Climate Change, Green Economy and its Reflections on Sustainable Agricultural Development in Egypt

Dr. Mahmoud M. Fawaz[1], Dr. Sarhan A. Soliman[2]

[1]Agricultural Economy Department, Faculty of Agriculture, Kafr El-Sheikh University, Kafr El-Shaikh, Egypt.
[2]Agricultural Economy Research Institute, Agricultural Research Center, Giza, Egypt
Email: [1] drmfawaz@yahoo.com, [2] sarhansoliman@yahoo.com

جهة النشر: الجمعية المصرية للاقتصاد الزراعي، المؤتمر الرابع والعشرون للاقتصاديين الزراعيين –" مستقبل الزراعة المصرية في ظل المتغيرات المحلية والإقليمية والدولية، ٩- ١٠ نوفمبر ٢٠١٦، ص ص: ٣٢٤- ٢٩٥.

Abstract

An increase of the temperature, decreased in precipitation and increased carbon dioxide emission , underlines the fact climatic changes which are affected in Egypt. Egypt is considered one of the countries most affected by climatic changes, Agriculture is one target of such activity as emission levels are about 13% of the annual GHG emissions that are related to all human activities, high demand for energy because of an increase in the number of population, the rate of per capita consumption of energy, and energy needs in order to increase production. Also, the average per capita energy consumption in Egypt have been increased by significant statistically an annual rate of 2.74%, consumption of 1.000 dollars of gross national product of energy have been increased by significant statistically an annual of 0.79%. Despite the increase in the use of clean energy by significant statistically an annual rate annually reached about 2.08%, but the proportion of clean energy and renewable energy of the total consumption of energy have been reduced by a rate annually significant statistically reached about 0.23%, the green economy and green growth which will lead to the reduction of emissions of carbon dioxide with increasing power consumption and increase the gross domestic product. An increase in Egyptian GDP by about billion dollars, lead to an increase of total Egyptian energy consumption by about 0.176 Mt., with an increase of total Egyptian emissions of carbon dioxide by about 0.5 Mt. Greening the Economy with Agriculture refers to increasing food security while using fewer natural resources, through improved efficiencies throughout the food value chain. This can be achieved by applying an ecosystem approach to agriculture, forestry and fisheries management in a way that addresses the multiplicity of societal needs and desires, without jeopardizing options for future generations to benefit from all goods and services provided by terrestrial and marine ecosystems. The gains of the Egyptian economy heading toward the green economy: A shift to a green economy pathway could lead Egypt to achieve annual savings of over US$1.3 billion in the agriculture sector, and about US$1.1 billion in the water sector, as well as a 13% reduction in CO_2 emissions, and a 40% reduction in water consumption.

Keywords

Climate Change, Green Economy, Sustainable Development, Environment, Global Warming

1. Introduction

Since the launch in 2008 of the United Nations' Green Economy Initiative (GEI), one of nine joint crisis initiatives, there has been a proliferation of interpretations and definitions [**UNEP, 2011**]. A number of other terms, including ' green growth' and 'greening the economy’, have also been widely adopted and used interchangeably in connection with an ever-increasing number of economic sectors, such as energy and water; topics, for example, mobility and consumption; and concepts such as the polluter pays principle and life cycle analysis. The concept of a 'green economy' does not replace sustainable development, but there is a growing recognition that achieving sustainability rests almost entirely on getting the economy right. Decades of creating new wealth through a ' brown economy' model based on fossil fuels have not substantially addressed social marginalization, environmental degradation, and resource depletion. In addition, the world is still far from delivering on the Millennium Development Goals by 2015 [**UNEP, 2011**].

A green economy can refer to sectors (e.g. energy), topics (e.g. pollution), principles (e.g. polluter pays) or policies (e.g. economic instruments). It can also describe an underpinning strategy, such as the mainstreaming of environmental policies or a supportive economic structure. Resource efficiency is a closely related concept since the transition to a green economy depends on meeting the twin challenges of maintaining the structure and functions of ecosystems (ecosystem resilience) and finding ways to cut resource use in production and consumption activities and their environmental impacts (resource efficiency). Whatever the underlying approach of green economy is, it stresses the importance of integrating economic and environmental policies in a way that highlights the opportunities for new sources of economic growth while avoiding unsustainable pressure on the quality and quantity of the natural assets. This involves a mixture of measures ranging from economic instruments such as taxes, subsidies, and trading schemes, through regulatory policies, including the setting of standards, to non-economic measures such as voluntary approaches and information provision.

However, far fewer cover other important (often newer) aspects of green economy, including futures and scenarios, environmental impact assessment/strategic impact assessment (EIA/SIA), corporate social responsibility (CSR), life-cycle analysis (LCA), and finance, trade and tourism. Assessments are overwhelmingly focused on the state of different priorities, and this is particularly the case for the more well-established or traditional themes. Other aspects of the DPSIR framework (drivers, pressures, state, impacts and responses) are discussed much less frequently. Most assessments cover well-established themes, such as energy, industry, and governance (green economy), and use of natural capital (resource efficiency).

1.1. Research Problem

Egypt is considered one of the countries that are expected to be affected by climate change. How expected and witnessed climate change in recent years, which has impact on the agricultural sector, generally, and on the productivity of the most agricultural crops and consumption of water in particular, while have negative effects on the economic and agricultural resources, one of the important reasons for these changes is the rise in temperature as a result of the increase in greenhouse gases emissions, and as a result of the increase in energy consumption and pollution. Concept of the green economy began to emerge of the mechanisms as a means to reduce the climate change, and the reliance on clean energy and phasing out on products of carbon character high, the trend toward the green growth green jobs, green products and other tools and techniques that can reducing the increase in greenhouse gas emissions. the Egyptian agricultural sector vulnerabilities by climate change which would have an impact on agricultural production, food security and the sustainable development in the agricultural sector. Therefore, it is important to study the current situation of climate change, the most reasons for emissions causing this phenomenon, and the role of the agriculture sector in greenhouse gasses emissions, and the relationship of the Egyptian economic activity and these emissions. It is Also to examine to the the green economy in achieving low rates of emissions climate change, in addition, to avoiding the expected negative effects of climate change on the Egyptian economy, generally, and the agricultural sector in particular.

Generally, the research tries to answer the following questions:

1. What are the climatic changes that have occurred in temperature and rainfall in Egypt?
2. What are the changes which have occurred carbon dioxide emissions? The extent of the change in the average per capita in Egypt, as well as changes in the methane and nitrous gasses and the relationship of these emissions economic activity?
3. What is the role of the agriculture sector in the climatic changes, and the emissions of these changes? And what is its role in an attempt to be eased or reduce them?
4. What are the annual rates of energy production and consumption in Egypt? The proportion of clean and renewable energy? Their relationship to climatic changes?
5. What is the green economy, and what is its role in alleviating or reducing the climatic changes in Egypt?
6. What is the Challenges and Gains of the Egyptian economy heading toward the green economy?

1.2. Research Objectives

Mainly, the research aims to study and analysis the climate change in Egypt and the role of the green economy to limit or reduce the impact of climate change on the Egyptian economy. Thus the search aims to:

1. **Stand on the trend of climate variables in Egypt**: including a study development of each of the Temperature and rainfall.
2. **Study and analysis of the trend of the greenhouse gases emissions that cause climate changes in Egypt**: including a study of the evolution of the carbon dioxide emissions as the most emissions of these changes and the average per capita, as well as the evolution of emissions of methane and nitrous gases, also, the extent of the contribution of the agriculture sector in such emissions, to de-

termine the role of agriculture in the climate change and can therefore develop policies and methods to reduce them, since agriculture can ease the climate change by reducing the contribution of emissions.

3. Study and analysis of indicators of Egyptian economic activity: include the study of the evolution of the agricultural gross production value, GDP, and the average per capita of GDP, as well as the ratio of the contribution of the agricultural sector in the gross domestic product (GDP).

4. Determination the relationship between the Egyptian economic activity, represented by the value of the gross domestic product (GDP), and carbon dioxide emissions as the most components of the greenhouse gasses emissions.

5. Stand on indicators of the production and consumption of energy in Egypt: include the study of the trend of the production and consumption of energy in Egypt and the average per capita share of each of them, as well as Egypt's consumption of renewable and alternative sources of energy and attribution in total energy consumption.

6. Definition of the green economy and its role in the reduction or limitation of the climate change in Egypt.

7. Determination the Challenges and Gains of the Egyptian economy heading toward the green economy: include studying the difficulties and the benefits that can be derived from the Egyptian attitude toward the path of the green economy in the major economic sectors, the most important of the agriculture, water, energy, and waste.

1.3. Research Methodology

The search depends on a descriptive and quantitative analytical methods to assess study and analysis of climate variables in Egypt and its impact on the Egyptian economy, as well as to analyse of the Egyptian economic activity and its relationship to the carbon emissions, also, study of exmine the indicators of the production and consumption of energy in Egypt and its relationship to climate change, in addition to examine the role of agriculture in greenhouse emissions evolve over time to stand on the evolution of variables and the extent of the complexity of the relationship with each other to achieve the objective of the study to know the evolution of the impact of climate change on the Egyptian economy, generally, and agricultural sectors practically.

1.4. Data Sources

The search was adopted on data, statistics and reports of several worldly and Egyptian intergovernmental organizations, which is the data from the Ministry of Agriculture and Land Reclamation, reports issued by the Central Agency for Public Mobilization and Statistics, the Food and Agriculture Organization of the United Nations (FAO), the World Bank, and Economic Affairs of the Ministry of Agriculture, the dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA), World Bank national accounts data, and OECD National Accounts data files, , International Energy Agency, United Nations, Eurostat, OPEC, U.S. Energy Information Administration, IEA Statistic, OECD/IEA, electronic files and web site.as well as some previous studies on the subject, in addition to data and statistics published by some on the international information network.

2. Research Results and Discussion

2.1. Climatic variables in Egypt

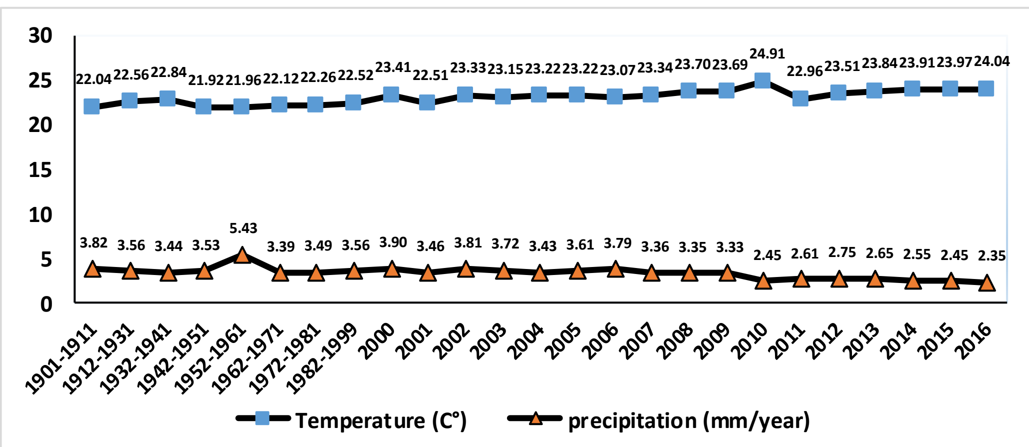
2.2. Changes in temperature degree in Egypt

Data in the figure no. (1) show that the annual average of temperature in Egypt during the period (1901- 2012) mounted to 22.96 C°, with significantly increased an annual average growth of 0.39%. while the annual average of temperature in Egypt during the period (2000- 2012) mounted to 23.39 C°, with significantly increased an annual average growth of 0.28%. The maximum growth of temperature in Egypt from 2000 to 2014 recorded in 2010: 5.16%, while the maximum fall minimum growth was in 2011: 7.84%. The temperature in Egypt from 2000 to 2014 reaching high of 24.91 C° in 2010.

2.1.1. Changes in precipitation in Egypt

Data in the figure no. (1) show that the annual average precipitation in Egypt during the period (1901- 2012) mounted to 3.51 (mm/year), with significantly decreased an annual average growth of 1.51%. while the annual average precipitation in Egypt during the period (2000- 2012) mounted 3.35 (mm/year), with significantly decreased an annual average growth of 3.07%. The maximum growth of precipitation in Egypt from 2000 to 2014 recorded in 2002: 10.32%, while the maximum fall minimum growth was in 2010: 26.55%. precipitation in Egypt from 2000 to 2014 reaching high of 3.9 (mm/year) in 2010, and reaching fall of 2.45 (mm/year) in 2010.

Figure no. (1): Temperature and precipitation in Egypt in the period (1901- ٢٠١٦).



- Volumes (2013- 2016) are estimated values, expected calculated by the researcher in the absence of the statement.

<u>Source</u>: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

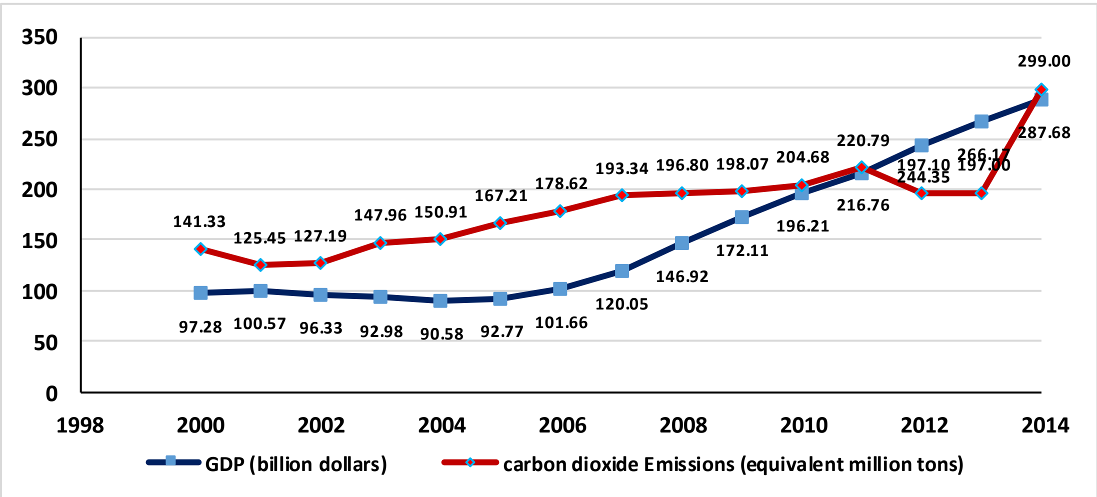
Accordance with the trend of the timetable of temperature and precipitation during the period (1901- 2012), the expected rise in temperature in 2016 where it reaches 24.04 C° and an average temperature in the period (1901- 2016) about ٢٣.12 C°, with an annual increase of statistically moral amounting to about 0.08 C°, or equivalent to an annual rate of about 0.34% of the annual

average for the period., and is expected to reach precipitation in 2016 mounted of 2.35 mm, and an average precipitation during the period (1901- 2016) mounted of 3.35 (mm/year), with decrease statistically moral reached about 0.06 (mm/year), or the equivalent of the rate of decrease in reached about 1.7% of the annual average for the period.

2.1.2. Changes in carbon dioxide emissions in Egypt

Data in the figure no. (2) show that CO_2 emission (Mt CO_2) in Egypt during the period (2000- 2014) totaled about 299 Mt CO_2 in 2014 (Mt = million tons), compared to 141.33 Mt CO_2 in 2013, with the growth rate was equal to 51.78%. CO_2 emissions increased by 157.7 Mt CO_2 from 2000 to 2014, equal about 11.57% of CO_2 emissions in 2000, and the average value amounted to 183.03 Mt CO_2, as equal 0.57% of the average value in the world during the same period. The average annual growth rate of CO_2 emissions in Egypt over that period was at about 4.71%, while the average annual growth rate of CO_2 emissions in the world at about 3.06%. The annual maximum growth rate of CO_2 emissions in Egypt from ٢٠٠٠ to 2014 recorded in 2014: 51.78% and the annual maximum fall minimum growth rate was in 2001: -11.23%. CO_2 emissions in Egypt of total CO_2 emissions in the world from 2000 to 2014 have been significantly increased with an annual growth rate at about 0.005%.

Figure no. (2): Egyptian GDP and co_2 emissions during the period (2000- 2014).



Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

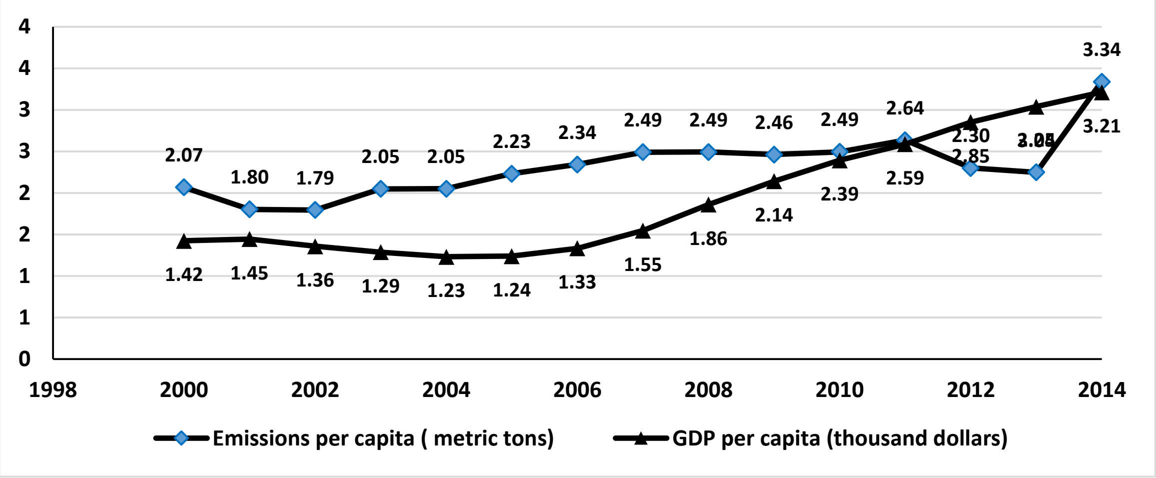
An average temperature in Egypt during the period (1901- 2012) was at about 22.96 C°, with an annual, statistically increase reached about 0.089 C°, and an average temperature during the period (2000- 2014) was at about 23.39 C°, with an annual statistically increase reached about 0,065 C°. While an average precipitation during the period (1901- 2012) was at about 3.51 mm/year, with an annual, statistically decline reached about 0.053 mm/year, and an average precipitation during the period (2000- 2014) was at about 3.35 mm/year, with an annual statistically decline reached at about 0.1 mm/year, as well as an average emissions of carbon dioxide emissions in the period (1990- 2012) was at about 129.59 million tons, with an annual statistical increase reached about 4.995 million tons, while an average emissions of carbon dioxide in the period (2000 - 2014)

to about 173 million tons, with an annual statistical increase, reached about 7.69 million tons. These results confirm that the previous increase of the temperature, decreased precipitation and increased carbon dioxide emissions during the period (1901- 2014), especially during the period (20000. 2014), underlines the fact climatic changes which are affected by Egypt, as Egypt is considered one of the countries most affected by climatic changes.

2.1.3. Changes Emissions of carbon dioxide per capita in Egypt

Data in the figure no. (3) show that CO_2 emissions per capita in Egypt totaled 3.34 metric tons CO_2 in 2014, compared with 2.25 metric tons CO_2 in 2013. The growth rate was equal to 48.45% compared to the previous year. CO_2 emissions per capita increased by 1.26 metric tons CO_2 from 2000 to 2014, equal to 61.39% of CO_2 emissions per capita in 2000, and the average value amounted to 2.32 metric tons CO_2, equal ٥١.٥٣% of the average value in the world during the same period. The average annual growth rate of CO_2 emissions per capita in Egypt over that period was at about ٢.٨٤%, while the average annual growth rate of CO_2 emissions per capita in the world at about ١.٨٤%. The annual maximum growth rate of CO_2 emissions per capita in Egypt from ٢٠٠٠ to 2014 recorded in 2014: ٤٨.٤٥%, the annual maximum fall minimum growth rate was in ٢٠١٢: -١٢.٨٥%.

Figure no. (3): Egyptian GDP per capita and emissions of co_2 per capita during the period (2000- 2014).



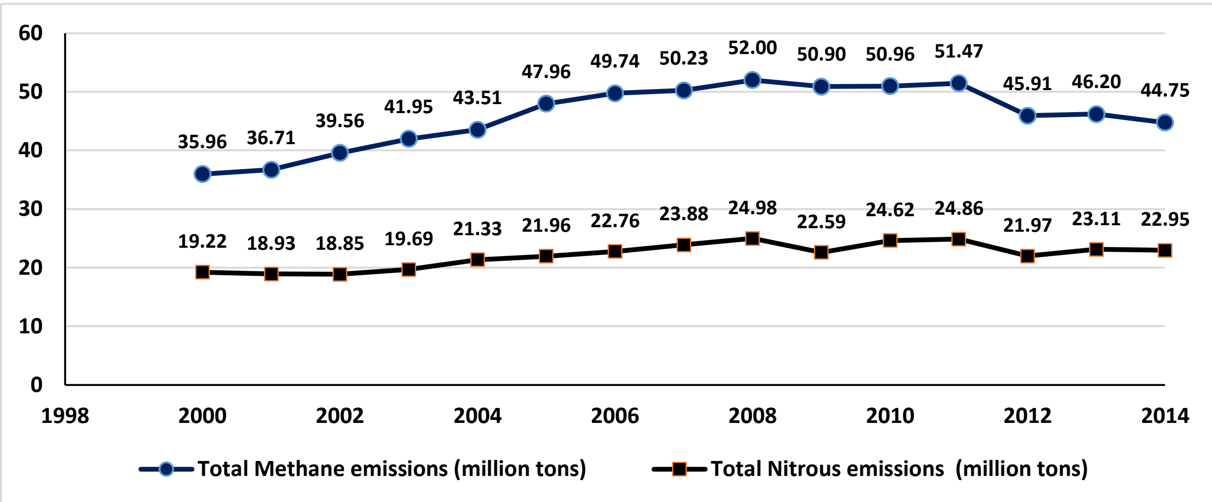
<u>Source</u>: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

2.1.4. Total emissions of methane and nitrous in Egypt

Total methane emissions in Egypt totaled 51.47 Mt in 2011, compared with 50.96 Mt in 2010, with a growth rate was equal to 1% compared to the previous year. total methane emissions increased by 15.51 Mt from 2000 to 2011, equal about 43.14% of total methane emissions in 2000, and the average value amounted to 45.91 Mt, with an average annual growth rate over that period was at about 2.69%. The annual maximum growth rate of total methane emissions in Egypt from ٢٠٠٠ to 2011 recorded in 2005: 10.22%, the annual maximum fall minimum growth rate was in 2009: -2.13%. figure no. (4)

Also, the data in the table no. (4) shows that total nitrous emissions in Egypt totaled ٢٤.٨٦ Mt in 2011, compared with ٢٤.٦٢ Mt in 2010, with a growth rate, was equal to 1% compared to the previous year. total nitrous emissions increased by ٥.٦٤ Mt from 2000 to 2011, equal to ٢٩.٣٧% of total nitrous emissions in 2000, and the average value amounted to ٢١.٤٧ Mt, with an average annual growth rate over that period was at about 2.١٨%. The annual maximum growth rate of total nitrous emissions in Egypt from ٢٠٠٠ to 2011 recorded in ٢٠٠٤: ٨.٩٦%, the annual maximum fall minimum growth rate was in 2009: -٩.٥٤%.

Figure no. (4): Total emissions of methane and nitrous in Egypt during the period (2000- 2014).



- Volumes 2013, 2014 are estimated values, expected calculated by the researcher in the absence of the statement.

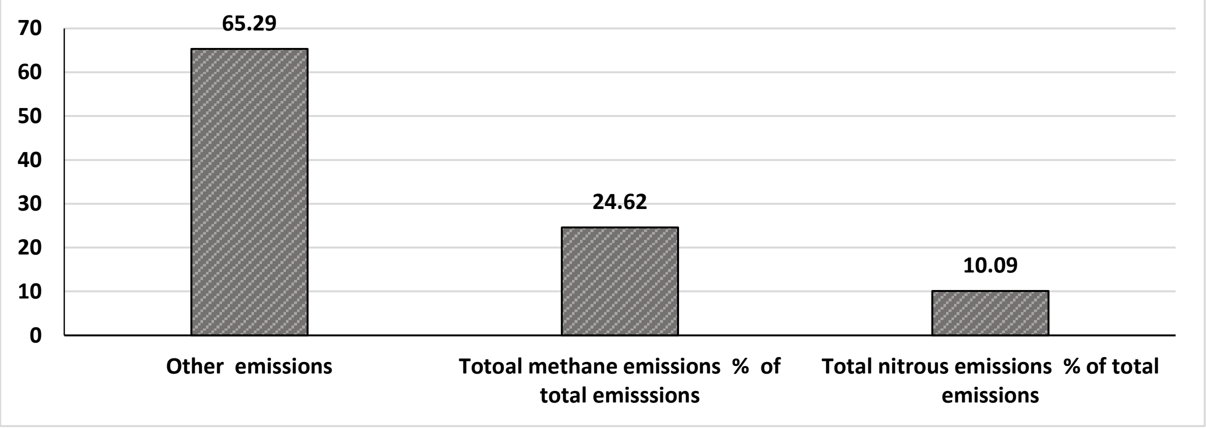
Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

Accordance to the trend of the timetable of total emissions of methane and nitrous in Egypt during the period (2000- 2012) of the expected rise in total emissions of methane in 2014 where it reaches 44.75 Mt and the average total emissions of methane in the period (2000- 2014) about 45.4 Mt, an annual increase of statistically moral amounting to about 0.781 Mt or equivalent to an annual rate of about 0.36% of the annual average for the period., and is expected to reach total emissions of nitrous in 2014 about 22.95 Mt, and average total emissions of nitrous during the period (2000- 2014) about 22.1 Mt, decrease statistically moral reached about 0.36 Mt, or the equivalent of the rate of decrease in reached about 1.63% of the annual average for the period. The results indicate that the increasing methane and Nitrous emissions in Egypt, but rates increasing nitrous oxide emissions more than methane emissions, due to the sources of pollution to the respective.

2.1.5. Relative the total emissions of methane and nitrous of the total emissions in Egypt

Data in the figures no. (5, 6) show that the total emissions of methane % of the total emissions in Egypt during the period (2000- 2014) varied from a minimum value of 22.85% in 2011, to a maximum value of 26.44% in 2002. Relative the total emissions of methane of the total emissions in Egypt have been significantly decreased with an annual average growth of 0.33%, with an annual average totaled of 27.14% during the same period. While an annual average of the total emissions of methane % of the total emissions in the world totaled of 24.72% and have been significantly decreased with an annual average growth of 0.22% during the same period.

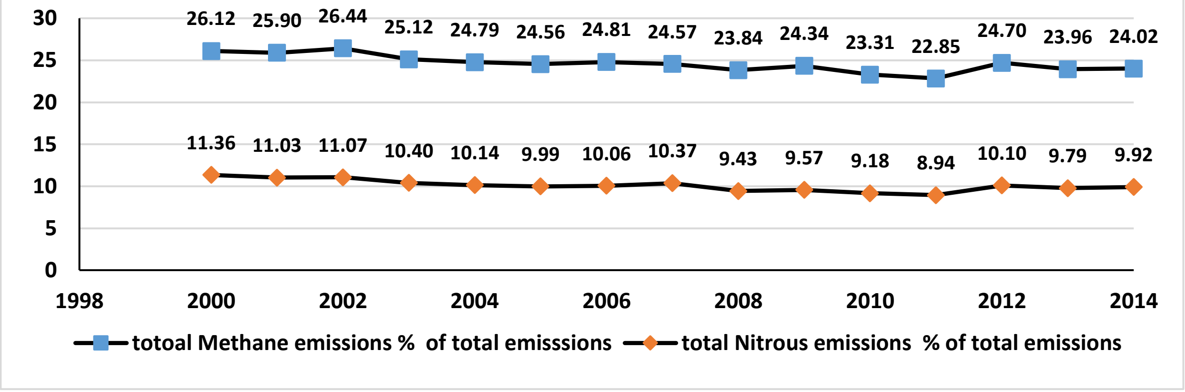
Figure no. (5): Total emissions of methane and nitrous of total emissions in Egypt during the period (2000- 2014).



- Volumes 2013, 2014 are estimated values, expected calculated by the researcher in the absence of the statement.

Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

Figure no. (6): Development total emissions of methane and nitrous of total emissions in Egypt during the period (2000- 2014).



- Volumes 2013, 2014 are estimated values, expected calculated by the researcher in the absence of the statement.

Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

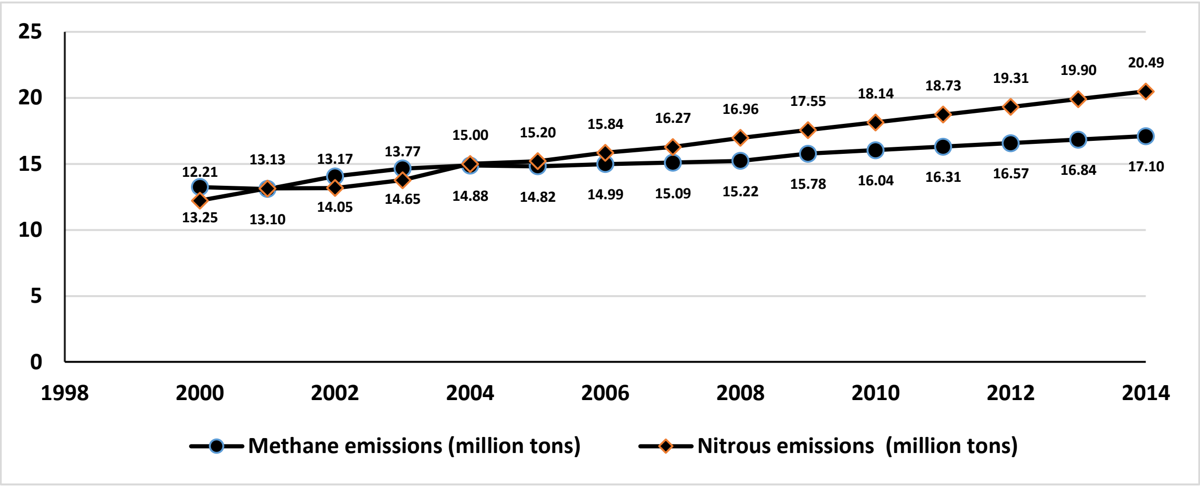
Also, the data in the figures no. (5, 6) show that the total emissions of nitrous % of the total emissions in Egypt during the period (2000- 2014) varied from a minimum value of 8.44% in 2011, to a maximum value of 11.36% in 2000. Relative the total emissions of nitrous of the total emissions in Egypt have been significantly decreased with an annual average growth of 0.24%. The annual average of the total emissions of nitrous % of the total emissions in Egypt totaled of 13.04% during the same period. While an annual average of the total emissions of nitrous % of the total emissions in the world totaled of 10.13% and have been significantly decreased with an annual average growth of 0.2% during the same period.

2.1.6. Agricultural emissions of methane and nitrous in Egypt

Accordance data in the figure no. (7) show that agricultural emissions of methane in Egypt during the period (2000- 2014) varied from a minimum value of 13.1 Mt in 2001, to a maximum value of 17.1 Mt in 2014. Agricultural emissions of methane in Egypt have been significantly increased with an annual average growth of 1.73%. The annual average of agricultural emissions of methane in Egypt totaled of 15.45 Mt during the same period. The annual maximum growth rate of agricultural emissions of methane in Egypt from ٢٠٠٠ to 2014 recorded in 2002: 7.25%, while the annual maximum fall minimum growth rate was in 2001: -1.13%.

Agricultural emissions of nitrous in Egypt during the period (2000- 2014) varied from a minimum value of 12.21 Mt in 2000, to a maximum value of 20.49 Mt in 2014. Agricultural emissions of nitrous in Egypt have been significantly increased with an annual average growth of 2.66%. The annual average of agricultural emissions of nitrous in Egypt totaled of 16.22 Mt during the same period. The annual maximum growth rate of agricultural emissions of nitrous in Egypt from ٢٠٠٠ to 2014 recorded in 2009: 20.01%, while the annual maximum fall minimum growth rate was in 2008: -10.12%.

Figure no. (7): Emissions of agricultural emissions of methane and nitrous during the period (2000- 2014).



- The period (2009- 2014) is estimated values, expected calculated by the researcher in the absence of the statement.

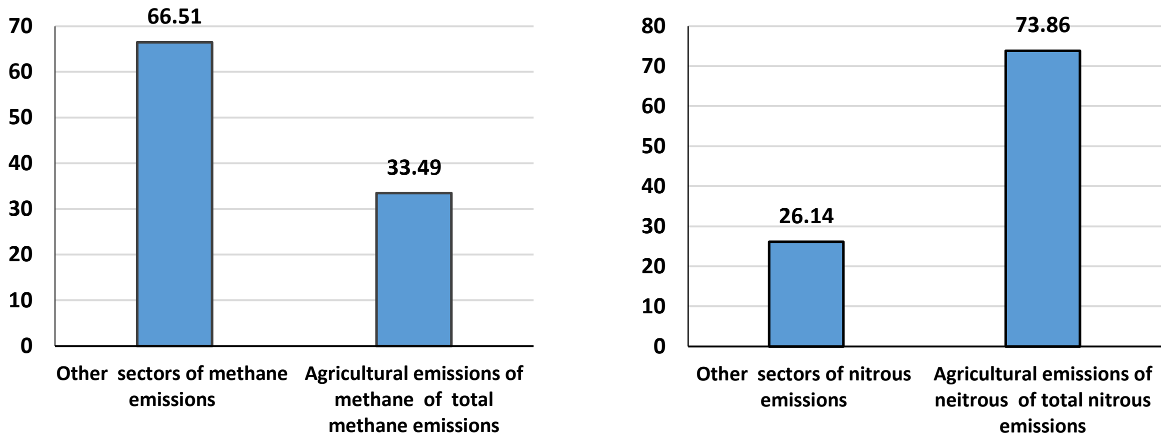
Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

2.1.7. Relative the agricultural emissions of methane of the total methane emissions in Egypt

Data in the figure no. (8) show that relative the agricultural emissions of methane of the total methane emissions in Egypt during the study period varied from a minimum value of 29.27% in 2008, to a maximum value of 38.21% in 2014. Relative the agricultural emissions of methane of the total methane emissions in Egypt have been significantly decreased with an annual average growth of 1.03%. Relative the agricultural emissions of methane of the total methane emissions in Egypt totaled of

33.49% during the same period. The annual maximum growth rate relative the agricultural emissions of methane of the total methane emissions in Egypt from ٢٠٠٠ to 2014 recorded in 2012: 4.41%, the annual maximum fall minimum growth rate was in 2005: -3.3%. Relative the agricultural emissions of methane of the total methane emissions in Egypt increased by 1.36% from 2000 to 2014.

Figure no. (8): Relative the agricultural emissions of nitrous of the total nitrous emissions in Egypt during the period (2000- 2014).



<u>Source</u>: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

2.1.8. Relative the agricultural emissions of nitrous of the total nitrous emissions in Egypt

Data in the figure no. (8) show that relative the agricultural emissions of nitrous of the total nitrous emissions in Egypt during the study period varied from a minimum value of 63.54% in 2000, to a maximum value of 89.28% in 2014. Relative the agricultural emissions of nitrous of the total nitrous emissions in Egypt have been significantly increased with an annual average growth of 0.17%. Relative the agricultural emissions of nitrous of the total nitrous emissions in Egypt totaled of 73.86% during the same period. The annual maximum growth rate relative the agricultural emissions of nitrous of the total nitrous emissions in Egypt from 2000 to 2014 recorded in 2012: 12.58%, the annual maximum fall minimum growth rate was in 2010: -4%. Relative the agricultural emissions of nitrous of the total methane emissions in Egypt increased by 25.74% over the study period.

During the study period, the total methane emissions have been increased statistically with an annual rate of ٠.٣٦%, methane emissions have been increased statistically with an annual rate from the agriculture reached about 1.٧٤%, thus the proportion of methane emissions from the agriculture sector in total methane emissions decreased annually by about 1.٠٣%, it is also clear that total nitrous oxide emissions have been growing at an annual average rate statistically reached about 1.63%, nitrous oxide emissions from the agriculture sector have been increased by annual rate statistically reached about 2.66%, consequently proportion of nitrous oxide emissions from the agriculture sector in total nitrous oxide emissions decreasing annually by about 0.17%. Which illustrates the importance of reducing the emissions of the agriculture sector, which has proved to be

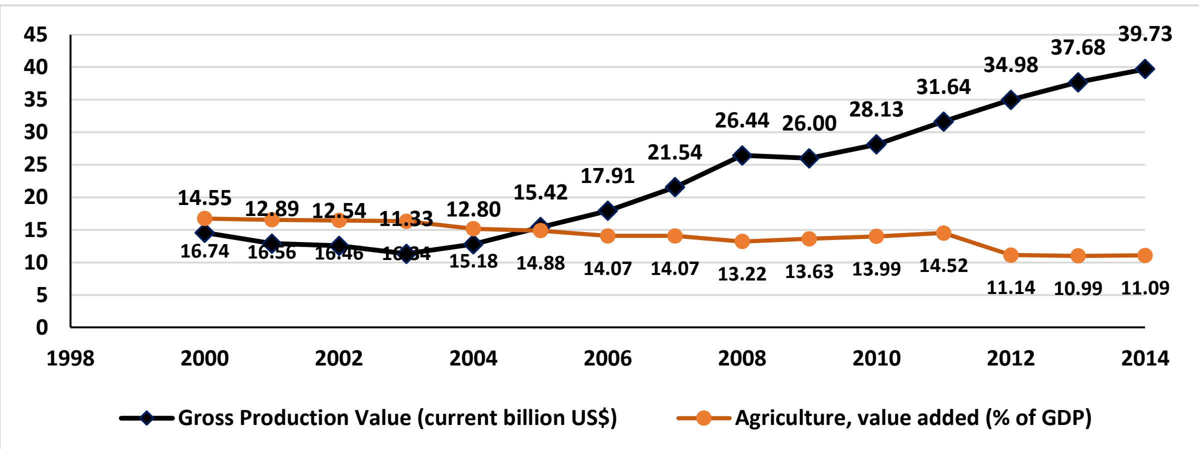
increasing annual rates, especially nitrous oxide emissions from the agriculture sector, where the study proved increasing their contributions to the total emissions of greenhouse gases, which is a major cause of the climatic changes to Egypt which appeared clearly in recent years. Agriculture activities emissions in Egypt were about 13% of the annual GHG emissions that are related to all human activities **[Olivier et al., 2005 and Harada et al., 2007]**. ***Agricultural activities are responsible for approximately 50% of the anthropogenic emissions of CH_4, with rice paddies contributing over 10%*** **[Scheehle and Kruger, 2006; USEPA, 2006].** ***Emissions of N_2O may also occur direct sources include emissions from cultivated and fertilized soils. Indirect emissions result from transport of N from agricultural systems into ground and surface waters with subsequent emission of ammonia or nitrogen oxide.***

2.2. Economic activity in Egypt

2.2.1. Egyptian agricultural gross production value

Data in the figure no. (9) show that Egyptian agricultural gross production value (current US$) in Egypt totaled ٣٩.٧٣ billion dollars in 2014, compared with ٣٧.٦٨ billion dollars in 2013, with the change rate was equal to ٥.٧%, and increased by ٢٥.١٨ billion dollars from 2000 to 2014, with an average value amounted to 23.5 billion dollars. An average annual growth rate of Egyptian agricultural gross production value in Egypt over that period was at about 9.03 %. The maximum growth of Egyptian agricultural gross production value in Egypt from 2000 to 2014 recorded in 2008: 22.75%, and the maximum fall minimum growth was in 2001: -11.39%. Gross production value in Egypt from 2000 to 2014 reaching high of 39.73 billion dollars in 2014.

Figure no. (9): Egyptian agricultural gross production value and agricultural value added (% of GDP) in the period (2000- 2014).



Source: World Bank national accounts data, and OECD National Accounts data files.

2.2.2. Egyptian agricultural value added (% of GDP)

Data in the figure no. (9) show that Egyptian agricultural value added (% of GDP) totaled 11.09% in 2014, compared with 10.99% in 2013, with the change rate was equal to 0.89%. Egyptian agricultural value added decreased by 5.65% from 2000 to 2014, with an average value amounted to 14.06%. The average annual growth value of Egyptian agricultural value added over that period was at about -0.41 %. The maximum growth of from 2000 to 2014 recorded in 2011: 3.77% and the maximum fall minimum growth was in 2013: 23.28%. Egyptian agricultural value added (% of GDP) from 2000 to 2014 reaching high of 16.73% in 2003.

2.2.3. GDP value in Egypt

The Egyptian GDP value totaled 287.68 billion dollars in 2014, compared to 266.17 billion dollars in 2013, with the change rate was equal to 8%. Egyptian GDP value increased by 190.41 billion dollars from 2000 to 2014, and the average value amounted to 154.83 billion dollars. The average annual growth rate of Egyptian GDP value over that period was at about 9.42 %. The maximum growth of Egyptian GDP value from 2000 to 2014 recorded in 2008: 22.39%, the maximum fall minimum growth was in 2002: -4.22%, The figure no. (2).

2.2.4. GDP value per capita in Egypt

Data in the figure no. (3) show that Egyptian GDP value per capita totaled ٣٢١١.٤٧ dollars in 2014, compared with ٣٠٣٨.٠١ dollars in 2013, with the change rate was equal to 3.21%. Egyptian GDP value per capita increased by 1787.96 dollars from 2000 to 2014, and the average value amounted to 1929.54 dollars. The average annual growth rate of Egyptian GDP value per capita over that period was at about 7.51 %. The maximum growth of Egyptian GDP value per capita from 2000 to 2014 recorded in 2008: 20.26%, the maximum fall minimum growth was in 2002: -5.99%.

2.3. Energy in Egypt

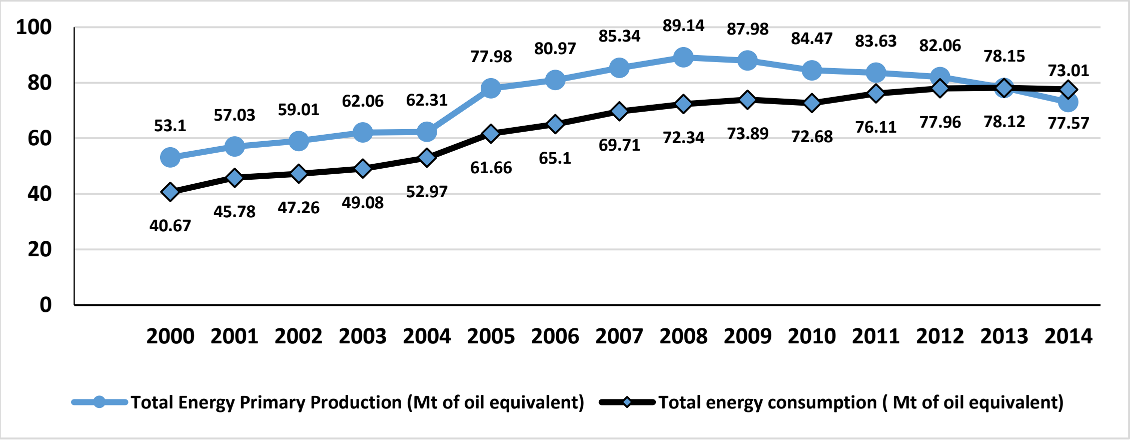
2.3.1. Total Egyptian Energy Production

Data in the figure no. (10) show that total energy primary production in Egypt totaled 73.01 Mt of oil equivalent in 2014, compared with 78.01 Mt of oil equivalent in 2013, with the change rate was equal to -6.58%. Total energy primary production increased by 19.91 Mt of oil equivalent from 2000 to 2014, with the average value amounted to 74.42 Mt of oil equivalent. The average annual growth rate of total energy primary production in Egypt over that period was at about 2.7%. The maximum growth of total energy primary production in Egypt from 2000 to 2014 recorded in 2005: 25.15% and the maximum fall minimum growth was in 2014: -6.58%. Total energy primary production in Egypt over the study period reaching a high of 89.14 Mt of oil equivalent in 2008.

2.3.2. Total Egyptian energy consumption

Data in the figure no. (10) show that total energy consumption in Egypt totaled 77.57 Mt of oil equivalent in 2014, compared with 78.12 Mt of oil equivalent in 2013, or as the growth rate was equal to -0.708%. Total energy consumption increased by 36.9 Mt of oil equivalent from 2000 to 2014, and the average value amounted to 64.06 Mt of oil equivalent. The average annual growth rate of total energy consumption in Egypt over that period was at about 4.49%. The maximum growth of total energy consumption in Egypt over the study period recorded in 2005: 16.41% and the maximum fall minimum growth was in 2010: -1.64%. as well as total energy consumption in Egypt from 2000 to 2014 reaching high of 78.12 Mt of oil equivalent in 2013.

Figure no. (10): total production and total consumption of energy in Egypt in the period (2000- 2014).



Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

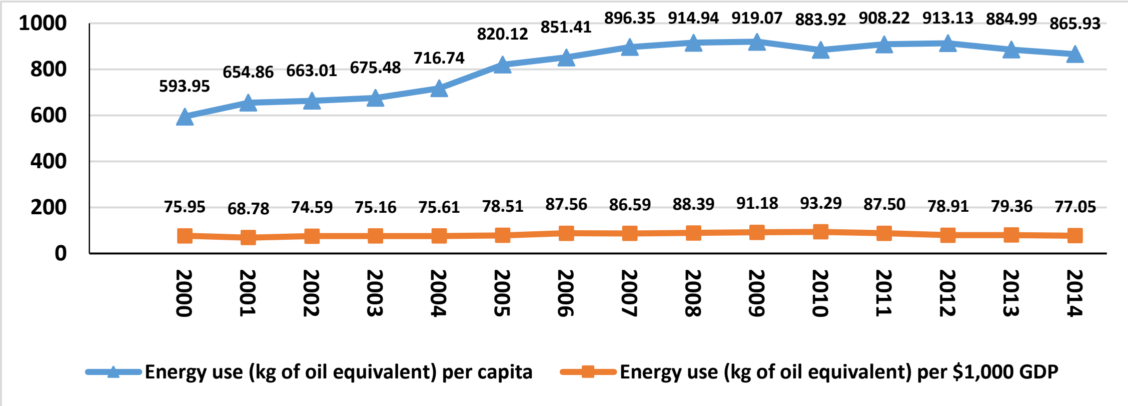
2.3.3. Egyptian energy use (kg of oil equivalent) per $1,000 GDP

Energy use (kg of oil equivalent) per $1,000 GDP in Egypt in the study period, as in the figure no. (11), show totaled 77.05 kg of oil equivalent in 2014, compared with 79.36 kg of oil equivalent in 2013, as the growth rate was equal to -2.91%. Energy use (kg of oil equivalent) per $1,000 GDP increased by 1.1 kg of oil equivalent from 2000 to 2014, and the average value amounted to 81.23 kg of oil equivalent. The average annual growth rate of energy use (kg of oil equivalent) per $1,000 GDP in Egypt over that period was at about 0.79%. The maximum growth of Energy use (kg of oil equivalent) per $1,000 GDP in Egypt from 2000 to 2014 recorded in 2006: 11.5%, while the maximum fall minimum growth was in 2012: -9.82%. Energy use (kg of oil equivalent) per $1,000 GDP in Egypt reaching a high of 93.24 kg of oil equivalent in 2010.

2.3.4. Egyptian energy use (kg of oil equivalent per capita)

Energy use (kg of oil equivalent per capita) in Egypt, as in the figure no. (11), show totaled 885.93 kg of oil equivalent per capita in 2014, compared with 889.99 kg of oil equivalent per capita in 2013, as the growth rate was equal to -2.15%. energy use (kg of oil equivalent per capita) increased by 271.98 kg of oil equivalent per capita from 2000 to 2013, and the average value amounted to 810.81 kg of oil equivalent per capita. The average annual growth rate of energy use (kg of oil equivalent per capita) in Egypt over that period was at about 2.74%. The maximum growth of energy use (kg of oil equivalent per capita) in Egypt from 2000 to 2014 recorded in 2005: 14.42%, the maximum fall minimum growth was in 2013: -3.82%. Energy use (kg of oil equivalent per capita) in Egypt from 2000 to 2014 reaching high of 919.07 kg of oil equivalent per capita in 2009.

Figure no. (11): energy use per capita and per 1000 dollar in Egypt in the period (2000- 2014).



Source: The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

2.3.5. Egyptian renewable energy consumption

Data in the figure no. (12) show that renewable energy consumption in Egypt totaled 4.46 Mt in 2014, compared to 4.37 Mt in 2013. The growth rate was equal to 1.98% compared to the previous year. Renewable energy consumption increased by 1.17 Mt of oil equivalent from 2000 to 2014, and the average value amounted to 4 Mt. The average annual growth rate of renewable energy consumption in Egypt over that period was at about 2.08%. The maximum growth of renewable energy consumption in Egypt from 2000 to 2014 recorded in 2004: 10.13% and the maximum fall minimum growth was in 2002: -2.93%. Renewable energy consumption in Egypt from 2000 to 2014 reaching high of 4.46 Mt in 2014.

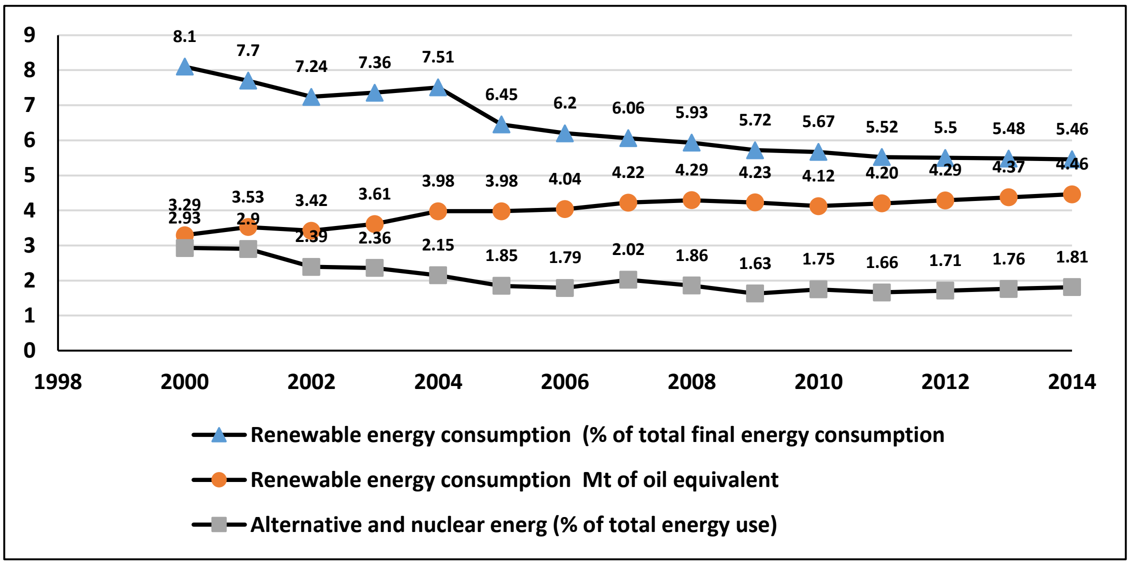
2.3.6. Egyptian renewable energy consumption (% of total final energy consumption)

Data in the figure no. (12) show that renewable energy consumption (% of total final energy consumption) in Egypt totaled 5.46 % in 2014, compared with 5.48 % in 2013, with the growth rate was equal to -2.64%. Renewable energy consumption (% of total final energy consumption) decreased by 2.64 % from 2000 to 2014, and the average value amounted to 6.39 %. The average annual growth rate of renewable energy consumption (% of total final energy consumption) in Egypt over that period was at about -0.23%. The maximum growth of renewable energy consumption (% of total final energy consumption) in Egypt from 2000 to 2014 recorded in 2012: 3.01 %, while the maximum fall minimum growth was in 2002: -0.51 %. Renewable energy consumption (% of total final energy consumption) in Egypt from 2000 to 2014 reaching high of 8.1 % in 2014.

2.3.7. Egyptian alternative and nuclear energy (% of total energy use)

Data in the figure no. (12) show that Alternative and nuclear energy (% of total energy use) in Egypt totaled 1.81 % of the total in 2014, compared with ١.76 % of total in 2013, with the growth rate was equal to 2.84%. Alternative and nuclear energy (% of total energy use) decreased by ١.12 % of total from ٢٠٠٠ to 2014, and the average value amounted to ٢.04 % of the total. The average annual growth rate of alternative and nuclear energy (% of total energy use) in Egypt over that period was at about -0.١٠٣%. The maximum growth of alternative and nuclear energy (% of total energy use) in Egypt from ٢٠٠٠ to 2014 recorded in 2012: 3.01 % of the total, while the maximum fall minimum growth was in ٢٠٠٢: -0.٥١ % of total. Alternative and nuclear energy (% of total energy use) in Egypt from ٢٠٠٠ to 2014 reaching high of 2.93 % of total in 2000.

Figure no. (12): Renewable energy consumption in Egypt in the period (2000-2014).



- Volumes 2013, 2014 are estimated values, expected calculated by the researcher in the absence of the statement.

<u>Source</u>:

1- **World Bank, International Energy Agency, United Nations, Eurostat, OPEC, U.S. Energy Information Administration,**
2- **IEA Statistic, OECD/IEA 2014 (http://www.iea.org/stats/index.asp), subject to (https://www.iea.org/t&c/termsandconditions).**
3- **Food and Agriculture Organization, electronic files and web site.**

During the period (2000- 2014), the average production of energy in Egypt of 74.42 Mt, with increased by significant statistically an annual rate of 2.7%. While the average consumption of energy in Egypt of 64.06 Mt, with increased by significant statistically significant an annual rate of 4.49%. But in 2014, consumption of Egypt increased to energy produced of 6.28%, as a result of high demand for energy because of an increase in the number of population, the rate of per capita consumption of energy, and energy needs in order to increase GDP.

Despite the increase in the use of clean energy by significant statistically an annual rate annually reached about 2.08%, but the proportion of clean energy and renewable energy of the total consumption of energy have been reduced by a rate annually significant statistically reached about 0.23%, as a result of the rise of the invasions of Egypt's growing energy in the recent years, and lack of capacity to provide a significant contribution to clean energy in total energy uses, where requires increasing the produced quantities of clean energy quantities and rates of more current, with increasing rates of consumption of Egypt from energy. Egypt's production of nucle-

ar energy, energy and non-conventional increased by an annual rate of significant statistically reached about 2.08%, but that the quantity produced from this energy is a small percentage of the total energy produced. On the basis of the foregoing, the increase in the consumption of energy and the increase in the average per capita consumption of energy in Egypt is considered one of the most important reasons that automatically lead to an increase in emissions of greenhouse gases, especially carbon dioxide, which confirms the importance of the trend toward clean energy production, orientation toward the green economy and green growth which will lead to the reduction of emissions of carbon dioxide with increasing power consumption and increase the gross domestic product (GDP).

2.4. The relationship between economic activity and co_2 emissions in Egypt

During the period (2000 -2014), Egypt's GDP value have been significantly increased with an annual average growth of 9.41%, and carbon emissions in Egypt have been significantly increased with an annual average growth of 4.17%. The average per capita of GDP in Egypt has been significantly increased with an annual average growth of 7.51%, while the average per capita of Egyptian carbon emissions has been significantly increased with an annual average growth of 2.84%. An average per capita of carbon emission in Egypt less than an average per capita of carbon emission in the world, where an average per capita of carbon emission in Egypt about 2.32 metric tons, while an average per capita carbon emission in the world toward 4.5 metric tons.

To examine **the relationship between economic activity and Emissions of carbon dioxide** in Egypt in the period (2000 – 2014), estimated the relationship between Egyptian GDP value and Emissions of carbon dioxide, as following as:

$$\mathbf{Log\ (Y_1) = \underset{(6.214)^*}{3.018} + \underset{(5.163)^*}{0.437}\ log\ (X_1)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\mathbf{(1)}$$

$$\mathbf{R = 0.82 \qquad R^2 = 0.672 \qquad F = (26.657)^*}$$

Where:

(Y_1) = Egyptian GDP value by billion dollars.

(X_1) = Egyptian emissions of carbon dioxide by million tons.

According to the equation no. (1), the results show that the GDP value has positive coefficient at significance level 0.01, and increase by about 1% of Egyptian GDP value lead to increase in Egyptian emissions of carbon dioxide by about 0.437%. These results agreed with its previous findings to estimate the annual growth rates of each Egyptian GDP value and emissions of carbon dioxide. Finally, increase in Egyptian GDP value by about $1 billion, lead to an increase of carbon emissions by about 0.516 million tons.

Also, to **examine the relationship between GDP per capita and emissions of carbon dioxide per capita** in Egypt during the same period, estimated the following equation as following as:

$$\text{Log}\ (Y_2) = -1.382 + 0.295 \log (X_2) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$(-2.011)^{**} \qquad (3.221)^{*}$$

$$R = 0.666 \qquad R^2 = 0.444 \qquad F = (10.375)^{*}$$

Where:

(Y_2) = Egyptian emissions of carbon dioxide per capita by metric tons.

(X_2) = Egyptian GDP per capita by a dollar.

According to the equation no. (2), the results show that the GDP per capita has positive coefficient at significance level 0.01, therefore 10% increase of Egyptian GDP per capita lead to increase in Egyptian emissions of carbon dioxide per capita by 2.95%. These results agreed with its previous findings to estimate the annual growth rates of each Egyptian GDP per capita and emissions of carbon dioxide per capita. Finally, increase in Egyptian GDP per capita by about 100 dollars, lead to an increase in carbon emissions per capita by about 0.04 metric tons.

As well as, to examine **the relationship between GDP and total energy consumption** in Egypt during the same period, estimated the following equation as following as:

$$\text{Log}\ (Y_{\text{٢}}) = 2.041 + 0.423 \log (X_{\text{٢}}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\text{٣})$$

$$(4.846)^{*} \qquad (4.994)^{*}$$

$$R = 0.\text{٨٨١} \qquad R^2 = 0.\text{٦٥٧} \qquad F = (\text{٢٤.٩٤٤})^{*}$$

Where:

$(Y_{\text{٢}})$ = Total energy consumption by Mt of oil equivalent.

(X_3) = Egyptian GDP by billion dollars.

The equation no. (٣), show that the GDP has positive coefficient at significance level 0.01, therefore 1% increase of Egyptian GDP lead to increase in total Egyptian energy consumption by 0.423%. These results agreed with its previous findings to estimate the annual growth rates of each Egyptian GDP and total Egyptian energy consumption. Finally, increase in Egyptian GDP by about billion dollars, lead to an increase of total Egyptian energy consumption by about 0.176 Mt.

1n addition to, to examine **the relationship between Total energy consumption and total Emissions of carbon dioxide** in Egypt during the same period, estimated the following equation as following as:

$$\text{Log}\ (Y_4) = 1.5 + 0.891 \log (X_4) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$(2.676)^{**} \qquad (6.583)^{*}$$

$$R = 0.877 \qquad R^2 = 0.769 \qquad F = (43.329)^{*}$$

Where:

(Y_4) = Total energy consumption by Mt of oil equivalent.

(X_4) = Egyptian emissions of carbon dioxide by Mt.

According to the equation no. (4), the results show that total energy consumption has positive co-efficient at significance level 0.01, therefore 1% increase of total energy consumption lead to increase in total Egyptian emissions of carbon dioxide by 0.891%. These results agreed with its previous findings to estimate the annual growth rates of each total energy consumption and total Egyptian emissions of carbon dioxide. Finally, increase in total Egyptian energy consumption by about million tons, lead to an increase of total Egyptian emissions of carbon dioxide by about 2.86 Mt.

According to the previous findings to during the period (2000- 2014), that an increase in Egyptian GDP by about billion dollars, lead to an increase of total Egyptian energy consumption by about 0.176 Mt., with an increase of total Egyptian emissions of carbon dioxide by about 0.5 Mt.

2.5. Green Economy

The Environmental Program of the United Nations (UNEP) defines green economy as ***"one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities"*** [**UNEP, 2011**]. Thus, green economies are not based on the demand for sacrifice but on the idea of qualitative growth, where low-carbon and environmentally friendly technologies.

The reasons for going to adopt the green economy for the following reasons:

- The global financial crisis in 2008 –2009 became multidimensional economic, social and environmental. On the economic level, the effects of the crisis were a reduction of the world GDP and volume of international trade, reducing investment and jobs creation, etc. A side effect of the crisis was a reduction of the level of well-being. People have lost savings, their jobs, in particular, have lost confidence in the financial sector, banking and more generally in the market economy. The scale of this crisis, its global dimension and the lack of early warning signals from a market economy were a shock for the citizens, politicians and even for financiers and bankers. International organizations and countries prepared recovery programs and strategies for the future. A new model of the economy and many actors of political and economic life propose a sustainable development, operationally defined as a green economy concept [**Barbier 2010; Ocampo 2011**]. [**Streeck 2011; Krugman 2009; Roubini, Mihm, 2011**] [**Stiglitz, 2010**].

- It has failed the fragile ecological systems on which we depend for survival. It has failed, spectacularly, in its own terms, to provide economic stability and secure people's livelihoods. Today's world is characterized by the degradation of forests, lakes, and soils, conflicts over land use, water quality, fishing rights and the concentrations of carbon in the global atmosphere. And we face these tasks with an economy that is fundamentally broken, in desperate need of renewal. In these circumstances, a return to business, as usual, is not an option. Prosperity for the few founded on ecological destruction and persistent social injustice is no foundation for a civilized society. The global crisis challenged the dominant economic model to its foundations [**Jackson, 2009**].

- The new trends in the economy are already a fact. We can see sustainable banking, eco-taxes, green investment funds, green public procurement, eco-innovations in industry, low carbon economy, alternative sources of energy, etc.

- There is a “growing recognition that achieving sustainability rests almost entirely on getting the economy right.” It also emphasizes the crucial point that economic growth and environmental stewardship can be complementary strategies. The concept of green economy should be seen as consistent with the broader and older concept of sustainable development, which has been mainstreamed. The specificity of the broader concept is associated with both its holistic character, as it encompasses the three pillars of development – economic, social and environmental – and its particular focus on inter-generational equity [**Ocampo, 2011**].
- The concepts of green economy and green growth is the understanding that the benefits of environmental sustainability outweigh the costs of investing in and protecting the ecosystems, so that it is possible to have a win-win or “double dividend” strategy of growth with environmental sustainability, and even win-win-win or “triple dividend” strategy that also includes poverty eradication and broader improvements in social equity. This is interesting from the point of view of policy makers because they have to deal with many dimensions of the crisis and the idea of sustainable development is offering the path to transforming economy but also to support citizens and environment. [**Ocampo, 2011**].
- Green growth is closely related to the concept of a green economy which UNEP defines as one in which “growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services
- There is a growing debate among scholars about the importance of green economy concept for future development policy. Below the author presents few of them: “The concept of a green economy is crucial for guiding policies for sustainable development since it goes to the heart of the matter: organize economies in ways that fit local and global ecological prerequisites and long-term dynamics”. “A ‘green economy’ concept is an essential step towards the transition to a resilient and sustainable economy. [**Mol, Sonnenfeld, Spaargaren , 2011**].
- However, it does not go far enough as long as it does not address the dilemma of economic growth: every expansion of economic activity implies more stress on the planet’s ecosystems” [**Pirgmaier, Fulai et al., 2011**].
- “The ‘green economy ‘concept is useful to the extent that it engages policymakers, economists, and businesses in critical dialogue with other stakeholders to compare alternative pathways for development. The comparison should then consider economic criteria alongside social, political, cultural and ecological criteria, and how ‘business-as-usual’ development and more sustainable alternatives trade off. By recognizing that the economy is a subsystem of human society which is itself a subsystem of the environment, the green economy concept helps to prioritize sustainable development and resource management on decision makers’ agendas, influencing their thinking and giving them a mandate to ensure that our economic activities do not exceed environmental tipping points [**Polzin, Kostka, Fulai et al., 2011**]. [**Fulai et al., 2011**].

The green economy can also be viewed as a set of principles, aims, and actions, which generally include: [**ECLAC, 2010; EEA, 2010; UNEP 2011a; and OECD, 2011a**]:

- Equity and fairness, both within and between generations;
- Consistency with the principles of sustainable development;
- A precautionary approach to social and environmental impacts;
- An appreciation of natural and social capital, though, for example, the internalization of external costs, green accounting, whole-life costing and improved governance;
- Sustainable and efficient resource use, consumption and production;
- A need to fit with existing macroeconomic goals, through the creation of green jobs, poverty eradication, increased competitiveness and growth in key sectors.

Resource efficiency in green economy in the following:

- Resource efficiency is implicit in the green economy' s principle of sustainable and efficient resource use, consumption and production. the transition to a green economy depends on meeting the twin challenges of maintaining the structure and functions of ecosystems (ecosystem resilience) and finding ways to cut resource use in production and consumption activities and their environmental impacts (resource efficiency). More specifically, resource efficiency means achieving a desired increased level of output with a reduced level of human, natural or financial inputs. It is a necessary criterion for a green economy, although it may not be sufficient, as it may still allow resource use to increase in absolute terms, which indeed has been the case for most countries in recent decades [**OECD, 2011c**].

- Compared to a green economy, measures of resource efficiency are easier to define (UNEP, 2010a). At the macroeconomic level, indicators such as gross domestic product (GDP) per resource use highlight the relationship between resource use and economic output. Nevertheless, differences in interpretation remain, with only a few countries formally defining the term ' resources' in policy. Some include both renewable and non-renewable resources, while others use a narrower term ' raw materials' which includes fossil fuel reserves. Neither a clear definition nor a common understanding of the term ' resource efficiency' appears to be in place [**EEA, 2011**].

Green economy priorities regarding economy and resources efficiency, as following as [21]: Renewable energy (including hydropower, biofuels, and biomass); (2) Energy efficiency; Mobility (air quality, emissions, and noise); (3) Industry (emissions and waste); (4) Innovation; (5) Environmental Impact Assessment (EIA) and Strategic Impact Assessment (SIA); (6) Governance (including institutional arrangements and multilateral environmental agreements) and environmental performance reviews; (7) Corporate Social Responsibility (CSR) and environmental reporting; (8) Mining. (9) Resource efficiency, use of natural capital (including forestry, agriculture, urbanization linked to the use and degradation of land, soil, water and biodiversity); (10) Water efficiency in industrial, rural and urban areas; (11) Life-cycle analysis; (12) Environmental accounting; (13) Sustainable consumption and production patterns. (14) Tourism.

To summarize: a global green economy transformation will require substantial financial resources [UNEP 2011]:

- Additional investments required will likely be in the range of 1 to 2.5% of global Gross Domestic Product (GDP) per year from 2010 to 2050. A considerable amount of investment will be needed in energy supply and efficiency, particularly in greening the transport and buildings sectors.
- Financial investment, banking, and insurance are the major channels of private financing for a green economy. The financial services and investment sectors control trillions of dollars that could potentially be directed towards a green economy. More importantly, long-term public and private institutional investors, banks and insurance companies are increasingly interested in acquiring portfolios that minimize environmental, social and governance risks, while capitalizing on emerging green technologies.
- The rapid growth and increasingly green orientation of capital markets, the evolution of emerging market instruments such as carbon finance and microfinance, and the green stimulus funds established in response to the economic slowdown of recent years, are opening up space for large-scale financing for a global green economic transformation.
- The role of the public sector is indispensable in freeing up the flow of private finance towards a green economy. The governments and multilateral financial institutions should use their own resources to leverage financial flows from the private sector and direct them towards green economic opportunities.
- Public finance is important for triggering a green economic transformation, even if public resources are significantly smaller than those of private markets.
- Development finance institutions can allocate significant proportions of their new lending towards financing green economy transition projects.

2.5.1. Agricultural strategic objectives for a green economy

- Greening the Economy with Agriculture refers to increasing food security (availability, access, stability, and utilization) while using fewer natural resources, through improved efficiencies throughout the food value chain. This can be achieved by applying an ecosystem approach to agriculture, forestry and fisheries management in a way that addresses the multiplicity of societal needs and desires, without jeopardizing options for future generations to benefit from all goods and services provided by terrestrial and marine ecosystems [6] [8], [11].
- Information on strategic objectives, targets, and indicators in resource-efficiency assessments shows a large variety of approaches, directions, and level of detail. Strategic objectives for resource efficiency tend to be fairly general in nature, most often referring to ensuring sustainable use of natural resources; improving energy efficiency; increasing recycling of waste, and waste prevention/decoupling waste and growth. Other fairly common objectives include sustainable management of minerals; improving resource efficiency; reducing energy use; increasing the share of renewable energy; improving water quality; reducing the use of water; and protecting biodiversity.

2.5.2. Green growth

Green growth is "***growth that is environmentally sustainable"***. It is efficient in its use of natural resources, clean in that it minimizes pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management in preventing physical hazards and excessive commodity price volatility. Green growth is a tool to achieve sustainable development, not a competing paradigm. It offers a development pathway that reconciles the urgent need for sustained growth with the imperative of avoiding lock-in to unsustainable growth patterns and irreversible environmental damage. Green growth is not anti-growth; it represents a change in how we manage economies for sustainability.

The concept of green growth has its origins in the Asia and Pacific Region. At the Fifth Ministerial Conference on Environment and Development (MCED) held in March 2005 in Seoul, 52 Governments and other stakeholders from Asia and the Pacific agreed to move beyond the sustainable development rhetoric and pursue a path of "green growth". To do so, they adopted a Ministerial declaration (the Seoul Initiative Network on Green Growth) and a regional implementation plan for sustainable development [**UNESCAP, 2008**]. This commenced a broader vision of green growth as a regional initiative of UNESCAP, where it is viewed as a key strategy for achieving sustainable development as well as the Millennium Development Goals [**UNESCAP, 2012**].

The green growth approach adopted by the MCED sought to harmonize economic growth with environmental sustainability while improving the eco-efficiency of economic growth and enhancing the synergies between environment and economy. As with the green economy, green growth attracted significant attention as a way out of today's economic doldrums in the aftermath of the 2008 financial crisis [**Green Growth Leaders, 2011**].

The goal of inclusive green growth is to reduce poverty, promote equity, and create opportunities without irreparably harming the environment. In other words, green growth should create a green economy, which the United Nations Environment Program (UNEP) defines as one "that results in improved human well-being and social equity, while significantly reducing environment risks and ecological scarcities." So the two concepts are intimately linked – two sides of the same coin. Importantly, neither are new paradigms. Both are inputs into sustainable development, the ultimate objective of growth, development, and environmental policies. The World Bank's emphasis on growth aims to draw attention to the fact that continued growth in developing countries is necessary – though not sufficient – to deliver on the development agenda.

This common vision of green growth/economy as instruments to achieve sustainable development is being developed further through the Green Growth Knowledge Platform (GGKP), a joint initiative of the Global Green Growth Institute, the Organization for Economic Co-operation and Development, UNEP, and the World Bank. The GGKP, which launched in January 2012, is a global network of researchers and development experts seeking to identify and address major knowledge gaps in green growth theory and practice. Through widespread consultation and world-class research, the GGKP aims to provide practitioners and policy makers with better tools to foster economic growth and implement sustainable development.

3. Challenges and gains of the Egyptian economy heading toward the green economy

A shift to a green economy pathway could lead Egypt to achieve annual savings of over 1.3 billion dollars in the agriculture sector, and about 1.1 billion dollars in the water sector, as well as a 13% reduction in CO_2 emissions, and a 40% reduction in water consumption, according to a report released by the United Nations Environment Programme (UNEP).

Launched at the African Ministerial Conference on Environment (AMCEN), the green economy scoping study for Egypt finds that economic and environmental trends such as declining water share per capita of over 30% by 2025, solid waste generation increases of 36% since 2000, and natural resource depletion of around 3.78% annually, can be arrested and reversed through green interventions that can accelerate Egypt's sustainable development. Challenges such as Egypt's rapidly growing population - which could reach 100 million by 2020 – coupled with an ecological footprint almost three times its available bio-capacity, according to the Arab Forum on Environment and Development, are opportunities to implement an inclusive green economy strategy that can revitalize and diversify the economy and achieve social equity while also conserving the environment, and improving health and human welfare. Greening key sectors such as water, agriculture, waste, and energy is an economically and environmentally astute course of action. The savings alone make a strong case for a new policy approach that can decouple environmental degradation from economic development, create jobs, reduce emissions, attract foreign investment and develop new markets, as well as expected benefits and policy approaches for greening Egypt's agricultural, water, energy and solid waste sectors.

3.1. Green Interventions – Agriculture

The agriculture sector currently only contributes about 14% of GDP - compared to 30% in the 1970s – and as a result of business as usual practices is marred by the loss of agricultural biodiversity, land erosion and loss of soil fertility. Identified green interventions which can reverse these downward trends include investing in organic farming; changing cropping patterns; and shifting to modern irrigation systems. Directing investments to rural areas will also reduce rural to urban migration and the pressure this creates on the physical and social infrastructure and services in urban areas, which contributes to enhancing equity, social cohesion and improved distribution of wealth and opportunities, particularly among the poor and marginalized segments of the Egyptian population.

- Conversion of 20% of the total agricultural land from conventional to sustainable and organic cultivation amounting to about 1.44 million feddan, could result in a saving of approximately 700, 000 tons of chemical fertilizers annually or 1 billion EGP annually.

- The potential of producing compost from agricultural residues could provide more than 22 million tons of organic waste annually or 9 billion EGP annually.
- Reducing the area cultivated for rice (or using early maturing varieties) and sugar cane could lead to water savings of about (4-7) or five billion EGP by 2017.
- It is estimated that using drip irrigation could save up to 40% of water as compared to flood irrigation. This will result in water savings amounting to about 23 billion m^3.

3.2. Green Interventions – Water

Demand for water is increasing at an alarming rate, with water share per capita set to decrease by over 65 %by 2050 as population growth, urbanization, and increased agricultural and industrial activities continue to increase pressure on an already scarce resource. Identified green interventions which can help to reverse this trend include investing in non-conventional water resources development such as desalination and treated wastewater, and the upgrading and expansion of national water use efficiency.

- Investing in household water saving devices for domestic use including residential building is estimated to result in water savings between (10% to 20%) or 1.4 billion m^3 of water savings annually.
- Other benefits of water efficiency approaches include increased land productivity and yields estimated at between 20% to 30%.
- Efficiency in the use and allocation of water resulting from good governance and regulatory framework is expected to result in 10% savings in water consumption estimated at 6.75 billion m^3 annually.

3.3. Green Interventions – Energy

Since 2007, a gap between energy supply and demand has existed and is expected to continue to increase under the business as usual scenario. Public expenditure on energy subsidies has reached unprecedented levels, representing about 73% of all subsidies and approximately 21% of the country's budget, according to the African Development Bank. Identified green interventions which can help reverse this trend include investing heavily in renewable energy sources such as solar and wind infrastructure to increase the percentage share of renewable energy out of the total energy mix; investing in energy efficient appliances and equipment by households and economic sectors; and investing in human resource development, R&D in energy-saving technologies, practices and measures Investing in renewable energy can be a driver for job creation, with an estimated 75,000 new job opportunities in solar and wind systems design, manufacturing, operational services, and sales.

- Investing in energy efficiency practices such as the installation of efficient lighting equipment lead to significant energy savings especially that 34% of residential energy consumption is for lighting purposes.
- Energy efficiency measures in Egypt are expected to result in about 30% in energy savings estimated at 33 billion kW based on 2012 estimated of energy consumption in Egypt.

- Reduction in oil consumption by 20% is estimated to cut down CO_2 emissions by 18 million tons of CO_2 annually.

3.4. Green Interventions – Waste

It is estimated that annual solid waste generation has increased by more than 36% since 2000, with an estimated increase of 3.4% per annum. It reached about 21 million tons in 2010, nine million tons of which is generated by greater Cairo. The current state of solid waste management is resulting in increased environmental damage and negative impacts on health. Identified green investments which could reverse these trends include investing in waste to organic fertilizers and waste to biofuel facilities; investing in producing refuse-derived fuel for use as an energy source for cement factories and other industrial uses; and investing in human resource development, R&D and innovative recycling technologies and equipment.

4. Conclusion

An average temperature in Egypt during the period (1901- 2012) at about 22.96 C°, with an annual, statistically increase reached about 0.089 C°, and an average precipitation of about 3.51 mm/year, with an annual, statistically decline reached about 0.053 mm/year. In addition to average emissions of carbon dioxide emissions in the period (1990- 2012) at about 129.59 million tons, with an annual statistical increase reached about 4.995 million tons. These results confirm the previous increase the temperature, decreased precipitation and increased carbon dioxide emissions, underlines the fact climatic changes which are affected by Egypt, as Egypt is considered one of the countries most affected by climatic changes. The total methane emissions have been increased statistically with an annual rate of 2.69%, methane emissions have been increased statistically with an annual rate from the agriculture reached about 1.83%, thus the proportion of methane emissions from the agriculture sector in total methane emissions equivalent annually about 1.3%, it is also clear that total nitrous oxide emissions have been growing at an annual average rate statistically reached about 2.18%, nitrous oxide emissions from the agriculture sector have been increased by annual rate statistically reached about 3%, consequently proportion of nitrous oxide emissions from the agriculture sector in total nitrous oxide emissions equivalent annually about 0.17%. Which illustrates the importance of reducing the emissions of the agriculture sector. The average production of energy in Egypt of 74.42 Mt. Production of energy in Egypt have been increased by significant statistically an annual rate of 2.7%. While the average consumption of energy in Egypt of 64.06 Mt. Consumption of energy in Egypt has been increased by significant statistically significant an annual rate of 4.49%. Also, the average per capita energy consumption in Egypt have been increased by significant statistically an annual rate of 2.74%, consumption of 1.000 dollars of gross national product of energy have been increased by significant statistically an annual of 0.79%. Despite the increase in the use of clean energy by significant statistically an annual rate annually reached about 2.08%, but the proportion of clean energy and renewable energy of the total consumption of energy have been reduced by a rate annually significant statistically reached about 0.23%, as a result of the rise of the invasions of Egypt's growing energy in the recent years, and lack of capacity to provide a significant contribution to clean energy in total energy uses, where requires increasing the produced quantities of clean energy quantities and rates of more current, with increasing rates of consumption of Egypt from energy. Egypt's production of nuclear energy, energy and non-conventional increased by an annual rate of significant statistically reached about 2.08%, but that the quantity produced from this energy is a small percentage of the total energy produced.

On the basis of the foregoing, the increase in the consumption of energy and the increase in the average per capita consumption of energy in Egypt is considered one of the most important reasons that automatically lead to an increase in emissions of greenhouse gases, especially carbon dioxide, which confirms the importance of the trend toward clean energy production, orientation toward the green economy and green growth which will lead to the reduction of emissions of carbon dioxide with increasing power consumption and increase the gross domestic product (GDP). During the period (2000- 2014), that an increase in Egyptian GDP by about billion dollars, lead to an increase of total Egyptian energy consumption by about 0.176 Mt., with an increase of total Egyptian emissions of carbon dioxide by about 0.5 Mt. Greening the economy with agriculture refers to increasing food security (availability, access, stability, and utilization) while using fewer natural resources, through improved efficiencies throughout the food value chain. This can be achieved by applying an ecosystem approach to agriculture, forestry and fisheries management in a way that addresses the multiplicity of societal needs and desires, without jeopardizing options for future generations to benefit from all goods and services provided by terrestrial and marine ecosystems. gains of the Egyptian economy heading toward the green economy: A shift to a green economy pathway could lead Egypt to achieve annual savings of over US$1.3 billion in the agriculture sector, and about US$1.1 billion in the water sector, as well as a 13% reduction in CO_2 emissions, and a 40% reduction in water consumption.

5. Recommendations

It is recommended that research several recommendations, as follows:

[1] To develop new types of high temperature, salinity and drought conditions that will prevail under conditions of climate change, and to develop new types of short growth season to reduce water needs, as well as to change the dates for agriculture, including appropriate to weather conditions, as well as cultivation of new items in appropriate The appropriate climate to increase crop yield of water unit for each crop, such as cultivation of wheat bear the high temperatures, drought-resistant and agriculture in time with good distribution of items on geographical areas, and the expansion of winter crops such as lentils, beans, and other municipal, it is likely that these measures to prevent expected negative effects, or, at least, alleviate the negative effects.

[2] Reduce crop area of wasteful water consumption, or at least not to increase the size of such as rice, sugar cane, alternative crops and give the same purpose and water consumption and lower growth such as the cultivation of sugar beet instead of sugar cane.

[3] The application of the methods of the best in land management such as improving fork soil water management and erosion control, plow soil for maintenance, and other farming can have a major role in carbon sink compensatory mechanism on the contribution of agriculture to greenhouse gasses.

[4] The use of irrigation systems more effectively and provide better protection of coastal areas and farms, in order to mitigate the effects of climate change.

[5] The completion of the severe shortage of available data and information on the negative effects of climate change on different sectors of development in Egypt, in particular the issue of the internal and external migration, and the establishment of a full database continuing to occur, in advance of the study, to encourage scientific research and technology in all issues related to climate change and develop specific plans and financing is clear.

[6] Attention regionalization studies where can know the ways in which to overcome, or, at least, alleviate the shortage in crop productivity adversely affected by this phenomenon.

References

[1] El-Raey, M. (2000). Coastal Zone Development and Climate Change Drill Down of Climate Change in Egypt. ECRP.

[2] Fawaz, M.M. and Soliman, S.A. (2015). Economic Study of Climate Changes and Its Effects on Sustainable Agricultural Development in Egypt. Egyptian Journal of Agricultural Economics, 25, 1177-1196.

[3] Fawaz, M.M. and Soliman, S.A. (2016). The Potential Scenarios of the Impacts of Climate Change on Egyptian Resources and Agricultural Plant Production. *Open Journal of Applied Sciences*, **6**, 270-286. doi: 10.4236/ojapps.2016.64027

[4] G. Seyfang, 2007, Growing sustainable consumption communities, The case of local organic food networks, International Journal of Sociology and social policy, vol. 27, pp. 120-134.

[5] http://timeforchange.org/what-is-a-carbon-footprint-definition

[6] http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,,contentMDK:22812374~pagePK:210058~piPK:210062~theSitePK:244381,00.html.

[7] http://www.eeaa.gov.eg/arabic/main/env_ozone_ecc_neg.asp

[8] http://www.fao.org/fileadmin/user_upload/suistainability/docs/GEA__concept_note_3March_references.pdf.

[9] http://www.fueleconomy.gov/feg/greenpower.shtml

[10] http://www.greenretaildecisions.com/glossary/green-products

[11] http://www.imf.org/external/pubs/ft/survey/so/2010/NEW013010A.htm.

[12] Intergovernmental Panel on Climate Change (IPCC) (1991) The Seven Steps of the Assessment of the Vulnerability of Coastal Areas to Sea Level Rise—A Common Methodology "Intergovernmental Panel on Climate Change". Response Strategies Working Group, Advisory Group on Assessing Vulnerability to Sea Level Rise and Coastal Zone Management, Revision No. 1.

[13] Intergovernmental Panel on Climate Change (IPCC) (2007) New Assessment Methods and the Char-

acterization of Future Conditions. Fourth Assessment Report, Chapter Draft IPCC.

[14] J. Connoly, A. Prothero, 2008, Green consumption: life-politics, risk and contradictions, Journal of consumer culture, vol. 8, pp. 117-145.

[15] James, Paul; Magee, Liam; Scerri, Andy; Steger, Manfred B. (2015). Urban Sustainability in Theory and Practice:. London: Routledge.; Liam Magee; Andy Scerri; Paul James; Jaes A. Thom; Lin Padgham; Sarah Hickmott; Hepu Deng; Felicity Cahill (2013). "Reframing social sustainability reporting: Towards an engaged approach". Environment, Development and Sustainability (Springer).

[16] Lynn R. Kahle, Eda Gurel-Atay, Eds (2014). Communicating Sustainability for the Green Economy. New York: M.E. Sharpe. ISBN 978-0-7656-3680-5.

[17] Olivier, J., J. Van Aardenne, F. Dentener, Pagliari, L. Ganzeveld, L. and J. Peters, 2005. Recent trends in global greenhouse gas emissions: regional trends 1970e2000 and spatial distribution of key sources. Journal of Integrative Environmental Sciences 2, 81-99.

[18] R.Elliott, 2013, The taste for green:the possibilities and dynamics of status differentiation through "green" consumption, Sci Verse ScienceDirect, ELSEVIER, vol. 41, pp. 294-322.

[19] Renewable Energy & Efficiency Partnership (August 2004). "Glossary of terms in sustainable energy regulation" (PDF). Retrieved 2008-12-19.

[20] Scheehle, E.A. and D. Kruger, 2006. Global anthropogenic methane and nitrous oxide emissions, Energy Journal., 22, 33 – 44.

[21] Steering Group on Environmental Assessments (http://www.unece.org/env/efe/Astana/SGEA/1stMtg/OutlineAoA_e.pdf.

[22] Tasaadyet, B. (2013) The Impact of Climate Change on the Economy and Sustainable Development with Reference to the Case of Algeria. First National Forum on Environment and Sustainable Development—Climate Change, Pollution, University of Bouira, Algeria.

[23] The Egyptian Central Agency for Mobilization and Statistics (2014) The Report Issue.

[24] The Ministry of Agriculture and Land Reclamation (2009) Sustainable Agricultural Development Strategy until 2030. The Ministry of Agriculture and Land Reclamation, Cairo.

[25] UNEP (2011), ' Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication' (advance copy available from http://www.unep.org/greeneconomy).

[26] www.fao.org/climatechange/unfccc-bonn-2015

[27] www.worldwatch.org/node/4839

[28] Xu, H., G. Xing, Z. C. Cai, and H. Tsuruta, 1997. Nitrous oxide emissions from three rice paddy fields in China. Nutrient Cycling in Agroecosystems, 49, 23-28.

الملخص العربي

الاقتصاد الأخضر والتغير المناخي والتنمية المستدامة في مصر

ا. د/ محمود محمد فواز
أستاذ الاقتصاد الزراعى
كلية الزراعة، جامعة كفر الشيخ.

د/ سرحان احمد سليمان
الباحث بمعهد بحوث الاقتصاد الزراعي
مركز البحوث الزراعية.

تعتبر مصر من أولى الدول التي يتوقع ان تتأثر بالتغيرات المناخية، مما أثر على القطاع الزراعي بصفة عامة وعلى إنتاجية اهم المحاصيل الزراعية واستهلاكها من المياه بصفة خاصة، كما لها تأثيرات سلبية على الموارد الاقتصادية الزراعية بشكل عام،

ومن اهم أسباب هذه التغيرات ارتفاع درجة الحراة نتيجة زيادة انبعاثات غاز الدفيئة، نتيجة زيادة استهلاك الطاقة وتزايد التلوث، ومن المتوقع ان تستمر التغيرات المناخية في تأثيرها على القطاع الزراعي المصري، وقد ظهر مواكبة لهذه التغيرات مفهوم الاقتصاد الأخضر وبدأت تظهر الياته كوسيلة للحد من التغيرات المناخية، والاعتماد على الطاقة النظيفة والتخلي تدريجياً على المنتجات ذات الصبغة الكربونية المرتفعة، وكانت أبرز النتائج البحثية في الآتي: بلغ متوسط درجة الحرارة خلال الفترة (١٩٠١-٢٠١٢) نحو ٢٢.٩٦ درجة مئوية، وبزيادة سنوية معنوية احصائياً بلغت نحو 0.089 درجة مئوية، في حين بلغ متوسط سقوط الامطار نحو ٣.٥١ مليمتر / سنة، بتناقص سنوي معنوي احصائياً بلغ نحو ٠.٠٥٣ مليمتر / سنة، في حين بلغ متوسط انبعاثات ثاني أكسيد الكربون في الفترة (٢٠٠٠ – ٢٠١٤) نحو ١٧٣ مليون طن، بزيادة سنوية معنوية احصائياً بلغت نحو ٧.٦٩ مليون طن، تؤكد هذه النتائج حقيقة التغيرات المناخية التي تتأثر بها مصر. وتبين تزايد انبعاثات الميثان من قطاع الزراعة بمعدل سنوي معنوي احصائياً بلغ نحو ١.٨٣%، وزادت انبعاثات النيتروز من قطاع الزراعة بمعدل سنوي معنوي احصائياً بلغ نحو ٣%، مما يوضح أهمية تخفيض انبعاثات قطاع الزراعة، وبلغ متوسط انتاج مصر من الطاقة نحو ٧٤.٤٢ مليون طن، وزاد بمعدل سنوي معنوي احصائياً بنحو ٢.٧%، بينما بلغ متوسط استهلاك مصر من الطاقة نحو ٦٤.٠٦ مليون طن، وزاد بمعدل سنوي معنوي احصائياً بنحو ٤.٤٩%، وعلى الرغم من زيادة استخدام الطاقة النظيفة بمعدل سنوي معنوي سنوياً بلغ نحو ٢.٠٨%، الا ان نسبة الطاقة النظيفة المتجددة من إجمالي استهلاك مصر من الطاقة انخفض سنوياً بمعدل معنوي احصائياً بلغ نحو ٠.٢٣%، كما ان انتاج مصر من الطاقة النووية والطاقة غير التقليدية زاد بمعدل سنوي معنوي احصائياً بلغ نحو ٢.٠٨%، الا ان الكمية المنتجة من هذه الطاقة تمثل نسبة ضعيفة من إجمالي الطاقة المنتجة. كما تبين ان الناتج المحلى المصري زاد بمعدل سنوي معنوي احصائياً بلغ نحو ٩.٤١% وزادت الانبعاثات الكربونية في مصر بمعدل سنوي معنوي احصائياً بلغ نحو ٤.١٧%، كما زاد متوسط نصيب الفرد من الناتج المحلى الإجمالي في مصر بمعدل سنوي معنوي احصائياً بلغ نحو ٧.٥١%، بينما زاد متوسط نصيب الفرد المصري من الانبعاثات الكربونية بمعدل سنوي معنوي احصائياً بلغ نحو ٢.٨٤%، وتبين انه كلما زاد الناتج المحلى الإجمالي المصري بنحو مليار دولار، تزيد انبعاثات الكربون بنحو ٠.٥١٦ مليون طن. الانتقال الى مسار الاقتصاد الاخضر يمكن ان يحقق لمصر وفورات سنوية أكثر من نحو ١.٣ مليار دولار في القطاع الزراعي، ونحو ١.١ مليار دولار في قطاع المياه، وتخفيض نحو ١٣% في انبعاثات ثاني اكسيد الكربون، وتخفيض استهلاك المياه بنحو ٤٠%، فالانتقال الى الاقتصاد الأخضر سيتم تحويل ٢٠% من الرقعة الزراعية الاجمالية من الزراعة التقليدية الى الزراعة العضوية المستدامة، بما يعادل نحو ١.٤٤ مليون فدان، يمكن ان يؤدى الى تحقيق وفورات بشكل مباشر، تتمثل في توفير نحو ٧٠٠ الاف طن من الاسمدة الكيماوية سنويا او مليار جنيه سنويا، وامكانية انتاج السماد من المخلفات الزراعية يمكن ان يوفر اكثر من نحو ٢٢ مليون طن من النفايات العضوية سنويا، او 9 مليار جنيه سنويا، كما ان تقليص المساحة المزروعة بالأرز وقصب السكر يمكن ان يؤدى الى تحقيق وفورات في استهلاك المياه بما قيمته نحو ٥ مليارات بحلول عام ٢٠١٧. كما ان استخدام الري بالتنقيط يمكن توفير ما يصل الى ٤٠% من مياه الري، وسيؤدى هذا الى تحقيق وفورات فى استهلاك المياه التي تصل الى نحو ٢٣ مليار متر مكعب. كذلك الاستثمار في المياه المنزلية عن طريق أجهزة موفرة للطاقة يقدر ان ينتج عنه تحقيق وفورات في استهلاك المياه بين ١٠ الى ٢٠% او نحو ١.٤ مليار متر مكعب من المياه سنويا. بالإضافة الى الفوائد الأخرى المتمثلة فى زيادة كفاءة استعمال المياه تشمل زيادة انتاجية الأراضي والمحاصيل تقدر بما يتراوح بين ٢٠ الى ٣٠% علاوة على زيادة الكفاءة في استخدام وتوزيع المياه الناتجة عن الادارة الرشيدة والإطار التنظيمي والمتوقع ان ينتج عنه وفورات بنسبة ١٠% في استهلاك المياه، بما يعادل نحو ٦.٧٥ مليار متر مكعب. اما الاستثمار في الطاقة المتجددة يمكن ان يؤدى الى خلق فرص عمل، بما يقدر بنحو ٧٥ ألف فرصة عمل جديدة في مجال الطاقة الشمسية وطاقة الرياح وتصميم وصنع الخدمات التشغيلية والمبيعات. في هذا المجال، إضافة الى الاستثمار في كفاءة استخدامات الطاقة مثل تركيب واضاءة كفء لتجهيز والتنظيم تؤدى الى تحقيق وفورات ضخمة في الطاقة خاصة ان ٣٤% من استهلاك الطاقة في المنازل لأغراض الاضاءة. حيث يمكن رفع كفاءة الطاقة وممارستها يؤدى الى توفير حوالي ٣٠% في استهلاك الطاقة، بما يبلغ نحو ٣٣ مليار كيلو وات على اساس تقدير استهلاك الطاقة في عام ٢٠١٢ في مصر. كما ان تخفيض استهلاك النفط بنسبة ٢٠% المقدر لخفض انبعاثات ثاني اكسيد الكربون من المتوقع ان يؤدى الى خفض هذه الانبعاثات بنحو ١٨ مليون طن من ثاني اكسيد الكربون سنويا.