Sustainable Development approaches in Egypt

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Abstract. In conjunction with the current Egyptian sustainable and economic reform plan to enrich the country resources and face future challenges, the megaprojects have been pursued to improve the infrastructure and encourage investment. Starting with renewable energy planets and passing by 14 new sustainable cities all over Egypt to absorb the future expected population and improve the living standards of the Egyptian citizens. One of those cities is the New Administrative Capital which is being built as a smart city on an uninhabited strategic area between the Suez Canal and the Nile River and it will become the new administrative and financial capital of Egypt, housing the main government departments and ministries, as well as foreign embassies. This paper attempts to review the United Nations Sustainable Development Goals in the Egyptian megaprojects with a special focus for the Egyptian New Administrative Capital city.

Keywords: Egypt, New Administrative Capital, United Nations Sustainable Development Goals, UNSDG

1. Introduction:
Before 1952, Egypt was depending on agriculture for a massive part of its economy. That drifted to an ambitious industrial planned program in the 1960s. Most of the reform plans were going as planned until the war of 1967, or the second Arab Israel war, when Egypt lost an important strategic part of its land (Suez Sinai) and the whole country economy went for military reform effort to retrieve the occupied land. At the 1980s, the re-orientation of the investing strategy took place but at that time most of the reform effort wasted until the famous revolution in 2011. (Washington 2012)
As shown in figure (1), the total population of Egypt in 2019 exceeds 100 million people and with a growth rate of 1.8% annually in the population, it’s predicted to range from 121.8 to 151 million people by 2050 and could exceed 200 million in 2100 (Worldometers 2019). All age groups in Egypt’s demographic pyramid are set to increase in the next decades. (Nations 2015) However, the increase is relatively higher in younger strata than the older one (Zaky 2009), which means that policies should be aimed towards constructing new cities in accordance with the future needs of new housing units.

Moving towards achieving the United Nations Sustainable Development Goals (UNSDG) (NATIONS 2018) The current Egyptian administration doctrine is to capitalize on Egypt’s big market. The aim is to make Egypt a safe competitor country that attracts investors from all over the world. This is only possible by constructing mega infrastructure projects, adopting an open market policy and deregulating the state’s currency (devaluation) while easing regulations and hurdles for foreign investors.

Figure 2. Egypt Population Graph (1950-2100) (Nations 2015)

Figure 3. Egyptian demographic pyramid (Nations 2015)

Figure 4. Egyptian Economic performance in 2017 (Global competitiveness Index, World Economic Forum 2018)
Egypt main potential for a strong economy is its large market size (figure 4, market size=73), proximity to the rich European market and it is a relatively developed infrastructure (figure 4, infrastructure=70). The change of macroeconomic environment to a free market economy will put Egypt on the path to catch up with its neighbours in MENA region. (figure 5).

Egypt has climbed steadily in the ease of doing foreign business index in the past 8 years which shows a good indicator of the potential growth in all sectors. The world economic forum survey in 2016 showed Policy and Government instability and Access to financing as the main hurdles of doing business in Egypt. As shown in Figure (6), It’s clear what should the current Egyptian Government work on to improve the overall investment atmosphere. (World Economic Forum 2011, 2016, 2018)
2. Renewable Energy projects:
During 2014, Egypt was facing a crisis that threatened all key sectors as there was a continuous never-ending electricity blackout which made daily life for most citizens becomes more and more complicated. The political leadership categorized the electricity and power demand as a national security demand and an immediate plan has been developed to increase the capacity of the national electricity grid and provide power to all sectors in the country and as soon as possible. (LIVE 2017)

An overall budget of 515 billion Egyptian pounds (EGP) was allocated for improving electricity sector of which 433.5 billion EGP was allocated for the generation, 54.5 billion EGP to support the transmission network and 27 billion EGP to upgrade the distribution network. And in summer of 2015, the dream became true and the government was able to provide reliable power to all sectors without any further blackouts which had a great impact for providing the investing environment and political stability. The current Egyptian administration is eager to maximize the use of renewable energy as a source of clean and affordable energy in the long term. (LIVE 2017)

Sustainable renewable power sources (like wind and sun-based power) will decrease the contamination caused by the regular thermal power producing stations which may produce vast volumes of oxides of nitrogen and carbon (CO2). (Shumkov, 2015)

2.1 Wind Energy
The Gulf of Suez (Northwestern shores of the Red Sea) is viewed as a prime worldwide area for on-shore wind energy because of its unique air currents marked by its high speed. The Egyptian government, in coordination with the Japan International Cooperation Agency (JICA), established the biggest wind farm in the Middle East and Africa located in Jabal el Zeit on an area of 700 sq.km. Featuring the latest turbine’s technology in the world with a capacity of over 200 megawatts. (Egypt Energy 2018)

This installation will be the first wind farm executed under a ‘BOO’ scheme (‘Build,’ Own ‘and’ Operate ‘). Kfw Bank in Germany and the European Investment Bank (EIB), as well as the European Commission, financed the project with more than 270 million USD setting a project schedule over a 30-month period. The plan contemplates private sector participation that will reach 60%. (Shumkov, 2015) Jabal el Zeit Wind Park will provide up to 800 GWh of electricity for more than 500,000 citizen annually. (Shumkov, 2015)

2.2 Solar Energy
To reach the 2022 Goal of having 20% of the total electricity grid from renewable resources, the largest solar complex in the world is being constructed in Benban village located in Aswan governorate. The Benban solar park Located over 37.2 km² (14.4 square meters) and consists of 41 plants with a total capacity of 2000 megawatt. The private sector investors have signed agreements to implement solar projects with a capacity of 1465 megawatt. (Raven, 2017)

The task got financing from Bayerische Landesbank (BLB) for 85% with the other 15% from Arab African International Bank [ar] (AAIB). The German government has given Euler Hermes trade credit ensure (ECG), covering the BLB advance. As a major aspect of the German outside exchange advancement program, it bolsters Egypt's objective of meeting more than 33% of its vitality necessities by 2035 through sustainable power sources. (Prabhu, 2017)
The Benban solar power plant will support the implementation of the Egyptian ambitious plan for achieving self-sufficiency for generating electricity in the next decades. From another perspective, that would also support a more sustainable environment by limiting the polluting traditional source of power “fossil fuels”. It would also provide 4000 job vacancies once it is fully operated (Mbogo 2018).

3. Roads and Transportation:
Despite its large population, and compared to similarly developed cities, Cairo has a very small metro network and the highest number of passengers per kilometer compared to cities of similar size (as shown in figure 10). The population density led to the necessity of the overuse of the metro transportation system. Therefore, there is an ongoing metro line extension project to meet the needs of the growing population. (Bank 2018)

Many bridges and tunnels have been constructed over the past few years all over Egypt to connect the main Egyptian cities supporting internal trade lines and encouraging foreign investment opportunities. The new Rod el Farag Bridge is the new life artery for Egyptian prosperity as it connects greater Cairo metropolitan area from its far east (Nasr city) to its west (October city) and continues to reach Cairo-Alexandria desert road.

Figure 7. Jabal el Zeit Wind Farm
(MacFarlane 2018)

Figure 8. The Benban solar park
(Mbogo 2018)

Figure 9. Comparison of Km of Metro-line/population in different cities (Bank 2013)

Figure 10. Comparison of Ridership/day/kilometer in different cities (Bank 2013)
4. The Construction of the New 4th Generation Cities:

4.1 Introduction
Considering the fact that most of the Egyptian population are living in just 7% of the total Area of Egypt land (1.01 million Km²). Currently, the housing capacity does not meet the future requirement and considering the growth rate will remain the same, the current Egyptian administration should act fast to expand the urban areas. An integral part of the investment plans should be directed to the housing purpose and building new cities away from the overcrowded old cities. Therefore, today is the day for constructing megaprojects that will improve the country infrastructure and achieve its future ambitious goals as well as supporting a stable environment for investing in Egypt. (LIVE 2017)

With the Egyptian Ministry of Housing, Utilities and Urban Communities (MoHUUC) remarkable efforts to develop the living standard for the Egyptian citizens, 14 new cities are being constructed all over Egypt in the next decades. On an approximate total area of 580,000 acres to accommodate 30 million people, the new cities have the title of the 4th Generation cities as there were previous waves of construction new cities from the mid-20th century until now. It is predicted that a significant decline of housing unit’s prices will occur after the construction and delivery of these cities because of the rise of supply in the Egyptian real estate market. Taking into consideration the United Nations Sustainable Development Goals, every city will have a sustainable design that provides high living standards for its residents. (LIVE 2017)

Some of the 4th generation Egyptian new cities are: (Agency 2018)

- The new administrative capital city, (the biggest new city) with an approximate area of 170,000 acres, the construction has been started in its first phase over an area of 40,000 acres.
- New Alamein City, with an area of 49,000 acres. Its first phase spans over 14,000 acres.
- New east Port Said City, with an area of 16,000 acres.
- New 6 October city, with an area of 78,000 acres and the first phase spans over 9,000 acres.
- New Luxor city, with an area of 10,000 acres.

Figure 11. Government’s prediction of the urbanized area in Egypt in the future (LIVE 2017)
5. The New Administrative Capital of Egypt (NAC):

5.1 Introduction
Cairo is one of the most crowded cities all over the world. Relieving the congestion in Cairo was the main reason for constructing the New Administrative Capital (NAC). Cairo has a population over 20 m people that expected to be double in the next few decades.(Anonymous 2019b). The population density reached 98 people per km2, which is the second highest in Africa. In 2017, the Egyptian president declared that overpopulation one of the national crisis.(Al-Wahaidy 2018)

With half of Egyptians living in cities and the other half living in rural areas, the urbanization rate is estimated to be 1.86, one of the highest in the region. Together with the population growth, Cairo’s population is expected to reach 24 million by 2027 while with a current population of 19.5 million people in 2019 its one of the most crowded cities around the world (the largest in the middle east, second largest in Africa, and one of the top ten most crowded cities around whole world). The already overused transportation system and infrastructure will not be able to contain this changes in the city’s demographics. (Agency 2018)

With problems such as traffic jam, air pollution from carbon dioxide emission and noise pollution in Cairo metropolitan area (Divided by the Nile river, Greater Cairo consists of Giza City on the left bank of the river and Cairo City on the right bank), the standard amenities and services cannot be reached. A study by the World Bank estimates the monetary loss to exceed 2,442 million USD because of traffic jams alone. (Bank 2013)

Figure 12. Crowded Greater Cairo Metropolitan Area (STREETS 2013)
On an uninhabited strategic desert located 60 kilometers east of Great Cairo center and 60 kilometers west of the Suez Canal, a new administrative capital for Egypt is being built. It would eventually have a population of seven million people on a total area exceeds 1800 acre (while the great Cairo metropolitan area didn’t exceed 1000 acre). March 2015, the president of Egypt announced that the New Administrative Capital will be built by the national Egyptian firms. 21 April 2016, the New Administrative Capital for Urban Development (ACUD) has been established and assigned for constructing the national megaproject. (ACUD interview 2018)

“The city is planned to have skyscrapers and home to Africa's tallest tower and would become the new administrative and financial capital of Egypt, housing the main government departments and ministries as well as foreign embassies. The city will also have a green river with artificial lakes and 90 km2 of solar energy farms. It will be built as a smart city that relies heavily on automated services instead of manpower to supply its citizens with services such as, traffic and transportation systems. It is planned that the transfer of parliament, government ministries and foreign embassies will be completed between 2020 and 2022 at a cost of US $45 billion for the first phase.” quoted by Egyptian Prime Minister Mostafa Madbouly.

5.2 Inspiration
Inspired by some other countries that have changed their historical capital for different reasons, Like: Brasilia City in Brazil and Astana City in Kazakhstan. Egypt was not the first country to construct a new administrative capital. In fact, the idea was first discussed in 1970 but the implementation of the project suffered a failure in reaching its main goal due to lack of providing housing units for employees that should operate the governmental buildings. (ACUD interview 2018)
5.3 Components of the new capital
The new administration capital has an overall area of more than 170,000 Fadden. It would be equals to the size of Singapore, 7 times over Paris area, 4.5 times over Washington D.C. The city would become the new financial and administrative capital of Egypt, housing the main government and ministries buildings, as well as foreign embassies. It also contains about 2,000 educational institutions, 663 hospitals and clinics, over 1000 mosque and churches, 40,000 hotel rooms, a major park four times the size of Disneyland, 90 km² farms of solar energy. (UNIVERSAL 2019) It has been divided into three construction phases. The first phase would be over an area of 40,000 Fadden at a cost of US $45 billion. A full cost and timescale for the overall project have not been disclosed yet. (ACUD interview 2018)

Figure 15. phases of the new capital (ACUD interview 2018)

5.3.1 The Governmental District.
The governmental district will be constructed over an area of 566 acres and includes the new Cabinet’s headquarters, the parliament building, and 34 other buildings designated for each ministry. The transition of the new Parliament Building, presidential palaces and government ministries will fold out over two stages; each stage will transfer 57,000 employees. (ACUD interview 2018)

Figure 16. The Governmental District. (ACUD interview 2018)
5.3.2 The Central Business District.

The first phase of the Central Business District would contain more than 20 residential, administrative, commercial and services’ sky scanners with a total Build-up area of 1.7 million m² and it will be home to Africa’s tallest tower with 385 m height. Five towers for residential purpose with a total area of 318,000 m². Five towers for Hospitality purpose with a total area of 81,000 m² (38,000 m² four-star hotels and 43,000 m² for five-star luxurious Hotels) and other 207,000 m² Building area for Retail and commercial purpose. (ACUD interview 2018)

Figure 17. The new Egyptian Parliament Building (ACUD interview 2018)

Figure 18. The new Cabinet’s headquarters (ACUD interview 2018)

Figure 19. Central business district building’s heights (ACUD interview 2018)
6. Conclusion:
Although the Egyptian administration has a very ambitious reform economical plan to enhance the country infrastructure by constructing megaprojects, there is many challenges facing them like energy. The energy demand is rapidly increased as a vital catalyst to wider social and economic development enabling health, education and creating jobs. The era of heavy reliance on fossil fuels has come to its end. The renewable energy solutions in mitigating climate change threat have been widely proven. Transitioning to renewable energies resources supports significant progress on the Sustainable Development Goals (SDGs) not only for the seventh goal, affordable and clean energy, but also for other goals related to global temperatures, air quality and human health. Sooner or later all nations will adopt the strategy of clean and renewable energy. Projects like the Benban solar power plant and Jabal el Zeit wind power plant will support the implementation of the Egyptian ambitious plan for achieving self-sufficiency for generating electricity in the next decades.

There are many challenges facing the new capital megaproject. The first challenge is operating a highly modern smart city technologies for the first time in Egypt and the entire Middle East while Egypt has a humble experience in operating smart cities. The Egyptian Administration should consider hiring an international company with unique experiences for operating smart cities to manage the new capital and transform their experiences to Egyptian management over a 5- or 10-years period. Another challenge is the high cost of the smart infrastructure in the city and the ways of funding of these constructions. While the New Administrative Capital will provide thousands of job opportunities, Housing for these employees should be close from their workplace to minimize the cost of daily travelling for thousands between old Cairo and New Administrative Capital.

While some opinions are against the concept of constructing a new Administrative Capital because, as they conclude, its massive cost made most of the Egyptian citizens suffer from painful austerity measures, others see it as a necessary solution for developing the country’s infrastructure and attract investors. Those who agree for the concept of an expensive new capital debates whether to demolish the old ministries and plant green gardens in its places to revive old Cairo or leave these building as a historic heritage. From another perspective, there is a demand from the Egyptian government to allocate more budget for the development of education and healthcare systems besides constructing megaprojects as there is a huge shortage in these two essential sectors in Egypt.

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