

## Economic Prospects of Renewable Energy (Solar System, Winds Energy)in Palestine

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### [Abstract]

[Energy is an important part of human life due to its different uses in daily life especially at homes, offices, companies, transportation, communications, and technology, no one can live without energy, but the sources of producing energy are different, the electricity is an important source of energy but the cost of electricity is very high in Palestine, and all of Palestinians depend 100 percent on Israeli side in their need of electricity. In this paper we will discuss the importance of using the renewable energy(Solar System, Winds Energy)in Palestine due to high costs of electricity by establishing a central stations of renewable energy in different main regions of Palestine to achieve energy-security, in addition to discuss the methodology and main challenges of using the renewable energy in Palestine].

**Keywords:**Technology, Solar System, Winds Energy, Transportation.

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### The Importance of Renewable Energy for Palestine

The importance of renewable energy (Solar System, Winds Energy)<sup>1</sup>for Palestine stems from the diversified geography of Palestine for renewable energy, (high mountains , lowest point in the World, hills and valleys ) in addition to the significant climate of Palestine, cold in winter and hot in summer<sup>2</sup>, so there is a good opportunity to mix between these resources of renewable resources during the year, we can use winds energy in the winter and autumn and solar system in the summer and spring. Definitely the high prices of electricity is the main reason to move for using these resources of renewable energy, because the Palestinians depend on Israeli side to get their need from the electricity which has a negative impacts on the economic sides for Palestinians who rely on their life on agriculture sector and some traditional industries, and tourism sector, so the importance to move to renewable resources would have a good economic impacts on the Palestinian economy, moreover all of these renewable resources would have a sustainability and they are renewable not as the oil, gas , and petrol<sup>3</sup>, so the use the renewable energy in Palestine has many benefits and advantages for Palestinian as the following :

- Economic benefits<sup>4</sup> : Palestinian people will depends on themselves in producing the their need of electricity and the costs of electricity will be decreased and it will achieve more saving for them, and the local government will collect income taxes and other payment from the owners of renewable energy project, which would be reflected on improving the public services in rural areas, sothe renewable energy would keep money in the local economy and production of electricity would decline the need on importing the natural gas and coal from other places .
- Creating new job opportunities for the Palestinians and increase the individual income: renewable energy will offer many job opportunities, and it will support jobs in different areas, building the energy stations,manufacturing and sales, operation and maintenance, turbine installation, and other projects related to developing this sector, transportation, financial sector, consulting services and logistics, transportation<sup>5</sup>.

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<sup>1</sup> Rinkesh, 2009,' Whats in renewable energy', access on the link <https://www.conserve-energy-future.com/advantages-and-disadvantages-of-renewable-energy.php>

<sup>2</sup> Emily Manthie,'Summer and Winter in Palestine ', USA today, access on the link <http://traveltips.usatoday.com/summer-winter-palestine-104225.html>

<sup>3</sup> Moll Eric , 2016,'Importance of Renewable Resources of Energy',SFGATE, access on the link <http://homeguides.sfgate.com/importance-renewable-resources-energy-79690.html>

<sup>4</sup> Union of concerned scientists ,science for healthy planet and safer world ,'benefits of renewable energy use ', access on the link <http://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power#.Wh08dbanEdV>

<sup>5</sup> Dawson Jack, December 2015,'The Different Uses of Energy in our Daily lives' access on the link , <http://www.renewableenergyworld.com/ugc/articles/2015/12/the-different-uses-of-energy-in-our-daily-lives.html>

- It will help in combat of climate change and warming globe caused by fossil fuel usage: producing electricity with non renewable resources contributes in global warming emissions, and drive up the planet's temperature which would have a harmful impact on the our climate and environment<sup>6</sup>.
- Protecting the environment by decreasing the pollution level and improving the public health<sup>7</sup>: producing electricity from renewable energy rather than fossil fuel would improve the public health, and it will decrease the level of water pollution and air pollution which is occurred from coal and natural gas plants that is linked to breathing problems and heart attack, cancer.
- Reducing the costs<sup>8</sup> of electricity and keeping energy prices stable<sup>9</sup>: renewable energy and producing the electricity from the renewable resources, solar system and winds would have a stable level in the future, so the cost the renewable energy will be decreased more in the future as market mature and as companies will utilized from the economies of scale, the renewable energy requires upfront investment to build and once they built it will be operated at very low cost and the prices of the renewable energy will be stable over time, in contrast the prices of the fossil fuel are confronting substantial price fluctuation due to the global demand and supply of coal and oil prices in the world.
- Cornerstone for developing other industries<sup>10</sup> and other sectors like transportation sector and mechanical machines by providing them with the required energy from renewable sources (solar system, winds turbines), the cost of electricity in the factories and industrial sector is very high due to the fluctuation and prices swings of fossil fuel that is used in the central stations of these industrial countries which is affected the cost of electricity in the big companies.
- Sustainable sources of energy: renewable energy (solar system, wind energy) are more sustainable than nuclear power, coal and natural gas.

#### **Innovation Policy 'Establishing Four Stations of Renewable Energy in Palestine and Enhancing the Cooperation with Developed Countries in this Sector**

Palestine is a newly established state and it must utilize from the accumulated practice experience from many other countries around the world to achieve its goals in energy sector and achieve energy adequacy for Palestinians in different countries, it could cooperate with international NGO'S and many other foreign organizations who are working in the Palestinian territories to exchange the experience and utilize from different donors to establish a good infrastructure for renewable energy (solar system, winds turbines), and the most important thing is to develop the strategies and plans and laws to deals with sustainable energy to achieve our goals.

So how the government will establish the stations of renewable energy, mainly we have four main geographical areas that fit our innovative idea in Palestine:

- Solar system station of Northern area of Palestine: consists of (Tulkarem, Jenin, Qalqilia) cities, where as hot weather in summer and sunny in spring and autumn, and rainy in winter, in this area we propose to establish a central station of solar system which is more proper for this area, this station will provide homes with the required mirror and raw materials, and maintenance services and each home will produce its required need of energy by itself<sup>11</sup>.
- Winds energy station of middle area of Palestine: this station will be established on high mountains of Nablus, Ramallah, Jerusalem and Hebron cities, in these cities of Palestine high mountains will support us to establish a central station for producing energy from the blowing of winds and converting it to electricity by using the required turbines.
- Solar system station of the Southern side of Palestine (Gaza strip): this station will cover the (Gaza strip) area where the weather is warming all the year, this station of solar system will provide the required electricity for all the homes by providing them with the required mirrors on their roofs and providing them with

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<sup>6</sup> Halliburton, K. Allen, September 2016, 'Importance of Renewable energy', THE SAVE THE EARTH the people's Co-operative, Access on the link, <https://savetheearth.coop/blog/importance-renewable-energy/>

<sup>7</sup> Union of Concerned Scientists science for healthy planet and safer world, April 2013, access on the link, <http://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power#.Whbg07anEdU>

<sup>8</sup> Rinkesh, 2009, 'WHAT IS NUCLEAR ENERGY', access on the link [https://www.conserve-energy-future.com/disadvantages\\_nuclearenergy.php](https://www.conserve-energy-future.com/disadvantages_nuclearenergy.php)

<sup>9</sup> PALESTINE Beginning out of the best Palestine magazine; July 2017, 'utilizing solar energy technology in Palestine' access on the link <http://thisweekinpalestine.com/utilizing-solar-energy-technology-palestine/>

<sup>10</sup> Philiber Cédric, May 2015, 'Three Reasons Why Renewable Energy Is So Important To The Power Industry', World Conversion, access on the link, <https://www.gepowerconversion.com/inspire/three-reasons-why-renewable-energy-so-important-power-industry>

<sup>11</sup> Palestinian Energy & Environment Research Center, Engineering Association – Jerusalem Center, June 2007, access on the link <http://www.cres.gr/solarbuild/pdf/Solar%20build-Market%20Analysis%20palestine%2002%2007%2007.pdf>

the required maintenance<sup>12</sup>, and required services during the year, there is also a good chance to use the energy of water<sup>13</sup> due to location of Gaza strip on the Mediterranean which will utilize in building artificial dams to produce electricity.

- Solar system station of Jordan Valley: this station covers Jericho city and Al-chore area, and absolutely it would be the strongest solar system station due to the significant geographical area of Jericho, and considered as the lowest point in the World whereas the weather is warming during all the year.

The government of Palestine will establish the clean energy stations in different areas in cooperation with the local organizations<sup>14</sup> which are :

- I. Palestinian Engineering Associations.
- II. Energy Research Center of An-najah University.
- III. Hebron University- Renewable Energy Unit.
- IV. Palestinian Economic Research Center.

The Palestinian electricity council (PERC), and Palestinian energy authority(PEA)as a regulatory authority will manage the process of establishing these stations in cooperationwith different stakeholders :

- Investors or donors .
- Palestinian people .
- Big commercial companies.

The government as main actor of this significant movement by its representative Palestinian energy authority who will work on:

- Issuing the rules and regulations for the investors and companies who will invest in this sector
- Determining the responsibilities and duties of municipalities and village council and how they to deal with energy company
- Facilitate the process of importing the raw materials from other countries .
- Developing the research centres in renewable energy in cooperation with local universities and conducting researches and searching for all energy sources .
- Signing cooperative agreements with developed countries to develop this sector, and contributes in capacity-building programmes for Palestinian specialists in cooperation with local universities and local donors.
- Shaping the institutional framework ,policy formulation <sup>15</sup>, system development, transmission and distributions .

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<sup>12</sup> Daoud Y. September 2014 , 'A Socio-Economic Analysis of Renewable Energy Usage in Palestine', Heinrich Boel Foundation Palestine and Jordan, access on the link <https://ps.boell.org/en/2014/09/04/socio-economic-analysis-renewable-energy-usage-palestine>

<sup>13</sup> United States Environmental Protections Agencies, access on the link <https://www3.epa.gov/region9/waterinfrastructure/waterenergy.html>

<sup>14</sup> **CLEANER ENERGY SAVING MEDITERRANEAN CITIES Contract No ENPI 2012/309-311, June 2015**, , 'REPORT Recommended National Sustainable Urban and Energy Savings Actions for Palestine' access on the link [http://www.ces-med.eu/sites/default/files/National\\_report\\_Palestine\\_SEAP\\_v.3.0%20-%20FINAL%20Layouted.pdf](http://www.ces-med.eu/sites/default/files/National_report_Palestine_SEAP_v.3.0%20-%20FINAL%20Layouted.pdf)

<sup>15</sup> **Palestinian Energy & Environment Research Center , Engineering Association – Jerusalem Center ,June 2007**,access on the link <http://www.cres.gr/solarbuild/pdf/Solar%20build-Market%20Analysis%20palestine%2002%2007%2007.pdf>

Figure (1) shows the shape of solar system stations which will be established in Northern area of Palestine, Southern side of Palestine, and Jordan valley.

**Figure (1) Solar System Stations**



Figure (2) shows the shape of Winds energy station which will be established in middle area of Palestine.

**Figure (2) Winds Energy Station**



### Policy Evaluation of Using Renewable Energy

Evaluation policy<sup>18</sup> means: the process of applying the evaluation principles and methods to examine the inputs, process, and output, implementation and impact of the policy and investigate the effectiveness of policy interventions, implementation process and determine the value in terms of social and economic conditions of different stakeholders<sup>19</sup>.

In order to evaluate our policy we should go back to the main problem and follow the next procedures (Howlett, & Ramesh.M, 2003) .

- I. Agenda setting: problems (high increase of electricity prices in Palestine )
- II. Policy formulation: Policy subsystems (procedures and plans for decreasing the high costs of electricity by adopting alternatives ways .
- III. Decision making: government decision making by establishing renewable energy stations in different focal areas of Palestine
- IV. Implementation the Innovation Policy by contracting with local or international investor to open the solar system station in the middle area of Palestine .
- V. Policy evaluation: evaluating the procedures and systems and test if the cost of electricity has been decreased or not after .

The process of evaluation will go through three steps :

<sup>16</sup> CEF (Conserve future energy ) ,2009, 'what is renewable energy', access on the link <https://www.conserve-energy-future.com/advantages-and-disadvantages-of-renewable-energy.php>

<sup>17</sup> CEF (Conserve future energy ) ,2009, 'what is renewable energy', access on the link <https://www.conserve-energy-future.com/advantages-and-disadvantages-of-renewable-energy.php>

<sup>19</sup> National Center for Injury Prevention and Control (CDC), ' Step by Step – Evaluating Violence and Injury Prevention Policies' access on the link <https://www.cdc.gov/injury/pdfs/policy/brief%201-a.pdf>

- I. Administrative evaluations: which include managerial performance and budget systems which mainly include :
  - A. Effort evaluation : which related the governmental efforts but into accomplishing the goals .
  - B. Performance evaluation: examines if the output of these stations have been achieved .
  - C. Adequacy of performance evaluation: finding out if the renewable energy stations in Palestine reduced the cost of electricity.
  - D. Efficiency evaluation: to assess the cost of this innovation if the same amount of quantity of output could be achieved.
  - E. Process evaluation: examines the governmental methods, rules and operating procedures used to deliver the program .
- II. Judicial evaluation: government actions toward implementing the rules and regulations by the new renewable energy company in Palestine .
- III. Evaluation of outputs, outcomes, and see if the prices of electricity decreases or not and if we achieve self-sufficiency of renewable energy or not in Palestine in 2030.  
Renewable energy stations would have good effectiveness and good efficiency<sup>20</sup>, and it will save time efforts and costs, in addition to provide Palestine with sustainable sources of energy which will be reflected on improving the economy and industry of Palestine .

### Policy Challenges and Policy Recommendations

The main challenges of implementing the innovation policy of establishing renewable energy stations in Palestine stems from financial challenges, technical and skills challenges, political challenges as the following :

- The investments of renewable energy still limited in Palestine<sup>21</sup>.
- The general framework and governmental policies of renewable energy still limited in Palestine and the legislations<sup>22</sup> and regulations of the renewable energy still need more clarification and illustration.
- The lack of required technology and transfer technology and the insufficiency of local manufacturers .
- The shortage of financial resources to support the renewable energy sector in Palestinian municipalities .
- the lack of human resources and skills, training programs, and capacity building in renewable energy sector .
- Political challenges related to Israeli control on the Palestinian territories, and obligatory control on the Palestinian economy and renewable resources .

**In Conclusion:** Palestine has a good climate and geographical area to adopt and invest in the renewable energy (Solar System, Winds Energy), and this will strengthen the Palestinian economy by creating new job opportunities<sup>23</sup> and alleviate poverty among the Palestinian youth, in addition to reduce the electricity costs and achieving the energy-security<sup>24</sup> for all Palestinians, and finally enhancing the investment in renewable energy and encouraging investors for opening new companies and factories in this sector.

#### Policy Recommendations :

- Developing and issuing a clear legislations and regulations of using the renewable energy (solar energy, winds energy, water energy) in Palestine .
- Enhancing the cooperation with NGO'S organizations to implement more projects in infrastructures of renewable energy ,and increasing their cooperation with local Palestinian municipalities.
- Allocating more budgets and financial resources to develop the renewable energy sector by government .
- Developing research and research centres of renewable energy in cooperation with local universities and NGO's organizations .
- Enhancing the cooperation with other countries to exchange the experiences.
- Improving the capacity building and human skills in the sector of renewable energy.

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<sup>20</sup> **Effectiveness** of energy which is related to the impacts of using the renewable energy and how could we achieve a self sufficiency of renewable energy in 2030 in Palestine.'

**Efficiency of energy** means' the costs involved in the implementation process to choose the best approach in using resources ' , European Commission DG ENER, (April 2015), Mid-term evaluation of the Renewable Energy Directive, access on the link [https://ec.europa.eu/energy/sites/ener/files/documents/CE\\_Delft\\_3D59\\_Mid\\_term\\_evaluation\\_of\\_The\\_RED\\_DEF.PDF](https://ec.europa.eu/energy/sites/ener/files/documents/CE_Delft_3D59_Mid_term_evaluation_of_The_RED_DEF.PDF)

<sup>21</sup> **Palestinian Energy & Environment Research Center , Engineering Association – Jerusalem Center , June 2007**, access on the link , <http://www.cres.gr/solarbuild/pdf/Solar%20buildMarket%20Analysis%20palestine%2002%2007%2007.pdf>

<sup>22</sup> **(MAS) Palestine Economic Policy Research Institute, May 2012**, access on the link <http://mas.ps/files/server/20141911185315-1.pdf>

<sup>23</sup> **Yamin .M . Z , March 2015**, 'Renewable energy in Palestine, access on the link <https://www.ecomena.org/renewables-palestine/>

<sup>24</sup> **Hrimat. N, 2017**, 'Utilizing solar energy technology in Palestine', This week in Palestine , Access on the link <http://thisweekinpalestine.com/utilizing-solar-energy-technology-palestine/>



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