Green Economy and Sustainable Development in the Sultanate of Oman

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Green economy is considered to be the emerging economy of the twenty-first century, as the world is changing its development path from unjust development to environmentally sensitive green development. Making the economy environmentally sustainable is no longer an option but an urgent necessity to achieve a balanced vision between social justice and environmental future. This work highlights the statues of the environment in Oman and the efforts to overcome the difficulties that prevent the transition to a green economy. This will encourage people to consider innovation and think about the values that will be gained from the transformation of the economy. Due to increased greenhouse gas emissions from industries based on non-renewable sources of energy, harmful carbon effects and scarce resources will increase in the near future. It is necessary to know the extent to which the Omani economy is green and the extent of its growth policies corresponding's to the transformation of the economy. It is equally important to analyze which mechanisms the government will adopt to reduce carbon emissions and global warming. This paper will explain the relationship between Green economy and Sustainable development in Oman and to what extant Oman is green. The objectives are to establish the relationship between green economy and sustainable development in the Omani context, to assess and measure the role of the green economy in achieving goals of sustainable benefits for the local economy. Also, it is important to inform the public about the importance of using green economy for the next generations and encouraging individuals to contribute to environmental protection on daily life routine, and to achieving a balanced vision between social justice and environmental future. The methodology considers the three types of indicators: Economic indicators, Environmental indicators related to economic activity, and Aggregate indicators on the path of progress and social welfare. In addition to primary and secondary data. The main outcome of this research is that the Sultanate is not green growing, as it is still highly dependent on non-renewable resources, therefore Oman should set a stronger lows on this issue.

Introduction

Different definitions for green economy exist. According to ALO (2918) Green Economy is a new model of fast-growing economic development based on knowledge of environmental economics aimed at addressing the interrelationship between human economies and the ecosystem in order to preserve the right of future generations to develop, enhance the efficiency of resource use and improve human well-being and social justice (ALO, Nov.2018). Chaplet defines the green economy as "a clean energy economy, improving the quality of the environment by reducing greenhouse gas emissions, reducing the environmental impact and improving the use of natural resources" (Chapple, 2008). The green economy consists of several economic sectors and not only the ability to produce clean energy, but also includes technologies that allow clean production processes. It is contrary to model what is known as the black economy, which is based is based on the use of fossil fuels such as coal, petroleum, natural gas. Also, he believes that the increased negative and dangerous effects of the use of "fossil fuels" from "coal gas oil" to human health and the environment have led to the urgent need to resort to renewable energies and biofuels.

The pollution of water, the pollution of food, and hence the frightening climate change we are witnessing, the erosion of the ozone layer and many other direct and indirect damages. The

production and use of "biofuels" is therefore an essential factor in mitigating the damage caused by the use of fossil fuels. Since 2010, European law and international environmental protection organizations have required all consuming countries for fossil fuels and in any way consumed 5.75% Consumption of those countries and to increase this proportion of the proportion of biofuels consumed to 20% in 2020. (Hidada-, 2017). Many studies define sustainable development as “development that responds to the needs of the present without jeopardizing the ability of future generations to meet their needs”.

This definition implicitly focuses on two pivotal ideas; the idea of needs, especially the basic needs of the most deprived social groups that deserve significant attention; and the idea of the limited capacity of the environment to respond to the current and future needs of humankind, under prevailing patterns of production and consumption and available technologies. The development has three primary dimensions; economic, social and environmental. (Aljazeera, 2015). To reach sustainable developments’ goals, a green economy model should be taking in consideration. This is what Dr. agreed when he said that the green economy. This is what Dr. Majd agreed when he defined the term "green economy" “as a link between economics and the environment” he explained “Green economy is generally defined as a new model of rapid economic development models, based on knowledge of environmental economics, which aims at addressing the interrelationship between human economies and natural ecosystems, and the adverse effect of climate change and global warming”. (Dr. Majd jurally, 2018).

The objectives of this work is to establish the relationship between green economy and sustainable development in the Omani context, also to contribute the literature about the issues of environment and sustainability and provide and offer an in-depth investigation for decision-makers about the status of the green economy and sustainability in Oman. It is necessary to assess and measure the role of the green economy in achieving goals of sustainable benefits for the local economy and to inform the public about the importance of using green economy for the next generations and encouraging individuals to contribute to environmental protection on daily life routine like reducing the use of plastic bags, supporting recycling efforts and purchasing recyclable products. Also, achieving a balanced vision between social justice and environmental future is one of the most important objectives of this work.

1. Green Economy and Sustainable Development.

According to the outcomes of the conference, FUTURE held in the UN in 2012, article 127 was about the Emphasis on encouraging strategies in line with specific conditions and development perspectives by increasing the application of clean energy sources and low emission technologies, and relying more on advanced energy, including fossil fuels. It also encouraged the exchange of practices and policy development as appropriate. (UN, 2012) Countries, including the Arab region, have started to implement the green economy. Also, AlQassar at the conference stated that “The transition to a green economy is of importance to the Arab world and is no longer an option”. It is an economic and environmental imperative to stop the decline in sustainable development in light of the deteriorating environmental conditions facing the Arab economy. As opposed to growing development needs, increased population, water scarcity, food security requirements and job creation needs. The green economy is an essential component of strategic thinking for both public and private sectors. AlQassar said "The environment is the incubator of economic activity and the efficiency of its performance, while the degradation of ecosystems is increasingly depriving the economy of the primary production” (AlQassar, 2015).

1.1 In Omani Context

H.M (Qaboos H. M., 1995) confirms that the “Development is not a goal in itself” but it is to build the human being therefore should not stop at the concept of achieving material wealth and building a diversified economy, but it must go beyond the formation of a citizen who can contribute aptly

and consciously in the process of development and comprehensive construction through the development of his technical and professional abilities, stimulating his creative and scientific energies, refining his diverse skills and directing all this towards serving the country and the happiness of citizens. One of the Sultanate's interest in achieving the goals of sustainable development is the establishment of an annual conference which general objective is to contribute to motivating governments and public administration in the Arab countries to utilize their potentials and capacities to adapt to the requirements of globalization to improve the position of the Arab economies over the next 10 years. (Oman2030, 2019).

Dr. Ali Al Sunedi said Sustainability had been one of the most essential pillars of the future vision and successive five-year plan in the Sultanate of Oman since the early seventies of the last century. (Dr.Ali, 2019) Oman is also an active partner in all international and regional forums and deliberations that resulted in the declaration of the Sustainable Development Goals in September 2015. The Sultanate contributes to the international discussions of document no. (700/69/A), which is entitled ‘The Way to Live with Dignity by 2030, Poverty, changing the lives of society and protecting the planet. Based on broad community consultations, the Supreme Council for Planning of the Sultanate of Oman endorsed the United Nations Sustainable Development Goals 2030 at its third meeting of 2015 on 24 June 2015. It is clear from His Majesty Sultan in his first speech on July 23, 1970, when he said: "I will work as fast as possible to make you live happily” (Qaboos S. , 1970).This shows His Majesty’s strong interest in changing the standard of living, and start a new era of social and economic developments. Developments in all aspects, for the happiness of the Omani people. As green economy is the result of an improved economic situation while reducing environmental risks and scarcity of environmental life, it is kind of organized way to create a society and a clean environment that raises the economic level and pushes the community towards a better life, and maintains the environmental balance from all forms of biodiversity.

All the foundations of the green economy in Sustainable Development have goals to achieve. Those goals are in the interest of transition to a green economy. In Oman there are a number of institutional structures ready to invest towards a green economy, including the Research centers, Sultan Qaboos University, Innovation and Development Center, Business Incubators and the Scientific Research Council. As part of the Sultanate’s efforts to sustain development and move towards diversification of the economy, it has been characterized by pioneering initiatives in the field of environmental action inherent to accelerate economic and social development. To accelerate sustainable development, the United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro, Brazil, in 1992 and the Sultanate has made a significant progress in achieving the Millennium Development Goals,

The 2030 Agenda for Sustainable Development adopted in New York City in September last year included 17 goals, 169 goals and strives to implement this agenda to serve its national goals. (Oman towards green eco At United Nations Summit 2015 officials and economists expressed confidence in the Sultanate's success in transforming the green economy and achieving the goals of the 2030 Sustainable Development Plan. they assure that “The Sultanate of Oman has proved over the past years that it is capable of managing large and important social and economic development issues” (Alnajdawi, 2016).It is one of the countries that is committed to international resolutions, including the implementation of development goals. It was one of the first countries to report on the achievement of these goals. She believes that if the Sultanate of Oman sets out the necessary plans to achieve the goals agreed at the New York Summit, it means setting targets for the transition to a green economy. (Shabiba, 2012).

UNCTAD began to work with the Sultanate of Oman in 2012, the Ministry of Commerce and Industry by establishing the Green Economy Bureau. UNCTAD asserts that Oman has a strong orientation towards sustainable tourism, the waste sector and clean energy as these sectors have a promising future. On this basis, the survey of existing opportunities was conducted (ESCWA, 26-28.September.2017).

The green economy is the development of productive projects on how to optimize the exploitation of natural resources to achieve sustainable development in its three dimensions of economic, social and environmental. The Sultanate is supporting sustainable development and supporting the green economy through a package of laws, legislation and high decrees as well as 12 Ministries in the government and independent institutions. This comes within the framework of launching the project of establishing the Green Economy Support Office within the framework of the ESCWA project by establishing green pilot offices for support in three countries Lebanon and Egypt. The Memorandum of Understanding was also signed between the Economic and Social Commission for Western Asia (ESCWA) and the Sultanate of Oman represented by the Ministry of Commerce and Industry at the General Directorate for the Development of Small and Medium Enterprises. The office representing the United Nations Economic and Social Commission for Western Asia (ESCWA), in cooperation with the Ministry of Trade and Industry, represented by the General Directorate for the Development of Small and Medium Enterprises, will support productive capacities in relation to the green economy. It will also train individuals supervising government projects (ESCWA, 26-28.September.2017).

The study prepared by ESCWA on the green production sectors in the Sultanate and the national policies and programs that support them have many essential facts and information, which pointed out the existence of institutional frameworks that are incubators, organizations and associations working in the field of sustainable development in the Sultanate and the national policies and programs that support them have many essential facts and information, which pointed out the existence of institutional frameworks that are incubators, organizations and associations working in the field of sustainable development in the Sultanate, such as Sultan Qaboos University, Scientific Research Council, Oman Environment Association,

And governmental institutions engaged in sustainable development. Ministry of Agriculture and Fisheries; Ministry of Oil and Gas; Ministry of Regional Municipalities and Water Resources; General Authority for Electricity and Water; Ministry of Social Development; Directorate General of Institutions The General Organization for Industrial Industries, and the Chamber of Commerce and Industry of Oman. So, sustainable development in the Sultanate aims primarily to preserve the resources of the environment and energy resources for future generations. The Sultanate is therefore moving towards finding and exploiting renewable energy sources, encouraging individuals to provide energy by launching various awareness campaigns from various government agencies, competitions in this field, such as the Omani Environment Friendly House Competition, which is prepared and funded by the Scientific Research Council. The Sultanate is also seeking to build solar power plants in Adam and Al-Gharbiya, while studying the possibility of exploiting wind energy (Alsunedi, 2019).

1.2 Oman’s Contribution to the Green Economy

The Environment Society of Oman was established in 2004, aims to increase environmental awareness and capacity building. The most important achievements are in the fields of environmental education, document in collaboration with relevant Ministries and the private sector, awareness of public school children on climate change in cooperation with the Ministry of Education; these are an integral part of Omani history and heritage. Empowerment of women and environmental education in cooperation with the Ministry of Environment and Climate Affairs. The German Technical University of Technology (GUtech) in Oman is also a supporting body with a certificate in urban planning and sustainable tourism. The university has applied for an environmental engineering program to the Ministry of Higher Education; it organizes public lectures on various topics related to Sustainable development and green economy. (Oman portal, 2017)

In 2008, the Electricity Regulatory Authority supervised a comprehensive study of renewable energy in the Sultanate in cooperation with a specialized international consultant. The study pointed out that the level of solar and wind energy density in the Sultanate is among the highest in

the world and is expected to have renewable energy in Oman to provide all local electricity needs in addition to export the surplus. This study recommends the need for early implementation of small-scale renewable energy pilot projects initially in rural areas to ensure the performance and effectiveness of renewable energy technologies in local climates. The first project was signed by the Rural Areas Electricity Company and the implementing company in late 2013.

Diem has supervised projects and studies aimed at establishing a reliable and informed base to be an essential and vital reference for setting the general framework for a sustainable and comprehensive policy for the promotion of renewable energy projects in the Sultanate. The development plan is to achieve long-term and sustainable utilization of renewable energy sources available in the Sultanate. The Sultanate represented by Diam officially joined the International Renewable Energy Agency (IRENA) in June 2009. This enabled the company to take part in the meetings of the Committee on Renewable Energy Policies as an observer member and the fruit of the meeting was to open the door for cooperation with the International Renewable Energy Agency and other countries represented by their governments. Diam was able to prepare a study (Readiness of the Sultanate for Renewable Energy), in cooperation with the Agency and a local consultant from Sultan Qaboos University. The study ended in October 2014 with a number of recommendations and proposals, the most important of which was the assessment of solar and wind energy. (Daim, 2019)

Sultan Qaboos University is also seeking to improve its Tertiary Education at the university level. It is responsible for carrying out research on several aspects of sustainable development, offering undergraduate and postgraduate programs in sustainable development, the university a conference on the green economy in 2012 in cooperation with the Ministry of Environment and Climate Affairs. It also organizes workshops aimed at school students on sustainable agriculture.

In line with the world's interest in energy efficiency and renewable energy, Diam is a local Electricity Company in cooperation with the Japan International Cooperation Agency (JICA), have appointed a team of Japanese experts from Tokyo Electric Power Company (TEPCO) to undertake a project to develop a master plan for energy conservation. Electricity Company aims to develop the necessary proposals in the field of energy efficiency and a master plan for energy conservation and rationalization of electricity consumption until 2035 in order to improve energy efficiency in terms of demand and increase the added value of both electricity and energy at the overall economic level of the country. The study was completed in March 2013. In the same year, 2013, Diam developed a guiding framework for a sustainable renewable energy plan in the Sultanate, which includes two principal axes; a short-to-medium-term plan based on the feasibility of exploiting rooftop photo-voltaic technology and a long-term plan based mainly on the development of a comprehensive national energy strategy.

The Sultanate of Oman places great importance on the issues of sustainable development in order to promote human beings, improve their livelihoods, support international efforts to protect the environment, preserve their natural resources, meet the challenges of climate change and their commitment to the principles and objectives of sustainable development. The Sultanate is working to implement its development plans, taking into consideration environmental safety, economic growth and social justice for all segments of society. The Sultanate signed the United Nations Convention on Climate Change in 1992 and ratified it by Royal Decree No. 94/119 and ratified the Kyoto Protocol to the Convention by Royal Decree No. 2004/107. There was an urgent need for Sultanate to join other bodies' efforts to protect the Earth from climate change. The Ministry in collaboration with UNDP, implemented the Capacity Building Project on Climate Change to prepare and published the report of the Sultanate's first national communication on climate change, which was formally adopted and sent to the Secretariat of the Framework Convention on Climate Change in October 2013.

The Sultanate also ratified the Vienna Convention for the Protection of the Layer Ozone and the Montreal Protocol on Substances that Deplete the Ozone Layer and their amendments in London

and Copenhagen. The Sultanate's efforts were successful, as the consumption of ozone-depleting substances fell to zero or below the levels set by the Montreal Protocol. (Omanportal, 2017). The Sultanate has adopted a balanced development path based on the principle of harmonizing the requirements of development in all fields, the need to protect the environment from all forms of pollution, preserve the vocabulary of nature and conserve natural resources in order to achieve sustainable development in accordance with international efforts based on the principles of sustainable development and adherence to all relevant international and regional conventions.

The Sultanate also enacted legislation and laws aimed at protecting the environment, combating pollution, managing natural reserves, conserving wildlife, minimizing the effects of climate change. Introducing environmental considerations and requirements in all production and service projects and applying legal rules that prevent the impact of development and industrial projects on ecosystems, community and the use of renewable energy applications and environmentally friendly production techniques. The Sultanate has emphasized on more than one occasion the importance of working to address many vital environmental and sustainable development issues in the light of the UNDP Human Development Report 2011 and the need for urgent measures to slow climate change and prevent further environmental degradation and to create. The best ways to help millions of people around the world address the challenges of poverty and hunger and stop practices that threaten the planet's climate and its consequences for the global environment and its biological resources. (MECA, 2012).

2 Measure and assess progress towards a green economy

Methodology is (ESCWA annual report 2011 2012) based on the approach which is more environmentally friendly according to national conditions such as environmental assessment, resource conservation, pollution control, creation of a number of jobs and revenues, employee's share of middle income, economic well-being, income distribution, etc. It allows measuring the performance. The three types of indicators which were suggested in the statement of the twenty-sixth session of the Governing Council / Global Ministerial Environment Forum - the Governing Council of the United Nations Environment Program (UNEP), indicators for measuring the green economy:

a) Economic indicators: such as the share of sectoral or aggregate investments that contribute to the efficient use of resources and energy or to reduce waste or pollution, as well as the share of sectoral or aggregate output or employment that meet the criteria for sustainability.

b) Environmental indicators related to economic activity: such as resource efficiency or pollution intensity, either at the sectoral or macroeconomic level. These indicators can be expressed, for example, by the amount of energy or water used to produce a particular unit of GDP.

c) Aggregate indicators on the path of progress and social welfare: eg macroeconomic aggregates reflecting the consumption of natural capital, including those proposed in the frameworks of environmental and economic accounting or proposed within the so-called (GDP) initiative that could reflect the dimension Health and various other dimensions and social welfare. (UNEP 2011).

This study used some primary data through websites, literature reviews and previous researches. Also, secondary data was the essential part at this study through linking and analyzing the (WDI), World Development Indicators which shows various indicators in Oman since 1960 until 2018, some of data was gained through visitsed and met concerned specialist some private and public sectors.

2.1 Indicators (WDI)

2.1.1 Emissions.

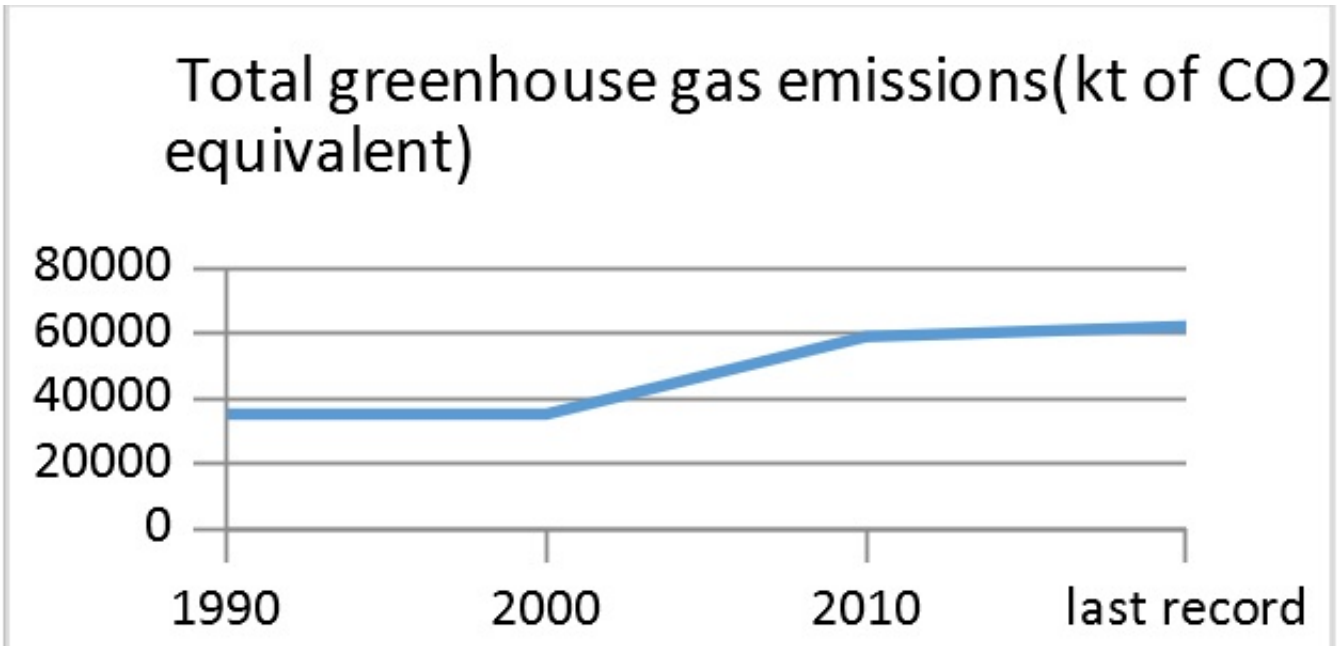

Figure 1. *Total greenhouse gas emissions- source WDI.*

The Greenhouse gas emissions in Oman in 1990 and 2000 was around 35356kt, but it has raised to 59041kt in 2010 and remain continued raised in2012. This means the emissions from 1990 until 2012 were rising in Oman. Also, the PM2.5 Air pollution has been raised as it is shown in the below graph:

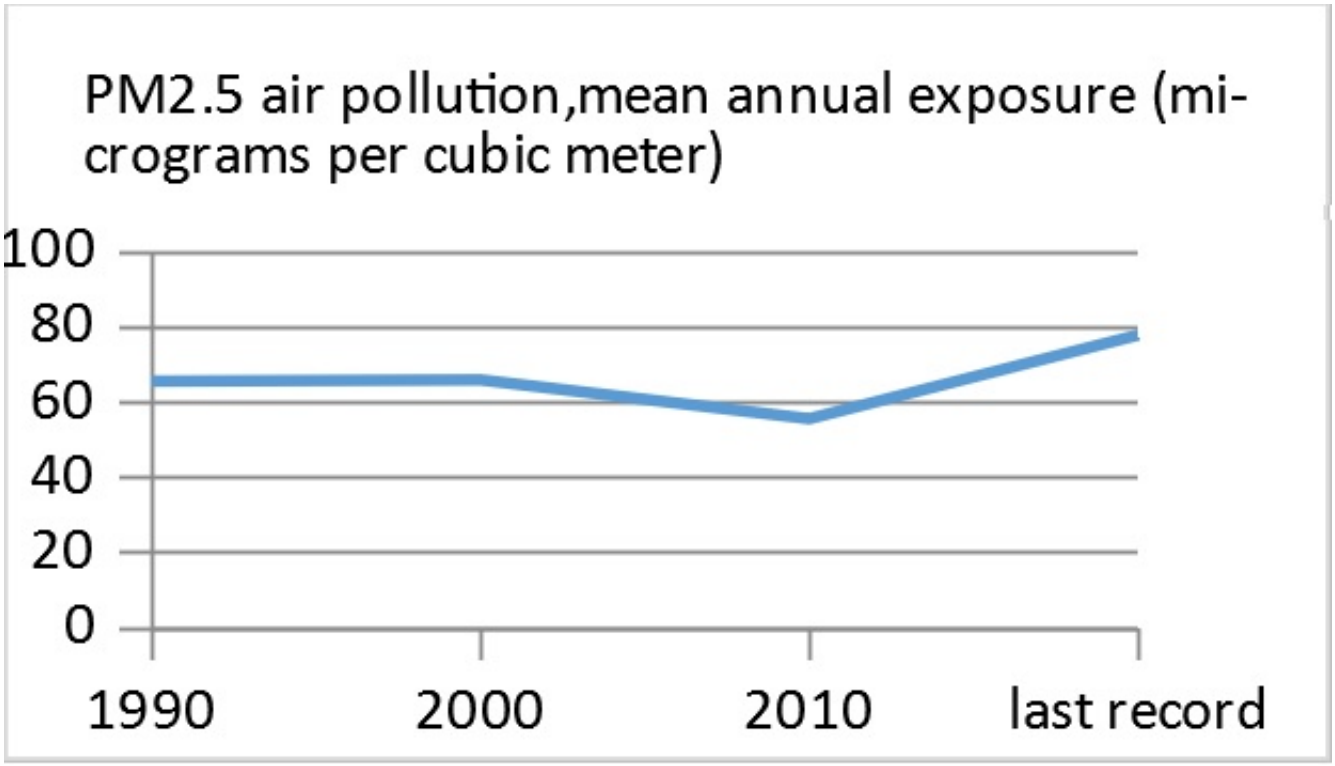

Figure 2. *PM2.5 air pollution- source WDI.*

Air pollution in 1990 was 65.7 micrograms per cubic meter; it has risen slightly to 66 micrograms per cubic meter in 2000, and again falls in 2010 to 55 micrograms per cubic meter then to raise the

gain in 2016 to 77.96 micrograms per cubic meter. This shows that Oman has air pollution. Also, carbon emissions from different fields (transport and other sectors).

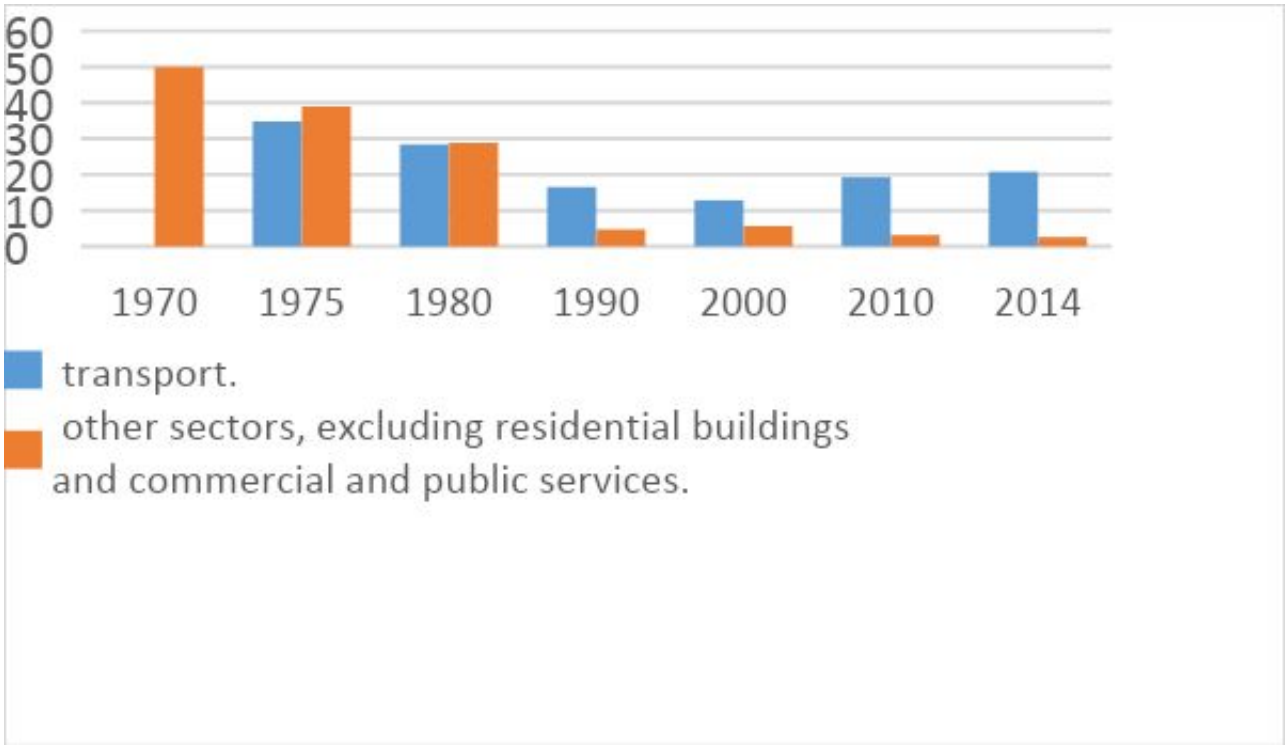

Figure 3. *CO^2 emissions- source WDI*

CO^2 emissions from transport in 1975 amounted to 34.7 percent of the total and began to decline in the following years until it reached its maximum decline in 2000 by 12.8 percent, but began to rise in 2010 reached 19.2 percent In 2014 it rose slightly to 20 percent. percent, while CO2 emissions from other sectors in 1790 reached 50 percent and in 1975 it dropped to 38.8 percent and then began to decline dramatically until it reached in 2014 to 2.5percent.

Also, emissions from manufacturing industries and constructions, from electricity and heat production and from residential buildings and commercial and public services in Oman shows the following rates:

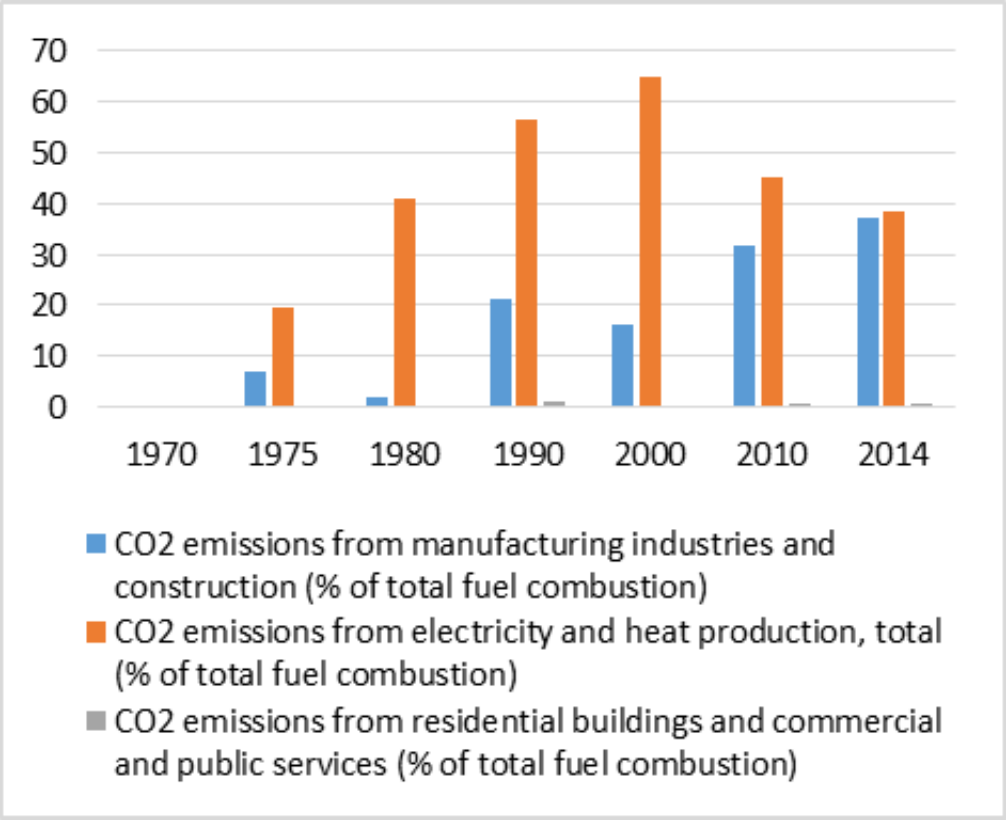

Figure 4. *CO^2 emission- source WDI*

It is clear that carbon from manufacturing and construction decreased from 1975 to 6.9 percent to 2.6percent in 1980, but increased significantly in 1990 to 21.2percent and slightly decreased in 2000 and reached 16.1 percent to rise again in 2010 to 31.6 percent and continued to rise until it reached in 2014 to 37.3 percent. On the other hand, the carbon produced by the production of electricity and heat recorded 19.4 percent in 1975 and rose rapidly in 1980 to reach 40.8 percent and reached a peak in 2000 at 65 percent but began to decline gradually until 2010 reached 45.3 percent Finally 38.5 percent in 2014. CO2 emissions from residential buildings, commercial and public services are minimal, with no effect from 1970 to 1982, gradually began to emerge from 1983 and was 1 percent but decreased in 1990 to .98 percent and continued to decline until it reached In 2000 it rose slightly to 2.0 percent in 2000 and reached .75 percent in 2014.

2.1.2 Fossil fuel.

Electricity production from Oil, natural gas and coal sources, the researcher analyzed it to know the quantity and type of energy sources in electricity production

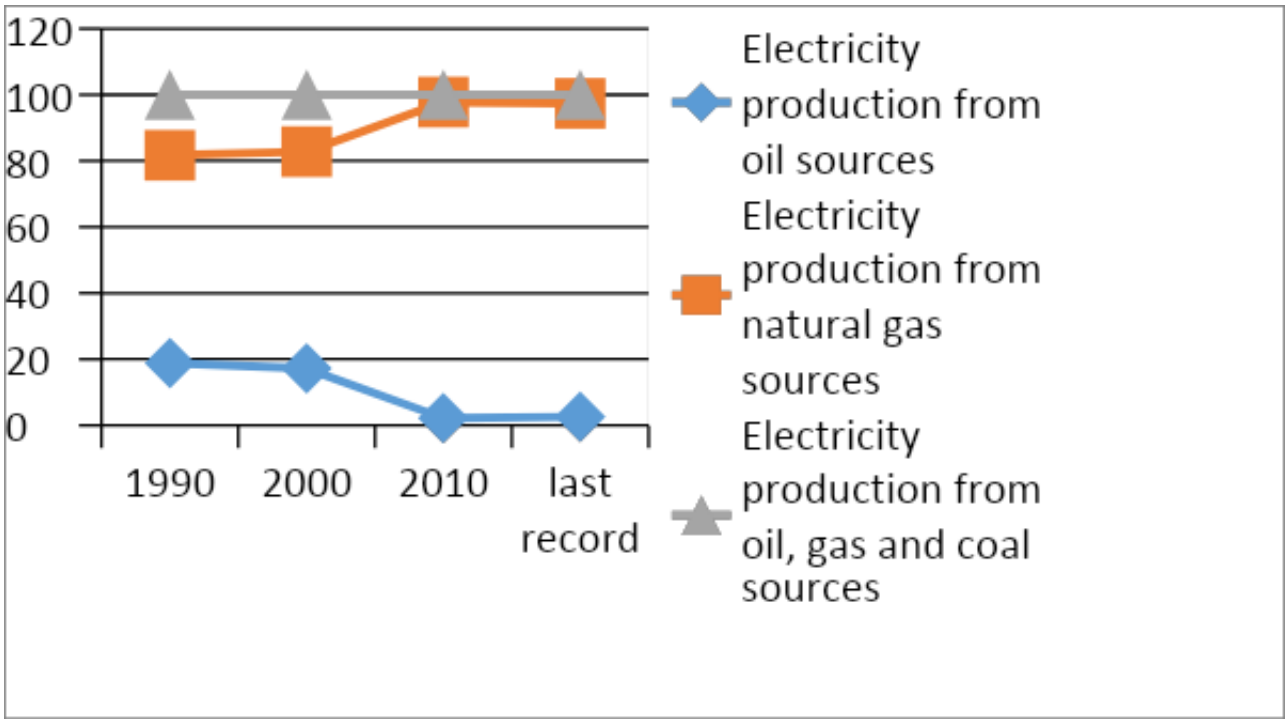

Figure 5. *Electricity production in Oman from oil, gas and coal – source WDI.*

Electricity production in Oman from oil source in 1990 was 18 percent and in 2000, it fell slightly to 17 percent and continued to decline until 2010 to 2.3 percent, but rose slightly in its last record in 2015 to 2.6 percent. But electricity production from natural gas resources in 1990 was 81 percent then slightly rise to 82 percent in 2000, but it increased significantly in 2010 to 97.8 and 97.3 in 2015. Therefore, the electricity production from oil, gas and coal sources of the Sultanate from which means that the Sultanate depends on oil, gas and coal in the production of electricity from 1990 until 2015. So, Oman is not using renewable energy for electricity production, the below graph confirms this fact.

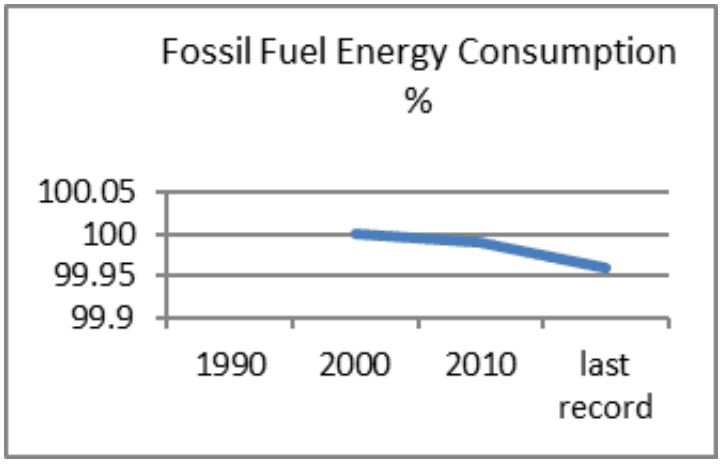

Figure 6. *Fossil Fuel Energy Consumption- source WDI.*

From the figure, it is clear that the level of Oman's consumption of fossil fuel energy from 2000 to 2014 at the level of Oman is high, Oman entirely depends on fossil fuel energy.

2.1.3 Social well-being.

To evaluate social well-being the researcher collects data from WDI to measure the status of the internal community GDP and GNI are both assess the situation. Graph seven states that the GDP per capita and GNI per capita peaked in 2010 but started declining in 2017 to less than in 6035

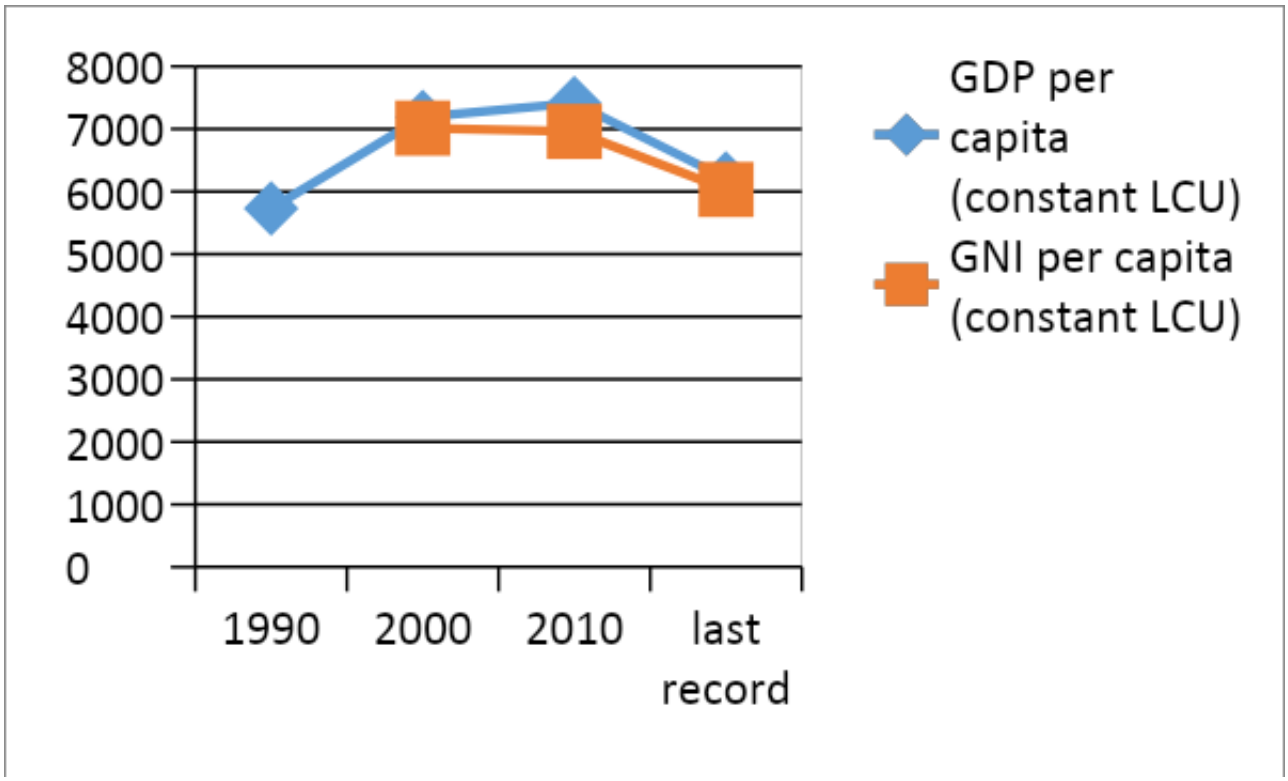

Figure 7. *CNI per capita- source WDI.*

While Graph eight shows that GDP per capita growth and GNI per capita growth decreased after 2010 to -4.8 and -5.2 in 2017.

This means that Oman is facing a challenge in social well-being as it decreased dramatically in recent years.

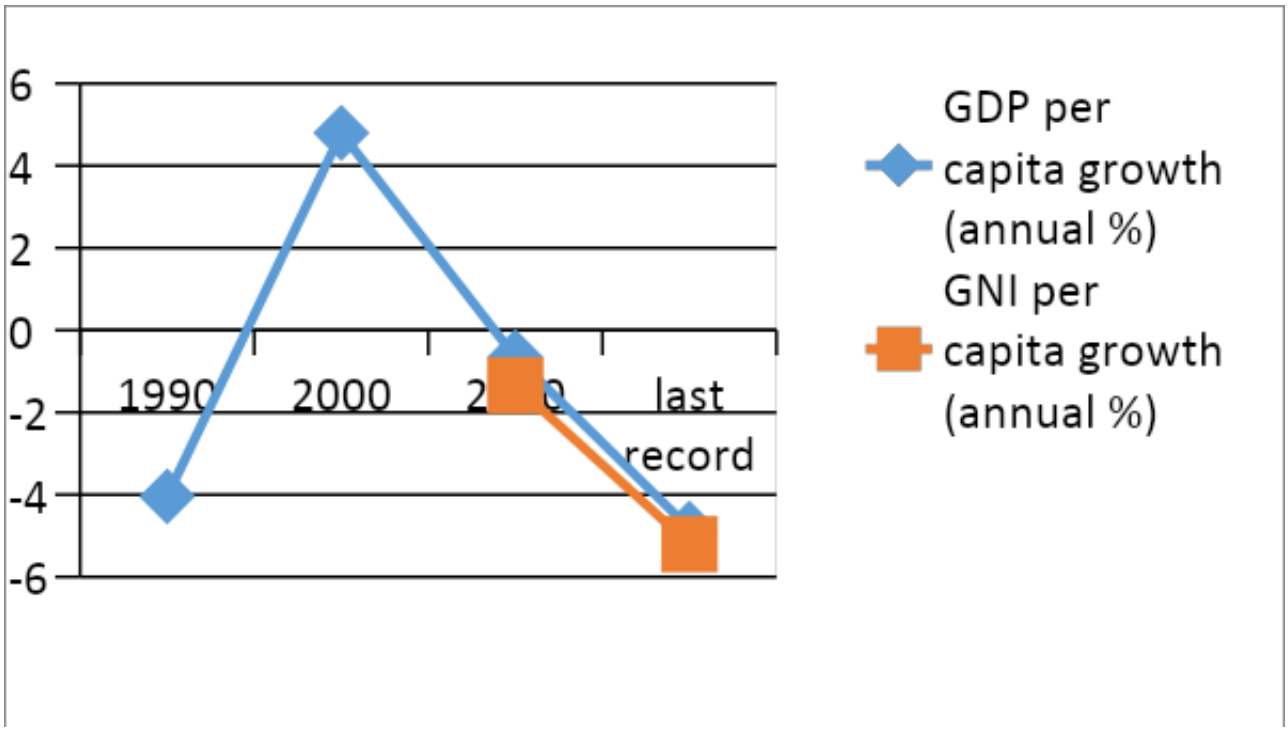

Figure 8. *GNI per capita growth- source WDI.*

According to the latest record in the world indicators in the Sultanate's consumption of fossil fuel energy, it confirms a high dependence on it, which reached 99.96 in 2014. Also, the Sultanate depends on oil, gas and coal in the production of electricity from 1990 until 2015. Furthermore, the emissions are very high and the air pollutions reached (77.9621781 micrograms per cubic meter) in 2016. Also, low GDP and GNI ratio until the latest estimations of world development indicators. This is a significant sign that Oman is still not growing green.

2.2 Meetings

Interview questions were designed; the questions around the status of green economy and sustainable development in Oman. The nature of questions were:

- What are the steps and initiatives of the Organization towards green growth?
- To what extent are the developed policies complies with the transformation of the economy?
- How can renewable energy be used as an alternative to natural energy sources?
- What mechanisms the organization will adopt towards the reduction of carbon and global warming?

Oman Botanic Garden, The Million-Palm project and Be’ah Co.

2.2.1 Oman Botanic Garden

The Director of Scientific departments believes that the most important is environmental education with regards to respect for nature and fostering the understanding of the fragility of our nature. Only if the environment is conserved through green growth, also the future generations will have a healthy environment to live in.OBG will also create jobs (and already have created positions for about 80 staff), all related to the environment. OBG will also reuse a lot of the horticultural

materials and are increasingly replacing peat moss with coco peat. In future, the plant waste material will be composted to create our own soil. The solar voltaic is up and running for about 3 years. For control of pests and diseases OBG using biological controls as much as possible. In future, the water use will be minimized and recycled as much as possible.

The Director said regarding developed policies towards green economy that OBG did not receive any guidelines or incentives or another document to guide any policies regarding transformation. About the renewable energy used in OBG, the Director said OBG already has the largest solar voltaic farm in the country. For about 4 years, large parts of the garden get their energy from photovoltaics. This will in future be more than doubled. It should be included as legislation in the country that every new building must have solar panels.

OBG is designed and built to achieve LEED (Leadership in Energy and Environmental Design) accreditation. This is a certificate of the American Green Building Council. It does affect design, construction and operation. AS OBG will be built as environmentally friendly as possible, its energy footprint is relatively low. It is clear that the OBG is implementing the trend of Green economy internally but they need to support this by providing them more policies towards shifting to the green economy.

2.2.2 Be’ah Company

The answers were collected verbally by meeting with some of the company's staff. Executive of Sustainable development said that Be’ah has contributed to reducing carbon emissions by about 430,000 tons each year and has contributed to preventing carbon dioxide emissions by about 24% of its international commitment. Prior to 2012, there were more than 300 open landfills and incinerators open to incineration and emitting harmful gases due to waste combustion. Bee'ah relies on minimizing the use of non-recyclable materials such as plastics where employees use glass bottles and recycled paper. This is because an environment that believes that these materials are very harmful to the environment and humans and that burning them for disposal causes emission of methane, which is more dangerous than carbon.

The company's initiatives have contributed to reducing the mortality rate due to cancer injuries due to greenhouse gas emissions due to the presence of open landfills in Sharqiya and Buraimi and then burning and emission of gases. Regarding policies, the staff think that it is necessary for the decision-makers to be more flexible so that all proposals, initiatives and ideas will develop the country in the green progress to be taken into consideration. Many proposals in this regard have been raised and ignored. It is interesting to know that Be’ah seeks to minimize the use of non-renewable resources because of environmental and human damage.

There are many initiatives such as encouraging the use of eco-friendly bags, recycled papers and the use of sun and wind energy to generate energy. Regarding mechanisms to reduce CO2, Be’ah had implemented the idea of laying a pipe to absorb methane, which is more dangerous than carbon gas, from landfills after incineration and then disposes of the gas in an environmentally safe. The company's initiatives are comprehensive and all are moving towards the green economy. With the company's reduction in the proportion of gases emitted and thus contributed to reducing deaths from cancers, this confirmed by previous graph showing the death rate in the Sultanate from cancer. The company has spread the culture of using renewable energy, but what is lacking in this area is the awareness of decision-makers need to adopt proposals that contribute more to the preservation of the environment.

2.2.3 Million-Palm project

The answers were collected from this government institution by meeting with the engineers of agriculture. They said that the main objective of the project is to achieve food, environmental, economic and social security. Eleven farms have been established and distributed over six

governorates in the Sultanate. The smallest farm contains ten thousand palm trees, while the largest organic farm contains one hundred thousand palm trees. It is worth mentioning that the project has achieved six Sustainable Development Goals (SDGs 2, 8, 9, 12, 15 and 17). The financial cost of palm plantations compared to their returns, they cost only a negligible amount.

Also, they think that the laws and regulations that have been significantly enacted encourage green growth. For the irrigation of the palm, the project relies on triple treated wastewater as the palm works to filter the water to be completely free of heavy metals. The project employed artificial intelligence in propagation operations through self-propelled aircraft.

Regarding the mechanisms to reduce CO2 they said the palm trees are an excellent choice for reduction CO2.

That this project may actually contribute to reducing carbon because by planting one million Palms around the Sultanate, it will be the lung that purifies the air. Moreover, the cultivation of the Palm does not cost a lot, in addition to its viability in a very hot climate.

This means that, once the planting of one million palms is completed in the next few years, the Sultanate will be able to reduce a sizeable CO2 emission.

3. Results.

The main results of this study proved that the relationship of sustainable development with the green economy is very strong. When adopting the green economy approach, sustainable development objectives such as health, quality education, poverty eradication and environmental and climate protection will be achieved. What is clear from the study is that the Sultanate is taking a very slow pace towards green growth. The results of this study confirm that the Sultanate is still highly dependent on non-renewable resources for energy generation, dependence on unclean resources causes greenhouse gas emissions and severe air pollution and thus harm the environment, human and next generations. There are success steps for the Sultanate in terms of establishing a green economy relationship. The establishment of offices to supervise the implementation of the green economy and the use of solar energy in some government agencies. The Sultanate has the potential to succeed if it raises efforts and enact laws more broadly in the field of green growth.

Studies have also shown that the Sultanate can follow the green economy model with great success because the Sultanate of Oman has all the necessary factors to achieve it, as stated by experts and consultants in ESCWA. The Sultanate will achieve significant results if it continues to grow green over the next few years, according to ESCWA economists, the potentials that the Sultanate possesses are huge.

Oman is still in the process of transitioning to a green economy. Much remains to be done in line with the Sustainable Development Plan and the Sultanate's Vision 2040. Looking back at previous studies, it is possible that the Sultanate will transform its traditional economy into a green economy.

The green economy step does not cause any environmental, social or health losses or damages. The Sultanate is striving to achieve green growth, as it is evident from the foregoing many green practices in the government and private sectors, the policies put in place by the Sultanate are consistent with and encouraging the green transformation, but it is clear that it should educate the people more in this aspect.

4. Oman towards green.

Oman has developed plans, projects and initiatives aimed at improving environmental conditions, reducing energy consumption by 30% in 2030 and achieving a vision

According to a global environmental study, cement plants around the world are the second leading cause of death in lung cancer after smoking. The researcher recommend to start using Portland cement as it is of great importance in preserving the environment, reducing carbon dioxide emissions harmful to health and the environment, improving concrete properties and prolonging the life of concrete buildings, and in achieving green building conditions. The study proved the benefit of using this type of cement like Increases the life of concrete elements / structures, reduces the amount of carbon dioxide emissions by 80%, resulting in the use of environmentally friendly green concrete, reduces the cracking rate of concrete during hydrogenation (in the first hours of pouring), reduces moisture and water permeability in concrete and thus reduces the possibility of reinforcing steel rust, improves the degree of thermal insulation of concrete, improved fire resistance and maintains the durability of concrete to compress as effectively as Portland cement.

For the community, it is essential to educate the community on the importance of shifting towards a green economy model for future generations by encouraging individuals to contribute to environmental protection on a daily basis such as; reducing the use of plastic bags, supporting recycling efforts and buying recyclable products. It is vital to encourage the community to be part of the green building community and move beyond the laws towards a green future.

As part of the education process, it is essential that the competent authorities in the Sultanate of Oman publish books to educate people about the importance of green buildings. Establishing electronic programs through Omani telecom companies by setting up a primary educational portal to be the home page for all Internet users in the Sultanate of Oman will also add evaluable significant to spread the knowledge.

Producing cartoon films for children and create a hero in the cartoon film who encourages the children to do the green practices, the hero should be in a new and attractive form for children so that the loyalty of environment and belongs to the environment will grow in the community.

Producing scientific material through the Ministry of Education, entitled (The Green Oman) teaches the student about the importance of green practices and encourages innovations that help in the transition towards a green economy. On the other hand, some mechanisms and laws should settled by authorizations that can adopt to reduce emissions and preserve the environment such as:

- Issuing laws and conditions for commercial establishments and institutions for construction so that the construction is using Portland cement to preserve the environment so this will reduce 50% of carbon emissions and reduce serious diseases.
- Issuing laws that force large enterprises in the Sultanate of Oman to use solar panels in order to use solar energy as an alternative to electricity.
- Strict fine of those who harm the environment in any way such as burning waste or disposal of chemicals in the house in the wrong way and communication regarding the disposal of harmful chemical waste with Be'ah Company.
- Encouraging afforestation in homes and gardens by planting Palm trees that needs a little water to use for irrigation.
- Using Mulch technique to maintain irrigation water under high temperatures.
- To encourage the community towards a green economy, it is better to hold an annual national competition for all citizens on (the best innovation that preserves the environment

in any way or helps reduce emissions) the winner will award by adopting the idea of the winner and supporting him/her.

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References

Aljazeera. (2015). Retrieved from https://www.aljazeera.net/encyclopedia/conceptsandterminology/2015/11/30/

Alnajdawi, R. (2016, 2 28). *Official and Economists:Oman has the potential for success to move towards a green economy and achieve the objectives of the UN plan for sustainable development*. Retrieved from https://alroya.om/post/156778

ALO. (Nov.2018). National Symposium for the transition towards a green economy in the Arab countries. Sudan, bortsudan.

AlQassar. (2015). Green Economy Forum. *National Media Agency*.

Alsunedi, D. (2019, 7). *Media Portal.*

Chapple, K. (2008). Innovation in the green economy: an extension of the regional innovation system model? *SAGE , 25*(1).

Daim. (2019). Renewable sources in Oman. *Public Authority for Water*.

Dr. Magd juratly, P. o. (2018, September). Study and Implementation of agriculturaland environmental projects. *Green Study*.

Dr.Ali. (2019). First voluntary national review of the Sultanate of Oman 2019-High level political forum. *NCASDG*, 8.

ESCWA annual report 2011. (2012). *UNESCWA*, 52. Retrieved from https://www.unescwa.org/ar/publications/

ESCWA, A. F.-I. (26-28.September.2017). Arab Climate Change Assessment report-Main report., (p. 36). Beirut, Lebanon.

Hidada-, D. (2017). *Green Economy in the Arab World, Foundation stone for the acheivement of*

Sustainable development.

MECA, M. o. (2012, 6). The Sultanate stressed the importance of working to tackle many vital issues related to the environment and sustainable development in Rio+20 conferance. *AlShabiba*, 23.

Oman towards green economy. (2016, 2). *Shabiba*(https://www.shabiba.com/article/128841).

Oman2030. (2019). *the 18th annual conferances-roles of governments in achieving the goals of sustainable development 2030*. Retrieved from https://www.arado.org/conference2018/ar/the-main-objective/

Omanportal. (2017). *Oman policies and strategies*. Retrieved from https://omanportal.gov.om/wps/portal/index/gov/environment/strategiesandPolicies/!ut/p/a1/hc9ND4IwDAbg3-KBo6zbENEbhgCisBgUcRcDBicJMoMo8d-LRg8aP3pr87xNiziKES-Tcy6SOpdlUtx6rq_ZDOvYZTBhwQKD6cJ8xkY2CQPSglUL4EuZ8C-_RPyVGEbQEkxGmk8jovnaA1BwANhg7GthhIF4ttUzwj5xm

Qaboos, H. M. (1995). Oman Future Economy Conference. *Oman2020*.

Qaboos, S. (1970, 7 23).

Shabiba, A. (2012). *The minister of MECA speech in the Rio+20 de Janeiro Conference*. Retrieved from https://www.shabiba.com/article/4734

UN. (2012). Retrieved from Sustainable development: https://sustainabledevelopment.un.org/futurewewant.html

UNEP. (2011). Twenty-sixth session of the Governing Council / Global Ministerial Environment Forum. *Governing Council of the United Nations Environment Program*, 8.