens for the robotics and Italian experts for the training centre and delivery of training programmes on the automated transformation solutions in the

traditional tanning model and life-cycle.

**The third case study** demonstrates the extent to which service providers act separately from other stakeholders. MoETE’s Technical Education, one of the largest sources for the industrial labour force, is implementing a number of initiatives to address green jobs needs, for example introduction of “environmental competencies”; introduction of new qualifications for the renewable energy sector; and introduction of extra-curricular activities in solid-waste production units for wood and aluminium in technical secondary schools. The institutional involvement of various stakeholders is required to verify relevance and ensure commitment to the outcomes.

**The fourth case study** demonstrates different approaches, by different organisations, to the same skills needs, emphasising the lack of coordination and collaboration between various stakeholders. The ENCPC, RCREEE and IMC, through implementing initiatives to facilitate and increase adoption of energy efficiency practices, have all identified the need for qualified energy efficiency managers. However each of the three organisations responded differently.



## 5. Conclusions and Recommendations

The first part of this section will demonstrate the most important conclusions, followed by some main recommendations that may enhance the country's ability to respond to the green jobs challenge.

### 5.1 First: Conclusions

Lack of an official and structured skills response strategy to greening, within the formal education and training system in Egypt, still persists, which is attributed to a highly fragmented education and training system, and a lack of a green skills standards and qualification framework. Employment opportunities generated by the activities, described in this report, undertaken by the various stakeholders to mitigate the impact of climate change on the environment, have not yet materialised into real jobs, owing to the lack of systematic collaboration.

Except for the MoETE/WISE initiative, introducing solar and wind energy qualifications into technical industrial education, most of the other responses to skills needs for mitigation measures are donor-initiated and donor-supported, with a limited duration and limited budget, implemented on a relatively small scale.

Access to a qualified labour force with green jobs skills is mandatory for the transition to a greener economy. Currently skills gaps have already been identified as a major constraint on implementation of greening, as example of which is lack of energy-efficiency specialists to implement energy-efficiency measures, lack of sector-specific cleaner production specialists, and lack of technicians for solar and wind energy plant operation.

The absence of a body concerned with and able to take a leading role in identification and provision of green skills, along with the lack of collaboration and coordination among various stakeholders, are the main challenges to a comprehensive response to green skills needs.

Lack of collaboration and coordination between organisations concerned with implementing environmental mitigation measures and the formal education and training system remains one of the main challenges for a comprehensive response to green skills needs.

Efforts towards the identification and anticipation of green skills are not systematised, and are achieved at the level of different implementing agencies in which most of the practical knowledge and experience currently exists.

Most of the TVET response to green skills identified in this paper have been undertaken by agencies and programmes implementing or piloting different environmental mitigation measures through limited-duration initiatives, with limited budgets and capacity outside the formal education and vocational training systems. Skills development is delivered through short-term courses to a limited number of beneficiaries, sustainability not being guaranteed.

### 5.2 Second: Recommendations

There is a need for a TVET Partnership enterprise or council as a platform for coordinating and sharing the outputs of the various activities of all organisations implementing measures to address environmental issues on the one hand and the TVET system on the other. This platform can take responsibility for identifying and forecasting green skills needs, developing green skills standards, translating green skills needs into educational and training programmes, and developing a green skills response strategy and action plan, as well as monitoring its implementation.

Adopting the model of the TVET Enterprise Partnerships as a model that brings together skills demand and supply in response to the needs of the labour market could be extended to

economic sectors currently undergoing greening but not currently covered,<sup>47</sup> and membership could be extended beyond the private sector and the TVET institutions to include other stakeholders (such as the ENCPC, NREA, WMRA, and others), and be given the mandate to identify and forecast green skills needs within their relevant sectors or industries, translate them into educational and training programmes, and link them to the National Skills Standard and the National Qualification Framework.

Introducing green skills needs identified through the various initiatives, through including it within the National Qualification Framework currently being developed by the National Authority for Quality Assurance and Accreditation for Education, is an opportunity to influence the formal education system (including the TVET and the PVET) at a national level and ensure that future entrants to the labour market are both aware of and capable of implementing the necessary measures.

Introducing green skills needs at technician level through technical secondary schools and the Productivity and Vocational Training Department PVTD is also an opportunity for qualifying large numbers of technicians and future entrants into the labour market for green jobs, as well as the existing workforce.

Anticipation of skills and green skills needs is crucial to harmonising the TVET response to the needs of existing and future investors in each sector. The GoE could reactivate the Egyptian Education, Training and Employment Observatory (EETEO) or build capacity with organisations for generating labour market information so as to be able to forecast labour needs (skills, location, and quantity) to ensure that a systematic approach to collecting data on green jobs and skills implications is operational.

There is a need to upscale the existing donor-supported initiative of limited duration and limited budget to a fully national project.

There is a need for inclusive green-specific labour market and skills policies to ensure that women are equally prepared for the shift to a greener economy.

<sup>47</sup> ETPs currently covers, tourism, construction, food, readymade garments, food, building materials, furniture, printing, chemicals, engineering.

## 6. References

- CAPMAS, Egypt in Figures 2015.
- CAPMAS, Egypt in Figures 2016.
- Egyptian Constitution, 2014.
- Egypt National Cleaner Production Centre;  
<http://www.encpc.org/projects/15>.
- El Reef El Masry, Director, Academy on Rural Development, October 2016, PPP.
- European Bank for Reconstruction and Development EBRD, "Strategy for Egypt", 2017.
- German Development Institute - "Building Domestic Capabilities in Renewable Energy" in 2012.
- GIZ – Fact Sheet on Egyptian German Joint Committee for Renewable Energy, energy Efficiency and Environmental Protection (2015-2018).
- International Labour Organisation, "Anticipation Skill Needs for Green Jobs – A Practical Study, 2015", [http://www.ilo.org/wcmsp5/groups/public/-ed\\_emp/-ifp\\_skills/documents/publication/wcms\\_564692.pdf](http://www.ilo.org/wcmsp5/groups/public/-ed_emp/-ifp_skills/documents/publication/wcms_564692.pdf).
- Ministry of Planning and Administrative Reform, "Vision 2030: Sustainable Development Strategy, 2016".
- Ministry of Trade and Industry MoTI, "Industrial and Trade Strategy 2016-2020".
- NREA: <http://www.nrea.gov.eg/english1.html>.
- UNDP, Human Development Index:  
<http://hdr.undp.org/en/statistics/>.
- The World Bank, Country Environmental Analysis of Egypt, 2005.
- GIZ, The Agricultural Water Productivity for Adaptation to Climate.
- GIZ, Country Report on the Solid Waste Management in Egypt, 2014.
- European Training Foundation ETF, Torino Process 2016-2017 Egypt.
- Presidential Decrees 371 for 2012, 274 for 2014, 2109 for 2014, 2088 for 2014, 2108 for 2014, 412 for 2016, 229 for 2017, 546 for 2015, 1418 for 2015.
- Prime Ministerial decree 1483 for 2015, 2215 for 2015.
- Ministerial Decree number 230 for year 2016 concerning the Executive Regulations of the Electricity Law 87 for year 2015.
- Green Climate Fund; <http://www.greenclimate.fund>  
<http://www.eeaa.gov.eg/portals/0/eeaaReports/IndUnit/CP.pdf>.
- Regional Centre for Renewable Energy and Energy Efficiency RCREEE, "International Quality Standards and Quality Assurance Mechanisms for RE and EE Training: Benchmarks and Good Practices, 2015.
- Waste Management Regulatory Authority;  
<http://www.wmra.gov.eg/en-us/Pages/default.aspx>.
- Centre for Environment and Development for the Arab Region and Europe <http://web.cedare.org/category/sgp/projects/sustainable-recycling-industries-sri/>.



## 7. List of key resource persons

-  Dr. Ahmed El Guishy – Deputy Minister for Technical Education – Ministry of Education and Technical Education;
-  Dr. Shereen El Sabagh – Head of Policy Unit and Supervisor of the Developmental Programs – Ministry of Trade and Industry;
-  Dr. Aly Abu Sena – Executive Director for the Egyptian National Cleaner Production Centre – Ministry of Trade and Industry;
-  Ms Samia Ayoub – Head of Central Department for Vocational Training – Ministry of Manpower;
-  Dr. Ahmed Soliman – Senior Advisor - Ministry of Planning and Administrative Reform;
-  Dr. Maged K. Mahmoud – Technical Director - Regional Centre for Renewable Energy and Efficiency;
-  Gehane El Sokkary – Principle Socio economist - African Development Bank;
-  Eng Amr Farouk – Founding Member - Solar Energy Development Association;
-  Yasmine Fouad – Assistant Minister - Ministry of State for Environmental Affairs;
-  Ms Rana El Guindy – Senior Specialist – Energy Economist - Regional Centre for Renewable Energy and Efficiency;
-  Mohamed Fawzi – Deputy CEO – Workforce Improvement Skills Development - USAID.



## 8. Annexes

### 8.1 Analysis of case studies

#### Q Case Study I. Renewable energy: A sustainable approach to green skills

As reflected in the main text, the GoE is moving rapidly towards the use of renewable energy applications to make up for current deficiencies, protect the environment by reducing GHG emissions, enhance local industrial capabilities, and generate more new job opportunities, examples of which are:

- ▶ The Benban Solar Energy project in Aswan - a cluster of solar energy developers spread out over an area of 8,843 acres in the city of Benban, estimated investment worth \$3 billion, allocated into 40 plots and expected to house an estimated 2GW of solar capacity through public tenders (under development). This project could probably become Aswan's largest employment sector, offering jobs and opportunities during construction, operation and maintenance.
- ▶ The Red Sea currently has the first commercial wind farm (established in 1993) in Hurghada, with a capacity of 9 GWh/year, the Zaaferana wind park annually producing about 850 million KWh (reducing emissions of about 450,000 tons of CO<sub>2</sub>), and the Gabal El-Zayt wind farm close to the Gulf of Suez.<sup>48</sup>

Scarcity of qualified workers for operation and maintenance is one of the main challenges facing these plants.

Recently, in response to these two major investments, the MoETE, supported by the WISE Workforce Improvement and Skills Enhancement (a USAID-funded project that commenced in 2015), is currently working on introducing new

specialisations in technical secondary schools to address the needs of both solar and wind energy investors. According to the MoETE these initiatives were triggered by a request from the governorates hosting solar and wind energy projects and investments and accordingly has the potential to generate jobs around Aswan and the Res Sea. Therefore the initiative currently includes undertaking of pilots in two technical secondary schools; the school in Aswan would qualify graduates to work in solar plants or establish their own installation and maintenance operations (entrepreneurship) for the Solar Energy generation units for household, farms and other end-users, while the school in Hurghada will qualify graduates to work in large Wind Farm plants, as well as offering a minor specialisation allowing graduates to establish their own installation and maintenance of solar boilers.

One of the most direct ways of gathering information on current and future skills demand in clean energy, energy efficiency, and related activities is to ask firms currently operating in these areas to report their current employment levels, human resource requirements and anticipated needs.

The skills identification and curriculum development process for both qualifications was initiated by WISE, information on current and future skills demand being acquired from employer organisations currently operating in the solar and wind energy sectors. Feedback from the employers' organisations was acquired through focus groups and technical consultations meetings with other stakeholders, including technical secondary education teachers and their supervisors, the National Renewable Energy Authority, the Ministry of Electricity and Energy, and local and international experts. The process resulted in the development of 75 occupational standards.

The programme is designed to be implemented in three years in technical education schools, with

<sup>48</sup> Fathy Ameen Mohammed, Financing Wind Park Projects Experience, NREA Egypt, 2007.

the potential to extend to five years, practical training being provided both in schools and within the private sector. It will commence in academic year 2017-2018, and already the MoETE is considering scaling it up to other technical schools and governorates, following the solar and wind energy investment map.

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

## Q Case Study II. Manufacturing: Robici environmentally friendly leather cluster

For centuries tannery production units have concentrated in the “Magra Al Oyoon” in the centre of old Islamic Cairo, which runs along the city's ancient aqueduct. Dyeing of animal hides in small ramshackle buildings, mainly using traditional processes, without infrastructure for absorbing or treating hazardous waste by-products, has resulted in high levels of contamination and unsafe working environments for those working and living in the area.

For more than a decade since 1995 the Egyptian Government has been trying to relocate hundreds of tanneries from “Magra Al Oyoon” to the outskirts of Cairo. This was first initiated when the governor of Cairo issued decree no. 161 of 1995 to relocate tanneries and glue factories from “Magra Al Oyoon” to the north of Badr City; then in 2003 financing was secured and a specialised ministerial committee chaired by the prime minister was formulated to oversee the relocation of tanneries. All this has been resisted by tannery owners because of the convenience of having a central location in the middle of the capital and of having access to the labour force).

In 2016 the government again took the initiative as part of its SDS Vision 2030 which was endorsed by the president of Egypt, and consequently tanneries have been moved at the order of the government, which is paying for

the transfer of machinery, subsidizing housing for workers and facilitating low interest loans for businesses trying to expand.

The location for the Robici will include not only production units but also treatment plants for industrial and sanitary drainage water, the Tanning Technology Center and integrated industries (tanneries, gelatin factories, glue, stores and chemicals, tanning technology centre).<sup>49</sup>

This initiative will result in decontamination of the “Magra Al Oyoon”, a historical area, as well as eliminating the unsafe working environment for those working and living in the area. The initiative will eventually allow investors to adopt cleaner production processes, increase their production, increase their added value, increase exports, and attract local and foreign investment which will eventually generate more jobs and require new skills.

It has been reported that some of the tanneries in the “Magra Al Oyoon” historical location have already relocated to the Robici industrial cluster, and that a number of investors have already shown interest in joining.

Provision of training to meet the needs of investors in the Robici Industrial Cluster appears to rely on following international skills standards through two main initiatives: the first is based on an agreement (signed in September 2017)<sup>50</sup> between the Ministry of Trade and Industry and Siemens to equip the robotics training centre and deliver training programmes on automated transformation solutions in the traditional tanning model and life-cycle; the second will aim at up-skilling the existing work force to redefine their technical skills in line with the latest international models, supported by Italian expertise.<sup>51</sup>

Provision of training through following international skills standards seems a realistic choice, especially now that the industrial clusters are mainly focused on producing an

49 Source: <http://www.ida.gov.eg/Arabic/StrategicProjects/Pages/RobiciProject.aspx>.

50 <http://www.akhbarak.net/news/2017/09/17>.

51 <http://sis.gov.eg/Story/132339?lang=ar>.

## Skills for Green Jobs in Egypt

exportable product that meets the standards of international consumers. However, a needs assessment and gap analysis should be conducted to tailor training programmes to Egyptian workers and job-seekers.

Leather tanning and production of leather items are also one of the specialisations offered by the industrial technical secondary school administered by the MoETE, which is currently enhancing the quality of technical education through modernising the curriculum, modernising schools and training teachers. Among the specialisations are leather tanning and production of leather items. The MoTI, together with the cluster investors, needs to work with the MoETE in development of leather-related specialisations.

### Q Case Study III. MoETE's Response to Green Skills

The Technical Education Department within the Ministry of Education and Technical Education MoETE, administers 2,000 technical secondary schools (industrial, agricultural, commercial and hospitality), offering a 3-year diploma in 95 per cent of schools and a 5-year diploma in the remaining five per cent, covering 2 million students.

The ministry is currently supported by a number of international agencies in reforming its technical education sector and enhancing the quality of its educational offer. Some of the most important initiatives are the TVET II Reform Programme to a total of 117 million Euro (co-financed by the European Union and the Egyptian Government) and WISE (a USAID-funded programme).

Recently the MoETE, realising that new skills needs means new job opportunities, has taken into its hands the task of responding to green skills needs as a means of generating new job opportunities for its graduates. According to the Deputy Minister of Education and Technical Education, the response to green skills is channelled through promoting the concept of

Green Technical Schools,<sup>52</sup> which includes three main activities:

First: in the newly-developed curriculum for technical secondary schools, as part of the TVET II Reform Programme activities the MoETE has considered introducing the “environmental competencies” needed for each specialisation. Each student within the technical education system will be “able to protect the environment and promote the principles of environmental protection through four main key competencies:

- 1) Applying the rules of environmental protection;
- 2) Using safe means to get rid of waste in the workplace;
- 3) Monitoring environmentally dangerous actions;
- 4) Knowing and applying the safe limits of pollutants (visual, audio and respiratory)”.

Second: the MoETE, working closely with WISE (a USAID Project) is developing two new specialisations for industrial technical secondary schools for Renewable Energy (solar and wind energy). Initially these specialisations will be implemented in Aswan (two schools: Nasr El Nuba and Edfu) and the Red Sea Governorate to address the needs of major renewable energy investments in these areas. Up-scaling to other areas is also in the pipeline (see Case Study 1).

Third: the MoETE is also addressing green skills requirements through extra-curricular activities in a number of schools. Examples of these are solid waste production units for wood, paper and aluminium; production of LED lamps; production of Solar Energy panels; and a solar energy generating unit selling electricity to the government.

Introducing and adopting these initiatives within technical secondary schools in the formal educational system, which provides the opportunity for influencing the 2 million students currently enrolled in technical education, will surely have a higher return on investments in skills development as compared to other

<sup>52</sup> Meeting with Dr.Ahmed El Geushy, Deputy Minister of Education and Technical Education for Technical Education.

initiatives implemented by projects and NGOs. However, its impact is limited to future entrants to the labour market, and will not have an impact on immediate needs.

## Q Case Study IV. Different approaches for qualifying energy efficiency managers

Energy-efficiency measures in Egypt are being adopted by more than one organisation, namely the Industrial Modernization Centre (**IMC**), the Egyptian National Cleaner Production Centre (**ENCPC**), and the Regional Centre for Renewable Energy and Energy Efficiency (**RCREEE**). The three organisations, which are concerned with facilitating and increasing the adoption of energy-efficiency practices, have identified the need for energy-efficiency managers, but each of the three organisations has adopted a different approach to qualifying them.

The **ENCPC**, supported by the German Arab Chamber of Industry and Commerce (AHK), is currently developing an accredited training programme, the “European Energy Managers for Egypt”, which aims at building up the capacity of 200 local Egyptian experts through qualifying them as Energy Managers. The project is built on the EU project EURO-Energy Managers “EUREM”, which started in four European countries and is now being implemented in a total of 12 countries. The programme qualifies specialists in the field of energy efficiency.

**RCREEE** is developing and implementing the Certified Energy Management Professionals (CEMP) programme, which is a standardized in-depth professional certification programme for energy managers tailored to the needs of Egypt (and other Arab Member States). The technical content of the CEMP has been developed by Econoler Inc, covering four modules (electrical, thermal, energy management and national case). Attending the preparatory training is optional, but applicants must sit a written exam without attending the preparatory course, and will be certified by RECREEE only if he or she passes by 70 per cent or more. Certificates need to be renewed every two years.

**IMC** developed and implemented a programme to increase the efficiency of energy use and rationalize consumption in Egyptian factories (2015-2016). According to the IMC executive director, this initiative has introduced a new profession in the factories, namely Energy Department Management, and is cooperating with UNIDO to create awareness in the private sector of energy efficiency measures, ISO 50001, and energy management needs within factories.



ISBN 978-92-2-132911-4



9 789221 329114