In Palestine, there are huge natural possibilities in the field of bio-energy, which greatly reduces dependence on imports. In the field of bio-energy, there are huge amounts of solid waste produced by municipalities, which spend large sums of money to bury them in waste dumps, which are deficient and inadequate to meet the needs, there is a large amount of waste oil used and polluting the environment. There are also large quantities of olive peats that pollute the environment. Investment in these fields produces large amounts of energy and protects the environment from severe damage. In addition, there are huge quantities of animal manure from goats, chickens and cows, which can generate energy. In any case, bio-energy processes lead to the production of natural fertilizers that are desirable to farmers because of their lack of odors. The amount of biogas that can be extracted from organic waste, depends on the waste itself and the design of the digester system, it ranges from 20 m3 per ton to 800 m3 of biogas per ton. Each cubic meter (m3) of biogas contains the equivalent of 6kWh of calorific energy.

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Bio-energy in Palestine between Reality and Potential

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Bio-energy in Palestine between Reality and Potential

2018

Forward

Palestine suffers from two main problems in the economy: dependence on imports in all sectors, including the energy sector, and relying on the assistance of donor institutions and international development institutions. In recent years, international aid has declined significantly, but energy imports and consumption continue to increase due to the increasing population, the absence of a public transport sector, and so the increase in the number of vehicles in the transport sector and the doubling of the consumption of petroleum energy.

Hence, there is a need to study the potential of renewable energy, including bio-energy. In Palestine, there are huge natural possibilities in the field of bio-energy, which greatly reduces dependence on imports.

In the field of bio-energy, there are huge amounts of solid waste produced by municipalities, which spend large sums of money to bury them in waste dumps, which are deficient and inadequate to meet the needs, there is a large amount of waste oil used and polluting the environment. There are also large quantities of olive peats that pollute the environment. Investment in these fields produces large amounts of energy and protects the environment from severe damage.

In addition, there are huge quantities of animal manure from goats, chickens and cows, which can generate energy. In any case, bio-energy processes lead to the production of natural fertilizers that are desirable to farmers because of their lack of odors.

The organic waste produced in Palestine per year is as follows: Wood and Charcoal 2,7917 tons, Organic municipal solid waste 7,325,741,5 tons, Olive peat 476,921 tons, Oils and Lubricants 1,083 tons, Animal manure 628,660 tons, the total is 74,391,996 tons. The amount of biogas that can be extracted from organic waste, depends on the waste itself and the design of the digester system, it ranges from 20 m^3 per ton to 800 m^3 of biogas per ton. Each cubic meter (m^3) of biogas contains the equivalent of 6kWh of calorific energy (www.biogasworld.com).

In Palestine: 74,391,996 tons* 20 = 1,487,839,920 m^3 of biogas produces (8,927,039,520 kW).Which consist of (2,975,679,840 kW) electric energy, and (5,951,359,680 kW) thermal energy.

Or, 74,391,996 tons* 800 = 595,135,96800 m^3 of biogas produces 3,570,815,80800 kW. Which consist of (119027193600 kW) electric energy, and (238054387200 kW) thermal energy.

Historically, the experience of Palestine in this area dates back to the seventh decade of the twentieth century. In 2010, an ambitious strategy for renewable energy, including bio-energy was developed. However, relevant legislation and policies have prevented the development of this sector, which requires correction.

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Introduction

Globally, carbon dioxide emissions have reached more than 11.830 million metric tons in 2013, and energy wear projected to increase by 80% by 2030 due to increased energy use. According to the US Environmental Protection Agency, the amount of carbon dioxide emissions from Gasoline and diesel combustion at 10,887,3 and 10,012,2 tons of carbon dioxide / gallon, respectively (Ben-Iwo, 2016).

The risks arising from the continuous increase in the consumption of petroleum energy and the resulting carbon dioxide require the use of bio-energy. The production of this type of energy is not new; its roots are deep in history. The first time biogas wear produced scientifically and logically was in the United Kingdom in 1895. The risks arising from the continuous increase in the consumption of petroleum energy and the resulting carbon dioxide require the use of bio-energy. The production of this type of energy is not new; its roots are deep in history. The first time biogas production wear produced scientifically and logically was in the United Kingdom in 1895. Since then there has been rapid development in this area. The oil crisis of the seventies of the last century stimulated a new and established start in the field of renewable energy in general, including bioenergy; this energy source is in an advanced position of energy priority list. Global efforts to phase out fossil energy and pursue sustainable energy solutions based on organic waste recycling continued (Jyothilakshmi, 2016).

Many bio-energy projects are have accelerated and spread in many countries of the world. In Turkey, for example, a landfill in Istanbul has the capacity to produce 58 megawatts of electricity and thus supply more than 266,000 Turkish homes with electricity. In the municipality of "Elazig" in eastern Turkey, the municipality was able to produce about 15 million kilowatts of electricity in 2016 in the solid waste dump through the transfer of waste citizens. The volume of municipal waste collected by municipalities throughout Turkey was around 28 million tons during the year, enough to supply about 2 million homes with electricity. As part of its effort to prevent methane emissions and clean the environment, the municipality aims to convert 400 tons of household waste daily into electrical power to supply about 10,000 homes with electricity. The state-owned landfill has been able to produce 2.8 MW by 2014, using 400 tons of waste to produce biogas. In Germany, there are more than 70 waste treatment plants all over the country. One of them is in Stuttgart, which has a Mercedes plant that produces about 500,000 tons of waste every year, some of which wear used to produce electricity and others to heat. The plant processes about one-third of the waste generated in southwestern Germany, converting it to enough electricity to supply some 35,000 homes with electricity. This does not provide 25,000 homes, 1,300 companies and 300 government buildings with thermal energy for heating (Quman, 2017).

In Ghana, for example, bio-energy technology began in the 1960s to help reduce the energy crisis. The first biogas plant, a fixed dome of 10 square meters, was constructed. Ghana has the capacity to build about 280,000 local plants with the capacity to produce 6,000 cubic meters of liquid fertilizer per day and to increase the production of biogas leading to a 25 % (Mohammed, 2017).

In Nigeria, biomass and solid wastes account for about 80% of total energy sources. Most bio-fuel projects wear built in areas far from oil refineries, but projects are still using the first generation of bio-fuel plants (Ben-Iwo, 2016).

In Indonesia, biogas production is not limited to animal plant animal waste but also to the use of human waste (human faeces). The use of human excretions leads to energy production and reduces the problem of disposal, in light of the increase in the population of 1.2% per year and the lack of comprehensive distribution of electricity (Andriani, 2015).

In the Chinese experiment, the biogas program is an effective approach to address rural energy shortages and to support rural households. However, despite more than 50 years of development in this sector, replacing fossil energy and has not achieved the social and environmental goals required the available studies show otherwise. The reason for this discrepancy lies in the inaccuracy of the adoption of the operational cycle, ie the real-time digestion of biogas, where it is often exaggerated. The ECO-LCA model wear constructed using Chinese economic input and output for 2007 to estimate CO 2 emissions during a typical life cycle of 8 m^3digestion of local biogas and their sources. The model indicates that biogas digestion should be run for at least 2.77 years to obtain a net reduction of carbon dioxide emissions (Wang, 2012).

In Turkey, the share of biomass in energy production in urban and rural areas is increasing. The annual production of waste in the country is 30 million tons. 1.5 million tons of bio-diesel, 3 million tons of bio-ethanol and 2.5-4 billion cubic meters of biogas per year. Total biomass production is expected to reach 52.5 million tons by 2030.Malaysia annually produces 168 million tons of biomass, producing about 58 million tons of palm oil annually. There is a capacity to generate about 15 billion cubic meters of biogas annually and more than 2,400 megawatts of biomass and 410 megawatts of biogas. The National Strategy 2020 proposes an additional 20 million tons of biomass by 2020 through palm oil (Ozturk, 2017).

Anaerobic de-gestation is an effective alternative technology that combines bio-fuel production with sustainable waste management. Various technological developments enhance the production and quality of biogas. Other investments in agricultural production wear expected to increase with increased success in biogas (Achinas, 2017). Marginal lands, which are unsuitable for agriculture, have received increasing interest in bio-energy as an alternative to agricultural land, for the supply of raw materials. After marginal lands were economically neglected (Liu, 2011).

There are political and technical challenges that make Palestine an exceptional energy state compared to other countries in the Middle East, whether in the field of import, storage or generation (Bacenetti, 2016).

For many reasons, the situation of the energy sector in Palestine is much different from that of other countries in the Middle East. These include lack of natural resources, political instability, financial difficulties and increasing population density. In addition, Palestine relies on 100% of its imports of fossil fuels and imports 87% of its imports of electricity. Rising population growth and standards led to increase the demands for energy in Palestine in recent years. Although the total energy consumption per citizen in Palestine is the lowest in the region (0.79 MW), energy consumption costs are higher than elsewhere in the Middle East (Juaidi, 2016).

Palestine suffers from a great scarcity of natural resources and mineral resources. This suffering wear compounded by traditional sources of energy (oil and gas). The generation and consumption of energy in Palestine depends on two main sources: The first source, petroleum and natural gas derivatives, which are imported entirely from Israel, cost about $900 million annually, and constitute about 51% of the total consumption of energy in Palestine .The second source is imported electricity, mostly from Israel (up to 87% of the total). Limited quantities wear imported from Egypt and Jordan (4%) and from Palestine Electricity Company / Gaza Power Plant, which supplies about 4.7% of the electricity. The generating station uses industrial diesel, which wear often imported from Israel. Electricity imports from Israel and neighboring countries range from $ 400 to $ 500 million a year (MAS, 2015).

This makes the energy sector in Palestine face the following major challenges:

First: Reliance on imports to supply energy. Palestine imports more than 86% of the electricity from Israel and 95% of the energy derivatives wear imported from Israel .Second: The high prices of this import and the consequent high financial cost to the Palestinian consumer and producer (MAS, 2015).

For these reasons, attention wear paid to renewable energy. Renewable energy includes many types of energy, including solar energy, wind energy, underground energy and bio-energy.

The theme of this paper is bio-energy in Palestine. There are many forms of it in Palestine: solar heaters, solar panels to generate electricity, underground energy, and bio-energy (PCBS, 2015a).

Bio-energy is particularly important because it eliminates accumulated bio-waste that wear produced in a large and rapid manner, without recycling, treatment of biological waste and production of electricity (Abu El Qomboz, 2012).

For century's wood has been the main energy source. In Palestine, much vegetable, wood, human waste, vegetable oil, animal fats, municipal solid waste, food scraps, grass clippings, and leaves wear produced. It can also be a source of energy in the West Bank by capturing biogas. From the arithmetic point of view, in 2010, it can produce from 4000 to 5,000 kWh / day of electricity, by digestion in the cupflower shed which receives 400 tons / day, about 50% of which is organic waste, which is enough to supply electricity for about 800 to 1,000 homes in the city of Jenin (Al Sadi, 2015). Production of bio-diesel, biogas and ethanol is the most attractive component of biomass and bio-waste production (Ghosh, 2016). Ethanol is a chemical compound. Bio-diesel biodiesel is a combination of compounds that vary in physical properties according to the raw materials used to produce it. Liquid bio-fuels can replace gasoline and diesel for transportation, power generation, water pumps as well as for cooking and lighting) Brittaine, 2010). Bio-fuels are biomass energy carriers. Biogas is a gas consisting mainly of methane and carbon dioxide produced by anaerobic digestion of biomass (FAO, 2007).

Although Palestine's history of solar energy is relatively long, solar panels have been used to heat water on rooftops since the 1970s (Mustafa, 2016). In addition, biogas technology has existed since 1998 through Jericho Station (Al-Ja'abari, 2013), but the reality of renewable energy, whether solar or biological, is still very simple and far from the necessary progress (Mustafa, 2016; Al Jabari, 2013).

In Palestine, there is still insufficient interest in the availability of biomass resources; hence, the need for research and assessment studies in this area. With a view to estimating the availability of bio-mass, each year and the potential for anaerobic process that can produce bio-gas in sufficient quantities and with simple, effective and effective procedures (Hammad, 2016).

The Palestinian territories rely on imports from external sources to meet their energy needs. About 80% of energy sources come from neighboring countries. This dependency raises the price of fuel, but the adoption of clear and transparent energy policies leading to strategies and action plans to promote the use of renewable energy is the first step in achieving energy independence. Renewable energy investments are one such step. Palestine has good potential for solar radiation, large amounts of biomass and good wind speed. Analysis of a number of pilot projects being developed or activated in the energy sector in various renewable energy fields indicates that they are economically feasible. The development of a clear energy conservation policy is also an important tools used, limiting dependence on external sources of energy (Ismail, 2013).

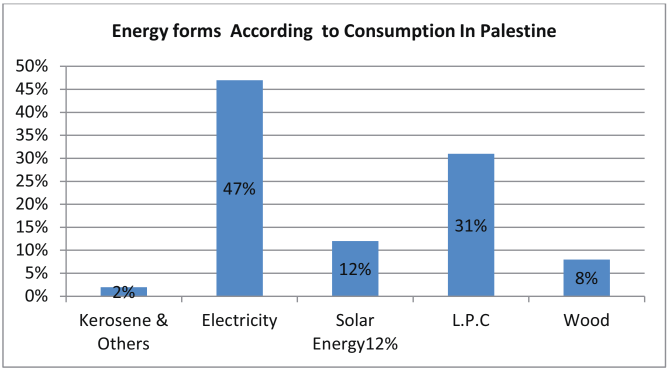
This study examines the reality of bi-energy in Palestine. What is the reality, what is the Potential? what are the weaknesses, strengths, opportunities and threats must be taken into account? , when drawing the future picture of the reality of bio-energy in Palestine**.**

Palestinian energy profile

The generation and consumption of energy in Palestine depends on two main sources of access to energy, as shown below:

The first source is petroleum products and natural gas, which wear imported completely from Israel, at a cost of about $ 900 million annually, and constitutes about 51% of the total consumption of energy in Palestine (MAS, 2015). Figure 1 on energy consumption patterns in Palestine shows that 90% of the energy consumed is petroleum.

Figure 1: Energy forms according to consumption in Palestine

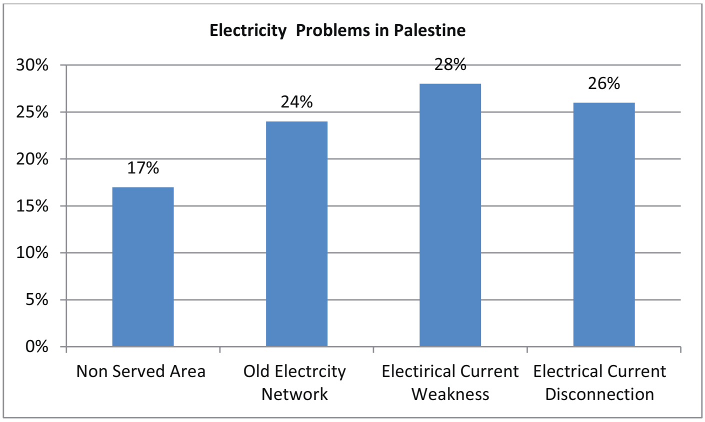


Source: (Ismail, 2013)

The second source is imported electric power, mostly from Israel (up to 87% of the total). Limited quantities wear imported from Egypt and Jordan (4%) and from Palestine Electricity Company / Gaza Power Plant, which supplies about 4.7% of the electricity. The generating station uses industrial diesel, which wear often imported from Israel. Electricity imports from Israel and neighboring countries range from $ 400 to $ 500 million annually (MAS, 2015).

It should be noted that the electricity imported from Israel is not yet governed by a purchase agreement between the Palestinian National Electricity Distribution Authority and the Qatar Electricity Company and Israel, but through bilateral contracts with local authorities and Israeli companies. Five distribution companies, the Northern Electricity Company, the Jerusalem Electricity Company, the Hebron Electricity Company, the Southern Electricity Company and the Electricity Distribution Company in the Gaza Strip, distribute electricity in the West Bank and the Gaza Strip. These companies distribute electricity to the Palestinian communities through 230 points of connection distributed in the Palestinian areas (MAS, 2015). Figure 2 shows the problems of the electricity grid in Palestine.

Figure 2: Electricity Problems in Palestine.



Source :(Juaidi, 2016)

The characteristics of the electric power sector in Palestine wear highlighted by the data of the Household Energy Survey for 2013. The data of the Household Energy Survey prepared by the Palestinian Central Bureau of Statistics for 2013 show that there are several important indicators, including what is positive and encouraging in the field of renewable energy exploitation, The Palestinian economy and consumption in terms of rising prices on consumers in general (MAS, 2015).

The absence of fossil fuel resources leads to Palestine importing all its needs (100%), imports all petroleum products, and 92% of the electricity from Israel, increasing the total energy bill to 385 million euro's annually. Solar resources are limited to photovoltaic and thermal generation, mainly for water heating. Biomass is wood waste and agricultural waste, used for cooking and heating in rural areas. Wind power is relatively few but not yet used in Palestine. Biogas has not yet been used, but there are estimates that 33 million cubic meters, or 10 million euro's, could be produced (Yaseen, 2009).

Table 1 below, shows that Palestine imports all sources of energy except olive oil, which imports 541,308,8 MWh, 677,774 thousand liters, gasoline 292,257 thousand liters, liquefied petroleum gas 167,213 tons, firewood 279,17 tons , Tyumen 116,80 tons, the fuel oil 3,556 thousand liters ,the kerosene 1,868 thousand liters and oil and grease 1,083 tons. Palestine imports 541,388 MWh of electricity and produces 9,250 MWh, which produces 1.7% of the imported quantity. This percentage is more symbolic than real (PCBS, 2015b).

Electricity, mainly consumed in the domestic sector followed by the trade and service sector. Much lower is the industrial sector and in the bottom of the list comes agriculture. Diesel and gasoline wear consumed in the transportation sector, while kerosene, peat, wood, coal and liquefied petroleum gas wear consumed in the domestic sector. Fuel oil wear consumed equally between the domestic and industrial sectors. Oils, grease and bitumen wear not used in the energy sector at all (PCBS, 2015c). Table 1 below shows the Energy Balance in Physical Units.

Table 1: Energy Balance in Physical Units (PCBS, 2015)

Lows	Energy Products										
	Solar Energy (MWh)	Wood and Charcoal (Tons)	Olive Cake	Bitumen (Tons)	Oils and Lubricants (Tons)	LPG (Tons)	Fuel Oil (1000 Liter)	Kerosene (1000 Liters)	Gasoline (1000 Liters)	Diesel (1000 Liters)	Electricity (MWh)
1.1 Primary production	1,498,096	343,240	38,057	-	-	-	-	-	-	-	9,250
1.2 Imports	-	27,917	-	11,680	1,083	167,213	3,556	1,868	292,257	677,774	5,413,088
1.3 Exports	-	-1,110	-	-	-141	-	-	-	-	-	
1.4 Stock change	-	-	-	-	-	-	-	-	-	-	-
1.Total energy supply	1,498,096	370,047	38,057	11,680	942	167,213	3,556	1,868	292,257	677,774	5,422,338
2. Statistical differences	-	-	-	-	-	-	-	-	-	-	-
3.Transformation	-	-	-	-	-	-	-	-	-13,503	-105,284	505,367
3.1 Electricity plants	-	-	-	-	-	-	-	-	-13,503	-105,284	505,367
4. Losses	749,048	-	-	-	-	-	1	5	2,247	1,832	711,325
5. Final consumption	749,048	370,047	38,057	11,680	942	167,213	3,555	1,863	276,507	570,658	5,216,380
5.1. Final energy consumption	749,048	370,047	38,057	-	-	167,213	3,555	1,863	276,507	570,658	5,216,380
5.1.1 By industry	-	4,886	9,514	-	-	8,445	1,777	208	401	17,887	576,201
5.1.2 By transport	-	-	-	-	-	4,855	-	-	268,086	533,760	-
5.1.2.1 Road	-	-	-	-	-	4,855	-	-	268,086	533,760	-
5.1.3 By household and other sectors	749,048	365,161	28,543	-	-	153,913	1,778	1,655	8,020	19,011	4,640,179
5.1.3.1 Households	749,048	363,600	28,543	-	-	139,024	-	1,241	-	6,125	3,273,689
5.1.3.2 Agriculture	-	-	-	-	-	3,004	-	39	5,159	10,003	39,409
5.1.3.3 Commerce & public services	-	1,561	-	-	-	11,885	1,778	375	2,861	2,883	1,327,081
5.2 Non energy use	-	-	-	11,680	942	-	-	-	-	-	-

(-): Nell

Notes:

- In all accounts related to charcoal and wood, a unified calorific value was used for each of the charcoal and wood based on the weight of each type in the balance, and the calorific value for both was considered to be 15.61 gigajoules/ton
- The efficiency of the solar water heater wear considered 45% and the consumed energy is half of the produces quantity.
- The technical losses in electricity in the Palestinian Territory wear considered 12% based on the Palestinian Energy Authority.

Table 2 shows that The largest consumer of fuel is the transport sector 3201373 terajoul and the domestic sector 2748504, followed by the trade and services sector 5647, then the industrial sector 346735 and the agricultural sector 82,868 (PCBS, 2015).

The domestic sector is one of the two largest sectors in terms of energy consumption, and most of the houses are in rural areas. Consequently, the countryside, which includes large quantities of wet solid waste required for bio-energy, can significantly reduce the energy bill in Palestine. Table 2 below shows the energy balance of Palestine in terajoul.

Table 2: Energy Balance of Palestine in Terajoul (PCBS, 2015)

	Energy Products											
Flows	Solar Energy	Wood and Charcoal	Olive Cake	Bitumen	Oils and Lubricants	LPG	Fuel Oil	Kerosene	Gasoline	Diesel	Electricity	Total
1.1 Primary production	5,393.15	5,357.98	637.45	-	-	-	-	-	-	-	33.30	11,421.88
1.2 Imports	-	435.78	-	469.54	43.54	7,909.17	136.48	66.73	9,580.77	25,355.53	19,487.12	63,484.66
1.3 Exports	-	-17.33	-	-	-5.67	-	-	-	-	-	-	-23.00
1.4 Stock change	-	-	-	-	-	-	-	-	-	-	-	-
1.Total energy supply	5,393.15	5,776.43	637.45	469.54	37.87	7,909.17	136.48	66.73	9,580.77	25,355.53	19,520.42	74,883.54
2. Statistical differences	-	-	-	-	-	-	-	-	-	-	-	-
3.Transformation	-	-	-	-	-	-	-	-	-442.66	-910.93	1,819.32	465.73
3.1 Electricity plants	-	-	-	-	-	-	-	-	-442.66	-910.93	1,819.32	465.73
4. Losses	2,696.58	-	-	-	-	-	0.04	0.18	73.66	68.54	2,560.77	5,399.77
5. Final consumption	2,696.57	5,776.43	637.45	469.54	37.87	7,909.17	136.44	66.55	9,064.45	24,376.06	18,778.97	69,949.50
5.1. Final energy consumption	2,696.57	5,776.43	637.45	-	-	7,909.17	136.44	66.55	9,064.45	24,376.06	18,778.97	69,442.09
5.1.1 By industry	-	76.27	159.36	-	-	399.45	68.22	7.43	13.15	669.15	2,074.32	3,467.35
5.1.2 By transport	-	-	-	-	-	229.64	-	-	8,788.39	22,995.70	-	32,013.73
5.1.2.1 Road	-	-	-	-	-	229.64	-	-	8,788.39	22,995.70	-	32,013.73
5.1.3 By household and other sectors	2,696.57	5,700.16	478.09	-	-	7,280.08	68.22	59.12	262.91	711.21	16,704.65	33,961.01
5.1.3.1 Households	2,696.57	5,675.79	478.09	-	-	6,575.83	-	44.33	-	229.14	11,785.29	27,485.04
5.1.3.2 Agriculture	-	-	-	-	-	142.09	-	1.39	169.12	374.21	141.87	828.68
5.1.3.3 Commerce &	-	24.37	-	-	-	562.16	68.22	13.40	93.79	107.86	4,777.49	5,647.29

public services												
5.2 Non energy use	-	-	-	469.54	37.87	-	-	-	-	-	-	507.41
1.1 Primary production												

(-): Nell

Notes:

- In all accounts related to charcoal and wood, a unified calorific value was used for each of the charcoal and wood based on the weight of each type in the balance, and the calorific value for both was considered to be 15.61 gigajoules/ton
- The efficiency of the solar water heater wear considered 45% and the consumed energy is half of the produces quantity.
- The technical losses in electricity in the Palestinian Territory wear considered 12% based on the Palestinian Energy Authority.

Bio-energy in the global context

Humans have relied on traditional bio-energy for thousands of years. In developing countries, about 95 per cent of the population in some countries relies on biomass, where more than 85 per cent of biomass energy wear consumed as solid fuel for cooking, heating and lighting, mainly firewood and charcoal on bio-energy consumption. FAO estimates that in 2005, bio-energy provided about 10 per cent of the world's total primary energy supply, mostly for use in the residential sector (for heating and cooking). Bio-energy accounted for 78% of the total renewable energy produced, with 97% of bio-fuels wear produced from solid biomass, 71% of which wear consumed in the residential sector. Modern biomass has become increasingly important in many countries as a low-carbon, common, widespread and renewable component. Over the past few years, the use of biomass materials has increased in coal-fired boilers, and some gasification technologies are approaching marketing (FAO, 2007).

Over the course of the bio-energy process, three generations of bio-fuels wear developed. The first generation of bio-fuels is the fuel that wear commonly used now. It is mainly the use of food crops such as corn, sugar cane and sugar beet to produce sugar to produce bio-ethanol, soybean, rapeseed and palm oil to produce bio-diesel, using traditional technology. Second and third generation bio-fuel technologies offer the potential to produce bio-fuels from non-food sources such as fast-growing trees, grasses and carbon-rich waste materials. These future technologies will also have the potential to transform algae and bacteria into oils that can replace petroleum fuels (Brittaine, 2010).

Bio-energy has helped many countries gradually reduce carbon from the energy system and reduce dependence on fossil fuels. Countries such as Brazil no longer need oil because of their growing integration of bio-fuels into the transport sector. This shift wear made possible by effective policies such as carbon taxes, mergers and R & D investments (World Energy Council, 2016).

Globally, universities, associations and companies have supported policies to strengthen the bio-energy sector. The availability of biomass raw materials in sub-Saharan Africa and Asia has increased dependence on biomass. Thus providing much needed energy in rural areas. Many countries around the world have recognized these benefits, and India, Indonesia, Malaysia and Brazil are among the leading countries in increasing the use of bio-fuels in the transport sector. Recent technological developments in countries such as the United States of America, Brazil and Italy have led to the commercialization of this technology (World Energy Council, 2016).

Biomass can provide sustainable energy supplies in the future, private and public sectors ensure the sustainability of the biomass crop, and that bio-energy and bio-fuels are environmentally friendly by achieve greenhouse gas emission, reduction targets. Thus, bio-energy wear expected to dominate the energy supply. Malaysian authorities have taken initiatives to increase the use of biomass as a renewable resource by growing crops that are not normally grown in the region (such as sorghum, cannabis and mustard). Palm oil accounts for 85.5% of Malaysia's total biomass production. There are also government incentives for industries that use biomass to produce renewable energy, and also convert bio-mass into solid fuels, such as coal briquettes and charcoal, and the government has seriously worked on programs aimed at reaching a higher proportion of the population For Malaysians living in rural areas (Ozturk, 2017).

Firewood

FAO suggests that wood biomass is a renewable, and CO_2 neutral energy source, which, if used in a sustainable and efficient manner, can contribute to a cleaner environment. Wood wear used as a fuel source for thousands of years and still used throughout the world (Krajnc, 2015).

Wood are classified into solid wood and soft wood: softwoods burn more quickly and generate less heat due to lower energy content per volume, although the energy content of weight is similar to both types. The moisture content of the firewood determines the energy content in the first place (GIZ, 2014).

Unlike fossil-based energy sources, wood biomass can create benefit, support economic development, and alleviate poverty. The use of wood-based biomass in most sub-Saharan Africa leads to a large workforce and regular income for tens of thousands or more. Hundreds of thousands of people in each country estimate that the coal sector in the city of Dar es Salaam in Tanzania provides opportunities for cash income for hundreds of thousands of people, especially among the poorest people (AFREA, 2011).

Despite the development of the energy sector, wood remains the most important source of energy in most developing countries. Globally, an estimated 2.5 billion people use bio-fuels primarily for cooking and heating, while more than 90 per cent of developing countries in poverty depend on energy from biomass. Although energy policies in many developing countries have so far neglected the role of wood fuel, the alternatives introduced by governments often failed in their goal of directing citizens not to rely on firewood and coal (Sepp, 2009).

In Kenya, about 700,000 people work in the coal sector. Malawi has similar trends. It wear estimated that about 100,000 people depend on the field of coal production and transport and sale. In 1996, there were 93,000 coal workers. In 2008, 133,000 people worked in the field. In the other types of fuel, in the first year 3400 worked in the second year, 4600 citizens (AFREA, 2011).

In Uganda, reliance on biomass (wood and coal) in household energy is 90%, mostly for cooking, and sometimes for other types of energy such as electricity. Coal is the dominant source in urban areas, while wood fuel is more common in rural areas. The use of liquefied petroleum gas in it is very little and is limited to the middle class in urban areas (Bizzarri, 2009).

In Tanzania, more than 80% of the population relies on the burning of wood, manure and other conventional fuels. At the national level, biomass use accounts for over 90% of total energy consumption. In recent years, bio-energy activities have increased, and rapid population growth in both urban and rural areas has put severe strain on their resources, leading to desertification and deforestation in some areas. There are ways to reduce the use of firewood and coal, which is to improve their production methods and use energy-saving stoves (Felix, 2011).

In Finland, the government aims to create a 100% carbon-free energy base where the country's forests are a source of energy and fuel. Therefore, the use of wood biomass for energy production would increase, through the most efficient use of wood. Examples of this are combining heat and energy production (CHP) through biomass gasification technology as well as gas turbines (35-40%), a useful advantage compared to biomass combustion (25-30%). In this regard, bio-fuels resulting from forest gasification can contribute to the achievement of the goals set by Finland. In addition, bio-fuel wear mixed with natural fuel, which is useful for land transportation purposes, where logistics and large infrastructure are available (Palander, 2017).

The contribution of the bio-energy sector to the national economy is significant and can easily exceed other economic sectors. In addition to providing important employment opportunities to poor sectors of society who cannot find formal employment in general, it is estimated that the coal industry in sub-Saharan Africa amounted to more than $ 8 billion in 2007, and 7 million people depend on the sector for Earn their living. The IEA expects that by 2030 the number of people relying on conventional biomass will increase to 918 million. In line with this forecast, the economic value of the coal industry could exceed US $ 12 billion, by 2030 and employ nearly 12 million people. The modernization of the wood-based, bio-energy sector leads to a substantial increase in financial revenues in most Central African countries and the enhancement of resources for investment in natural resources and other key areas of sustainable economic development. In Kenya, government revenue from coal production and trade is estimated at US $ 65 million (ESD, 2007), while in Tanzania it is estimated at US $ 100 million (World Bank, 2009) .Additional benefits such as employment, taxes On production inputs, and increased use of communications devices (AFREA, 2011).

From a policy perspective, biomass as a renewable energy source is able to reduce greenhouse gas emissions compared to fossil fuels. Therefore, one of the policy objectives set by the European Union under the so-called "2020": increasing the share of renewable energy to 20% of total domestic consumption Energy, 10% of the share of renewable energy must consist of bio-fuels. In addition, reduce greenhouse gas emissions by 20% to 1990 levels by 2020 (Ferranti, 2014).

The idea that energy wood reduces greenhouse gas emissions Carbon neutrality is a valid idea. When biomass extracted from the forest wear burned in the process of power generation, it wear replaced by the growth of new biomass in the forest, which re-absorbs the carbon emitted from the power generation process. In this sense, the carbon emitted by wood energy generation wear seen to remain in the atmosphere for a relatively short period. Carbon emitted when fossil fuels are used remains in the atmosphere for a very long time. From an economic perspective, the burning of forest wood allows diversification of forest production, the establishment of a low-value wood market and increased incomes of forest owners. From a social perspective, forest biomass is a means of improving rural development and increasing employment rates (Ferranti, 2014).

Municipal wastes

The link between municipal solid waste and energy has become very important in terms of sustainable development, according to the Rio Declaration in 1992 at the Rio + 20 Earth Summit. To achieve this goal, society must reduce the use of primary resources, particularly non-renewable resources, and increase the use of second resources (materials from recycling and residual waste). EU 2020 targets 20% of the EU's energy needs from renewable energy (Rada, 2014).

In China, the production of electricity from municipal solid waste for heating plays an increasingly important role in the management of municipal solid waste. This technology wear successfully implemented in the treatment of agricultural wastes and food waste (Xu, 2016).

Thailand is facing the problem of accumulation and increasing waste and disposal. Waste-to-energy technology has therefore been the most attractive option for waste management. Modern technologies, information technology and precise environmental monitoring facilities have proved cost-effective. It can contribute to cash flows in areas where transfer fees are high and the landfill site is limited. It also increases the life of landfills by reducing their size and improving the final disposal of waste. The government aims to increase production to 160 megawatts of energy and 100 kilowatts of thermal power by 2021 (Srisaeng, 2016).

A study in Bangladesh revealed that sensitivity analysis suggests that pre-heating of municipal solid waste to reduce moisture can promote energy recovery as well as reduce greenhouse gas emissions, which will certainly reduce the energy crisis problem to some extent and generate green jobs. At the national and global levels, and will ensure the management of comprehensive municipal solid waste for sustainable development (Islam, 2016).

In India, about 42 million tons of solid waste and 6,000 million cubic meters of liquid waste wear produced annually in India, in addition to the generation of huge amounts of liquid and solid waste due to industries. Improper disposal of municipal solid waste leads to environmental degradation and health risks to the public. Demand for energy in India is increasing dramatically, and energy supply is not commensurate with demand. Therefore, energy recovery from waste is one of the best ways to address the energy crisis. Thus, the production of biogas from industrial and domestic waste works successfully in small-scale projects in India (Appa Rao, 2016).

Olive Peat

Olive husks are vital remains of the olive age and make up about 80% of the mass of olives on a wet basis. Olive wear produced significantly in areas facing the Mediterranean, especially in Spain, Italy and Greece. Olive peel can be attractive as an energy source due to its high thermal value and ease of burning (Miccio, 2014).

The conscious use of olive cake in energy production can solve two problems: clean energy production and efficient waste treatment. The olive cake could burned alone or can be combusted with other biomass types. Olive remains remain a good substitute for fossil fuels in Mediterranean countries (Bounaouara, 2014).

Used oil

The production of biodiesel from vegetable oil waste provides a two-pronged solution: economic, environmental and waste management. There are new practical techniques developed in recent years to produce biodiesel from used frying oils and the quality of biodiesel derived from virgin vegetable oils can be compared with the advantage Another attractive is that prices are low . From the point of view of waste management, the production of bio-diesel from user-friendly frying oil is environmentally beneficial because it provides a clean means for disposal of these wastes. At the same time, it can result in reduced CO_2, and pollution prevention (ElSolh, 2011).

The fuel obtained from engine oil wear used as fuel in diesel engines, without any problems in terms of engine performance. The thermal and physical properties of the DLF value are close to the sample of diesel samples. Moreover, the distillation temperature is gradually increasing, and its behavior is similar to the behavior of diesel fuel used in engines (Nasim, 2014).

The cost of bio-diesel produced from virgin vegetable oil through transesterification is higher than the cost of fossil fuels, due to the high cost of raw materials. To minimize the cost of bio-fuels used cooking oil wear used in most cases; sodium hydroxide wear used as an alkaline catalyst, due to low cost and high reaction rate. In the case of cooking oil wastes containing high fatty acids, the alkaline catalyst reacts with free fatty acids. In order to reduce the level of fatty acid content, cooking oil waste wear re-treated with an acid catalyst for exposure to esters reaction (Gnanaprakasam, 2013).

Animal manure

By converting animal manure into methane, you will be able to produce enough electricity to run many homes across the country. One cow can produce enough compost in one day to generate 3 KWh of electricity, and only 2.4 KWh of electricity wear needed to run one-watt bulb for a day. In addition, any rural households with methane digestion will enjoy the following benefits, saving fossil fuels, saving time in collecting firewood, protecting forests, using crop residues for animal feed instead of fuel, saving money, saving cooking time, improving health conditions, and producing. High-quality fertilizers (methane residues), local mechanization and electricity generation, improved rural living standards, and reduced air pollution and water pollution. This justifies the need to explore and encourage the use of animal manure (Ndinechi, 2012).

Livestock generates abundant amounts of animal manure. As a result, there is a need for immediate intervention to eliminate and manage these wastes properly in an effort to avoid negative consequences on the environment and public health (eg, pathogenic pollution, odor, airborne ammonia, greenhouse gases, etc.). Interestingly, anaerobic digestion of animal manure in the biogas digestion process has shown promising potential as a biogas technology, a renewable energy source that can be used for heating and other purposes, as well as reducing bacterial load, biogas potential varies according to chemical, microbiological and composition Foodstuffs from nutrients found in animal waste. Weather and soil characteristics may also affect the physical and chemical properties of these wastes as well as animal species, sources of nutrition, the state of healthy animals, and factors affecting animal growth (Manyi-Loh, 2015).

That dairy and poultry dung has high potential as biomass for dry anaerobic digestion if appropriate design wear applied to prevent the accumulation of large volatile fatty acid (VFA) and low pH. The possible operational conditions could identified to improve the production of biogas from fertilizer and dairy products. A suitable design wear developed to reduce the energy required to maintain the reactor temperature. Heating energy will reduced by changing the temperature at which digestion occurs or by creating an additional economical source such as fertilizers (Ahn, 2008).

Methodology

Question of the study, is the current reality of the bio-energy sector in Palestine, and what is the possible reality connected in the Palestinian context.

A number of sub-questions about the following. The current features of the electric power, the petroleum energy and the bio-energy, the energy extracted from animal manure, municipal waste, olive waste, used oil, the features of the Palestinian policy in the fields of energy and the most prominent features, the challenges facing bio-energy projects, and the attitudes of the Palestinian society toward bio-energy projects.

Questions asked including the following topics: The reality of electrical energy, petroleum energy, and bio-energy derived from animal manure, bio-energy derived from municipal waste, bio-energy extracted from olive residues. Bio-energy derived from used oils, Palestinian Energy Policy and its most prominent features, challenges facing bio-energy projects, community attitudes towards bio-energy projects.

Sources of information collection

- The amount of wood available and the quantities used in the production of organic energy wear estimated according to the estimates of the Ministry of Agriculture and the Central Bureau of Statistics. The quantities of wood in the municipal waste, the quantities used in the production of organic energy from the Joint Services Council in the Ministry of Local Government and the Central Bureau of Statistics wear estimated.
- The Ministry of Agriculture for the quantities of olives estimates the estimate of the existing peat and the expected rate of peat production from the quantities of olive oil produced. The Ministry of Agriculture and the Central Bureau of Statistics estimate the amount of peat used in organic energy production.
- The quantities of animal manure wear estimated by the Ministry of Agriculture to estimate the number of cows, sheep and chickens in Palestine, and the rate of manure produced by each. The quantities of manure used in the production of organic energy wear estimated according to the estimates of the Ministry of Agriculture and the Central Bureau of Statistics.
- The quantities of organic waste for municipalities wear estimated through the estimates of the Joint Services Council in the Ministry of Local Government and the Central Bureau of Statistics. The quantities of organic waste of the municipalities used in the production of organic energy wear estimated according to the estimates of the Joint Services Council in the Ministry of Local Government and the Central Bureau of Statistics.
- Used oils are estimated by estimating the quantities of mineral oils (for machines such as transportation) and by estimating quantities of imported cooking oil. The amount of used oils used in power generation wear estimated according to the estimates of the Energy Authority, the Environmental Quality Authority and the Central Bureau of Statistics.
- The quantities of imported electricity, the quantities of imported petroleum fuels, their costs and the rate of increase in their use wear estimated according to the Environmental Quality Authority and the Central Bureau of Statistics.

Energy policy in Palestine

In 2010, the Palestinian Energy Authority launched the energy sector strategy for the years 2011/2013, which included interest in solar energy, but the solar energy sector remained limited. The strategy spoke very briefly about bio- energy, and there are no governmental efforts in this field. The policy of the energy sector depends on the increasing import of petroleum products and electricity. Table 3 shows the prospects for using renewable energy until 2020.

Table 3: National Renewable Energy Strategy

The Expected installed Capacities for 2020 are listed below	
Technology Used	MW
On Ground PV	25
Rooftops PV (Palestinian Solar Initiative)	20
Concentrated Solar Power Plants	20
Biogas Landfills	18
Biogas from Animal Waste	3
Small-Scale Wind	4
Wind Farms	40
Total	**130**

Source: (Nairat, 2015)

It is evident from the table that the quantity of imported electricity increases annually. In the West Bank in 2015, it increased by 15.5% compared with 2014. In the case of lifting the siege on the Gaza Strip, electricity consumption may be equal to consumption in the West Bank. Since the West Bank imported in 2015 about (4,281,615), the import of Palestine will double to (8,563,230), which will increase by 100%, before the natural increase, which reached in the last two years 15.5%. This requires the need to produce electricity through renewable sources, especially bio-energy, and if the annual increase of 10% each year, this means that the amount of electricity to be imported after 10 years will increase by 200% compared to 2015 (PCBS, 2007, 2009-2015). Table 4 shows quantities of imported electricity over the past eight years.

Table 4: Imported Electricity in Palestine (PCBS, 2007, 2009-2015)

Type of Energy	Region	2007	2009	2010	2011	2012	2013	2014	2015	Total
Electricity MWH	W.B	20,989,990	2,807,601	2,919,786	3,325,579	3,659,623	3,406,998	3,619,112	4,281,615	45,010,304
	G.S	10,892,724	1,175,339	1,239,062	1,296,107	1,249,637	1,327,256	1,316,185	1,131,473	19,627,783
	PAL.	31,882,714	3,982,940	4,158,848	4,621,686	4,909,260	4,734,254	4,935,297	5,413,088	64,638,087

As all energy sources, the import of the Gaza Strip for energy is considered a little because of the blockade. If the siege on Gaza wear lifted, the import of the Gaza Strip will be at least equal to the quantity imported by the West Bank, which means doubling the quantity.

On the other hand, we note that the West Bank import of benzene is increasing by 10% annually, and it increased by 100% during 2007 to 2015, rising from (1,281,473) in 2007, to (243,473) in 2015. This means that in the next 10 years, imports could rise by 200% if the siege on Gaza is lifted, which means a severe economic burden, especially in light of the decline of the Palestinian economy.

For these reasons, it is very important to find alternatives to reduce the rapid increase in the import of petroleum products, because of the huge economic burden on Palestine and the resultant pollution. Table 5 shows quantities of imported petroleum energy over the past eight years.

Table 5: Imported Petroleum Energy in Palestine (PCBS, 2007, 2009-2015)

Type of Energy	Region	2007	2009	2010	2011	2012	2013	2014	2015	Total
Bitumen	W.B	34,133	10,899	16,502	17,441	5,436	17,630	10,826	7,744	47,655
Ton	G.S	1,030	781	183	66	-	-	-	-	-
	PAL.	135,163	11,680	16,685	17,507	5,436	17,630	10,826	7,744	47,655
LPG	W.B	1,558,963	108,210	97,113	93,432	95,113	88,397	83,571	90,317	902,810
Ton	G.S	826,959	59,003	51,100	39,032	30,872	34,213	38,076	34,783	539,880
	PAL.	2,385,922	167,213	148,213	132,464	125,985	122,610	121,647	125,100	1,442,690
Kerosene	W.B	56,962	1,646	1,031	1,577	1,722	1,619	1,795	3,832	43,740
Thousand	G.S	9,829	222	110	71	34	-	-	-	9,392
Liter	PAL.	66,791	1,868	1,141	1,648	1,756	1,619	1,795	3,832	53,132
Fuel Oil	W.B	6,709	3,556	3,153	N.D	N.D	N.D	N.D	N.D	N.D
Thousand	G.S	-	-	-	N.D	N.D	N.D	N.D	N.D	N.D
Liter	PAL.	6,709	3,556	3,153	N.D	N.D	N.D	N.D	N.D	N.D
Diesel	W.B	6,874,815	464,813	430,256	437,316	413,847	404,713	405,241	392,988	3,925,641
Thousand	G.S	2,828,551	212,961	167,638	119,464	97,237	134,399	70,706	108,084	1,918,062
Liter	PAL.	9,703,366	677,774	597,894	556,780	511,084	539,112	475,947	501,072	5,843,703
Gasoline	W.B	2,668,725	243,473	223,207	217,409	193,140	181,184	171,918	156,921	1,281,473
Thousand	G.S	284,676	48,784	44,663	20,136	843	150	272	370	169,458
Liter	PAL.	2,953,401	292,257	267,870	237,545	193,983	181,334	172,190	157,291	1,450,931

Bio-energy in Palestine

Bio-energy in Palestinian context

Firewood

Firewood fuel wear considered as one of the forms used in Palestine for bio-fuels. The percentage of households using this type of renewable energy is about 34% as of January 2015, ranging from 29% in the West Bank to 43% Gaza, which suffers from a power outage, as the rate of access to the electricity does not exceed 8 hours a day to 81% of households at best. Uses firewood in baking, cooking, and heating water and heating, especially in homes (PCBS, 2015).

The table shows a significant difference in the quantity of imported wood. The quantity has more than tripled in 2010 and 2015 compared to the previous two years, and fell to less than half of the year 2013 compared to the previous year. The irregularity in the quantity of imports and the increase for wood indicates that it is not useful to rely on firewood for power generation except on a limited level, especially in light of the decrease in wooded areas due to the spread of construction of buildings. In addition, the little wood available in the environment, it decomposed without causing pollution (PCBS, 2007, 2009-2015).Table 6 shows quantities of imported wood and charcoal over the past eight years.

Table 6: Imported Wood and Charcoal in Palestine (PCBS, 2007, 2009-2015)

Type of Energy	Region	2007	2009	2010	2011	2012	2013	2014	2015	Total
Wood and	W.B	2,935	5,372	18,661	17,960	24,726	10,073	9,807	2,7917	11,7451
Charcoal	G.S	268	0	0	0	530	77	3	0	878
Ton	PAL.	3,203	5,372	18,661	17,960	25,256	10,150	9,810	2,7917	118,329

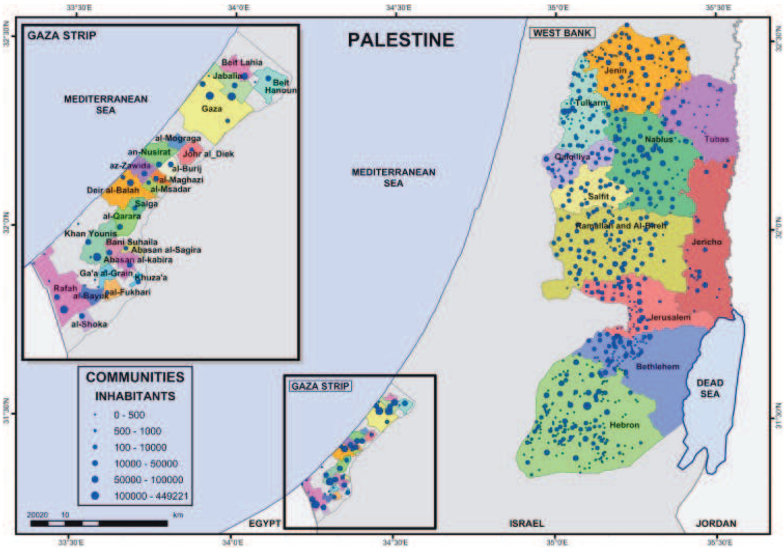
Municipal wastes

Municipal solid waste can be an appropriate solution to the energy problem, especially when it wear processed in small and local anaerobic digestion plants. The environmental impact assessment for the generation of electricity wear evaluated in two anaerobic digestion plants in Palestine. In Dura (Hebron governorate) and in Bethlehem and the life cycle assessment methodology wear used. In each of them, biogas wear used to feed the engine and generate electricity in the grid. For both stations, the results show the following: 1) The energy efficiency of the two plants has less environmental impact for those imported fossil materials; 2) The first station that feeds with animal waste and other municipal waste has a capacity of 137 kilowatts. While the second, which feeds on municipal organic waste, has a capacity of 60 kilowatts (Bacenetti, 2016).

The Gaza Strip is a developing area with a population of about 1.5 million and an area of 365 square kilometers. This high population density produces a high amount of waste, which constitutes organic waste of 65-70% of them. These wastes are currently being disposed of without any recovery of materials or energy. The population of the Gaza Strip wear expected to be about 3 million by 2020, which means increasing waste production in a fixed land area with a corresponding increase in demand for landfills. There is therefore a need to look for alternative solutions to the current and potential impact of waste produced. Biological treatment of biodegradable rich wastes in biogas generation could directly use to generate thermal or electrical power, which provides an alternative solution to the waste problem. This strategy solves the problem of waste and reduces the demand for landfill waste while providing an alternative source of energy. At the same time, landfill gas emissions wear significantly reduced to the atmosphere, helping to address the problem of global warming (Abu El Combos, 2012).

In Palestine waste is disposed of in, dumps mostly open, burned or received at the entrances of residential sites, and roads wear randomized. In the West Bank, nearly half of the household waste is in 156 dumps, most of which are unhealthy, while the other half is on the street or burned. In Gaza Strip, 70% of the waste is disposed of in three major dumps, Deir al-Balah and Rafah, and the rest is burned and dumped along the roads .By the end of 2015, the volume of these wastes is estimated at 1.2 million tons, most of which are disposed of in open dumps, random on street sides, or burned. While the experiences of developed countries show the efficiency of energy production from burning of these solid wastes in advanced facilities, where one ton of these wastes wear obtained from the same amount of energy produced by one barrel of oil. In addition, carbon dioxide emitted from this process is less than that generated from these wastes in open dumps. The amount of energy available from solid waste in Palestine wear estimated at 2.1% of the total energy consumed in Palestine in 2013. This requires, of course, legislation and laws that limit the disposal of landfills, regulate the sorting and collection of solid waste, and encourage the development of energy from these wastes (Mustafa, 2016).Figure 3 shows the distribution of population density by governorate, reflecting the distribution of waste generated.

Figure 3: Distribution of Population Density by Palestinian Governorates



Source: (Juaidi, 2016)

From a computational point of view, a collection of 4,000 to 5,000 kWh / day of electricity wear produced by digesting about 400 tons / day of waste received in the cupflower dump, which accounts for about 50% organic waste, producing enough energy to supply 800 to 1,000 homes In Jenin City. (Al Sadi, 2010) The production of energy from waste gas dumps is a technically feasible option at the site of Zahrat Al-Finjan landfill with some modification of the conditions of the site. The gas collection rates will be about 980m3 / h in the current waste dumps, depending on the humidity and the assumption that the site is full. Gas production in 2017 will be about 1,170 cubic meters / hour of current waste (Integrated Skills Limited, 2013).

The results of the environment economic survey for 2017 showed that the economic establishments in Palestine produced about 16.9 thousand tons of solid waste per month. Most of the waste from the West Bank came in about 13.4 thousand tons per month, while the quantity produced by the Gaza Strip was about 3.5 thousand tons per month. 89.8% of enterprises produced waste of paper and cardboard, the largest amount of waste of economic establishments (PCBS, 2017). The average daily production of household waste in Palestine in 2015 was about 2.9 kg. This average varied between the

West Bank and the Gaza Strip, averaging 3.2 kg in the West Bank and 2.4 kg in the Gaza Strip. The estimated amount of household waste produced in Palestine was 2,551.0 tons per day in 2015, 1,835.0 tons in the West Bank and 716.0 tons in the Gaza Strip (PCBS, 2015).

The classification of solid waste is estimated as follows: 3% metal, 6% glass, 8% plastic, 8% paper and cardboard, 70% organic materials, 5% other (MAAN, 2010). Thus, household solid waste in Palestine reaches 931,115 tons per year (PCBS, 2015). The solid waste of the economic establishments is 202,800 tons (PCBS, 2017). The total is 9,513,950 tons. As the organic waste in addition to waste paper and cardboard reaches 77% (MAAN, 2010), therefore, organic waste, including paper, is 7,325,741,5 tons per year.

Olive Peat

The production of Palestine of this solid fuel ranges from 10 000 to 70,000 tons per year, according to olive season. Palestinian households use this type of fuel for heating and baking, and it wear used for heating in some economic establishments (PCBS, 2015).

In Palestine, during the olive season, from early October to late December, olives wear removed from the wastewater from the process, which includes many forms of olive remains in the valleys. There, they wear mixed with untreated sewage or with rainwater. An urgent environmental problem deteriorates the environment in Palestine. The dumping of untreated wastewater and untreated wastewater into the valleys and waterways of Palestine is a threat to aquifers, waterways and the environment (Shaheen, 2007).

For electricity generation, olive waste will be burned under the closed boiler tank containing water, then after sufficient amount of energy sent from the olive waste to the boiler, the water will start to boil and turn on steam, the temperature will rise and the steam will increase and pressure on the top Of the boiler. This compressed steam wear used to convert plates of external steam turbines in order to make turbine shaft revolve rotor generator and generate electric power (Abu Amro, 2016).

The West Bank annually produces between 47,621 tons and 73,858 tons of olive peat, representing 81.46% of the total olive harvest. While oil is less than 19%, which means that olive peat is the most important material wear used in the field of bio-energy in Palestine for two reasons, the abundant quantity of peat, and its negative impact on the environment (PCBS, 2016, 2014, 2013, 2012, and 2010). Table 7 shows quantities of olive peat in Palestine, while table 8 shows the distribution of olives in Palestine by governorate, and figure 4 shows the distribution of olive quantities in Palestine by governorate.

Table 7: Olive peat in the years (PCBS, 2010-2016)

Year	WB			GS			PAL		
	Quantity of Olive Pressed, Metric Ton	Olive oil extracted, Metric Ton	Olive peat extracted, Metric Ton	Quantity of Olive Pressed, Metric Ton	Olive oil extracted, Metric Ton	Olive peat extracted, Metric Ton	Quantity of Olive Pressed, Metric Ton	Olive oil extracted, Metric Ton	Olive peat extracted, Metric Ton
2016	641,265	164,344	476,921	200,211	37,005	163,206	41,476	201,349	640,127
2014	883,564	212,415	671,149	200,226	35,170	165,056	1,083,791	247,585	836,206
2013	606,492	165,402	441,090	51,802	11,017	40,785	658,294	176,419	481,875
2012	952,158	213,569	738,589	95,468	15,942	79,526	1,047,626	229,511	818,115
2011	850,034	193,072	656,962	85,623	14,468	71,155	935,657	207,540	728,117
2010	910,821	219,148	691,673	110,798	18,392	92,406	1,021,619	237,540	784,079
Total	**4,844,334**	**1,167,940**	**3,946,384 =81.46%**	**744,128**	**131,994**	**612,134 =82,26%**	**5,588,463**	**1,299,944**	**4,288,519 =76.73%**

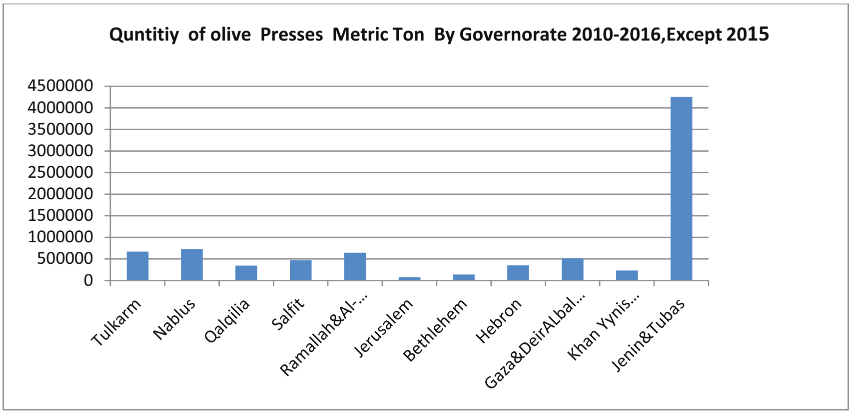
Source: (PCBS, 2010-2016)

Table 8: Quantity of Olive Pressed Metric Ton by Governorate 2010-2016, Except 2015

Governorate	Quantity of Olive Pressed Metric Ton
Jenin & Tubas	4,252,500
Tulkarm	666,398
Nablus	723,575
Qalqilia	345,062
Salfit	466,093
Ramallah&Al-bireh	644,433
Jerusalem	76,983
Bethlehem	137,541
Hebron	351,752
Gaza&Deir Albalah	515,684
Khan Yonis&Rafah	228,446

Source: (PCBS, 2010-2016)

Figure 4: Quantity of Olive Pressed Metric Ton by Governorate 2010-2016, Except 2015



Source: (PCBS, 2010-2016)

Used oil

According to PCBS, the total number of licensed vehicles in West Bank in 2016 was 202,270 the percentage distribution of licensed vehicles in West Bank shows that the majority were private cars 77.9%, on the other hand, the percentage of trucks and commercial cars was 14.4%, Taxis formed 4.5% of the total vehicles. The percentage of agricultural tractors in Palestine was 0.4%, while the remaining vehicles formed 2.8% .The percentage distribution of registered new vehicles in the West Bank by type shows that the highest percentage was for the registered private cars by 82.4% followed by trucks and commercial cars 6.2%. The percentage of taxis was 5.7%. On the other hand, the percentage of the other vehicles, which covers moped, motorcycles, buses, trailers and semi-trailers, road tractors, agricultural tractors, in addition to other vehicles, was 5.7%. Regarding new registered road vehicles in the West Bank in 2016, the monthly average of registered vehicles was 2,194 vehicles (PCBS, 2017).

According to PCBS, Palestine imported 7,120,741 thousand USD of Mineral fuels, mineral oils and products of their distillation; bituminous substances, mineral waxes. In a related context, PCBS points that Palestine imports 1,403 thousand USD of animal or vegetable fats and oils and their cleavage products prepared edible fats, animal or vegetable waxes (PCBS, 2017).

It is clear from the table, that the West Bank imported in 2014 about 3,000 tons of oil, and in the years 2013 and 2015 imported about 2,000 annually. The import of the Gaza Strip is few, and in the case of lifting the siege on Gaza, the quantity imported annually in the West Bank and Gaza Strip doubling and will range from 4,000 to 6,000 tons, all of which will be a major source of pollution of the environment, especially groundwater. Soil and plantations, which makes use of oils as vital energy necessary not only to reduce the import of oil derivatives also to reduce the risk of pollution from used oils (PCBS, 2007, 2009-2015).Table 9 shows the quantities of Imported Oils and Lubricants in Palestine.

Table 9: Imported Oils and Lubricants in Palestine (PCBS, 2007, 2009-2015)

Type of Energy	Region	2007	2009	2010	2011	2012	2013	2014	2015	Total
Oils and	W.B	N.D	1,512	18	10,294	1,755	2,078	2,777	1,015	1,9449
Lubricants	G.S	N.D	0	0	0	214	32	137	68	451
Ton	PAL.	N.D	1,512	18	10,294	1,969	2,110	2,914	1,083	1,9900

Animal manure

The spread of sewage lines in most of the cities and towns of Palestine, and the numbers of livestock in Palestine, and the method of breeding, which tend to barns allow the benefit of these organic waste in the production of energy. We can get 5.6% of the total energy consumed in 2013 from the waste of these animals, and the remnants of cultivated plants (Mustafa, 2016).

That 60% of Palestinian villagers have their own animals, which can use their waste to generate biogas as happens in other countries in the world. There are only three projects at present using this method as follows: 1) Jericho digestion plant: established in 1998 with 5 m^3 active volume; produces about 1 m^3 of biogas and 200 liters of natural fertilizer 2) Founded in 2000 in Al Khodary College of Agriculture in Tulkarm to serve a farm that contains 15 cows. The plant can produce 4 m^3 of biogas and about 700 liters of natural fertilizer per day, the size of 14 m^3 for digestion, and 3 m^3 for the fixed dome, which can store 60% of the daily production of biogas. 3) An Indian-style biogas plant at the Faragla farm in Hebron, as a joint project with the Ministry of Agriculture in Palestine. This plant wear built in 2002 with almost effective size. In 2012/2013, the West Bank alone produced 558,942 tons of animal manure. If the problems of rising animal feed prices wear solved by cultivating and processing the feed components internally, livestock production will increase, so the amount of animal manure will double. The production of manure in Gaza is low because of the wars that affected livestock. However, 70,622 reached. This means that if the political situation improves and there are no new wars, if the feed components are grown locally and their prices are reduced, animal manure in Gaza will also multiply and be a major source of power generation. However, can now be a vital source of energy in the West Bank due to financial difficulties (Al Jabri, 2013).

Biogas wear produced from animal manure, sewage sludge from aerobic wastewater treatment plants and industrial and municipal wastes. Solid and semi-solid wastes such as the organic fraction of municipal solid waste currently disposed on landfills may treated in anaerobic plants saving landfill space and converting the organic material to biogas energy and compost. The mount of biogas potential from animal manure in GS can calculated by considering Livestock Unit (LSU), which represents a live weight of 500 kg and equal to one cow, 8 fattening sheep or 250 laying hens. LSU of chicken, sheep and cow in GS are 33,800, 4,865 and 6,807, respectively. According to biogas yields, one LSU of cow, sheep and chicken produce in average 0.75, 0.6 or 1.25 m^3. Hence, biogas resource from animal manure is around 50*103 m^3 daily, which is equivalent to annual energy resources of 109 GWh. Small community based biogas digesters could introduced in farm, which could supply the farm with needed energy for heating and lighting (Ouda, 2015).

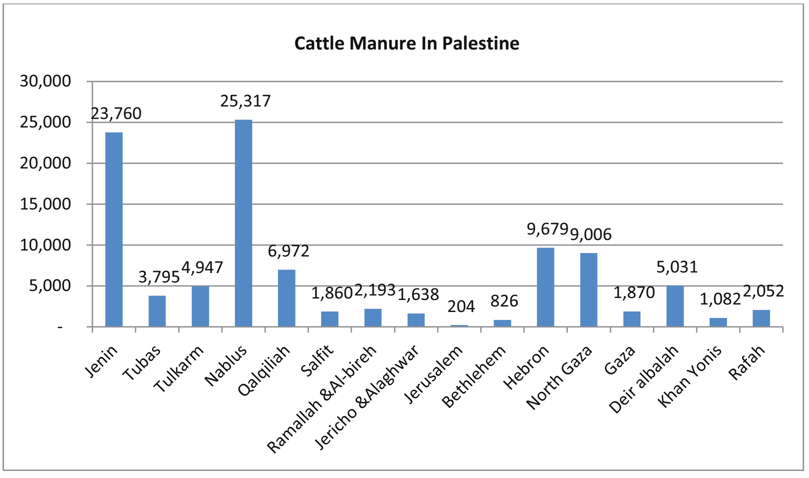
The amount of biogas production from the chicken and cow manure mixture is higher than its production of cow and chicken residues separately, and it is necessary to use different mixtures of organic materials to increase the production of biogas (Hammad, 2016).

The majority of sheep and cattle are concentrated in Nablus, Jenin and Tubas. Most of the poultry are concentrated in Ramallah and Tulkarm, while the majority of the goats are concentrated in Hebron, Bethlehem, Ramallah, Jericho and the Jordan Valley. This means that animal manure exists adequately in all areas of the West Bank. The use of animal manure in energy production is a major source (PCBS, 2013). Table 10 and figures 5,6,7,8 show the quantities of animal manure in Palestine.

Table 10: Manure in Palestine 2012/2013 (PCBS, 2013b)

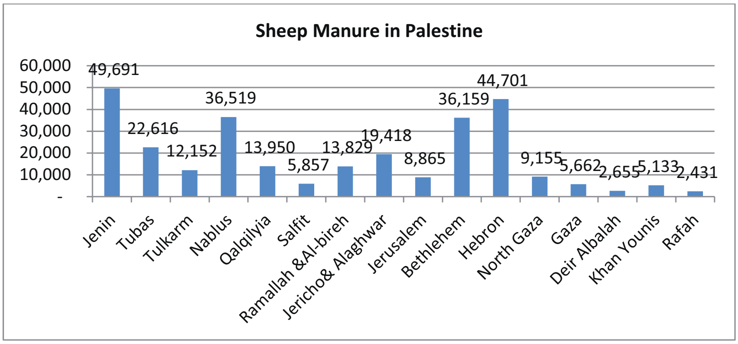
	WB		GS		PAL	
Kind of Animal	Number	Quantity of Manure (m^3)	Number	Quantity of Manure (m^3)	Number	Quantity of Manure (m^3)
Cattle	10,074	81,191	1,858	19,041	11,932	100,232
Camels	473	2,939	242	904	715	2,939
Sheep	505,556	263,757	29,039	25,036	534,595	288,793
Goats	151,072	87,967	4,926	4,141	155,998	92,108
Poultry	70,034	123,088	17,646	21,500	87,680	144,588
Total		**558,942**		**706,22**		**628,660**

Figure 5: Cattle Manure in Palestine 2012/2013 (PCBS, 2013b)



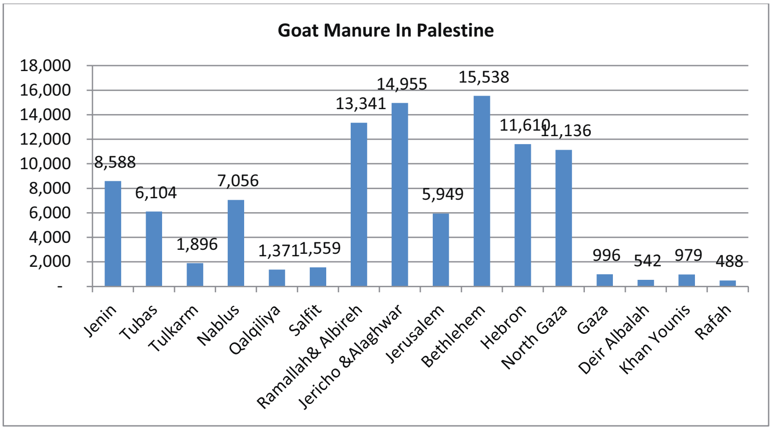
Source: 2012/2013 (PCBS, 2013b).

Figure 6: Sheep Manure in Palestine 2012/2013 (PCBS, 2013b).



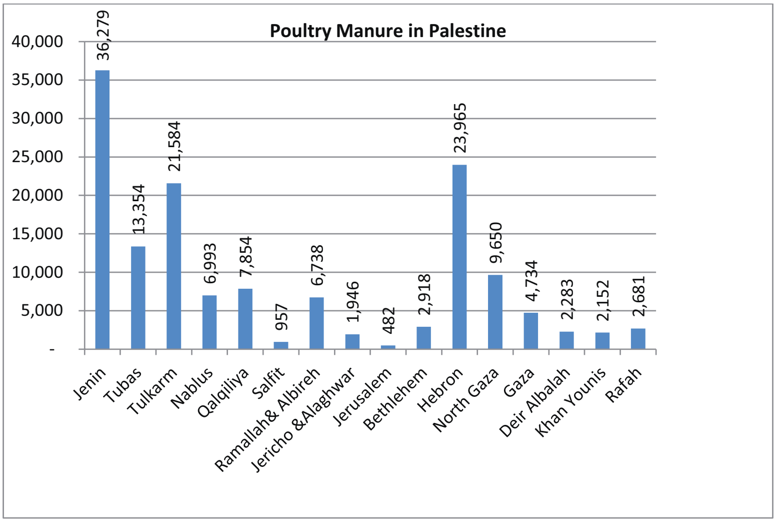
Source: 2012/2013 (PCBS, 2013b).

Figure 7: Goats Manure in Palestine 2012/2013 (PCBS, 2013b).



Source: 2012/2013 (PCBS, 2013b)

Figure 8: Poultry Manure in Palestine 2012/2013 (PCBS, 2013b)



Source: 2012/2013 (PCBS, 2013b)

Cost of bio-energy

Ali (2015) conducted a study on the generation of biogas from chicken manure, using a novel solar assisted system during which she discussed the costs of constructing the plant. The costs of the digestion plant (steel and iron bars, pipes, solar system, storage balloon, agitators, and workers for plant construction) and site preparation for construction. The study excluded the cost of land, because the biogas plant is usually in agricultural land. The total cost of the station was $2,560, as per the following tables. Where all components evaluated at market price to reach final capital and installation costs. According to the study, a biogas plant wear built within a small range of 5.0 m^3. The plant wear operated by permanently supplying poultry waste and was suitable for anaerobic fermentation. The result was that the ratio of solid organic materials was 50%, while the ratio of carbon to nitrogen was 30, and in total, the daily production rate of biogas was 110 liters. In this research, also show that the financial analysis of the biogas plant shows great potential for profit on capital investor. The net present value, the IRR, the cost of the benefit ratio and the repayment period are 3,030 USD, 04.8%, and 1.03 and 3.0 years, respectively. This shows that economic profit wear expected to increase of the project, making investment worthwhile for farmers, since organic material is available (Ali, 2015). Tables 11-18 show details about the biogas plants in Palestine.

Table 11: The full scale cost of biogas plant (Ali, 2015)

Equipment	Cost ($)	Lifespan (year)
Tanks	143	10
Valves, pipes, and connection	702	10
Solar system (solar unit, heat exchange)	226	10
Waste collection tub	100	10
Pump	157	5
Agitators	69	10
Storage balloon	129	5
Sensors (thermometer , pressure meter, and biogas flow meter)	194	5
Structure (miscellaneous)	580	10
Workers expert construction	346	
Site preparation	43	
Total	**2,560**	

Table 12: Operation and maintenance cost per year (Ali, 2015)

Type	Cost ($ / year)
Substrate cost	0
Water consumption	26.1
Electricity	0
Plant worker	0
Replacement	0 48
Total	**74.1**

Table 13: Market value and total benefit of biogas plant considering biogas and slurry value (Ali, 2015)

Name of component	Annual Quantity	Unit price ($)	Annual benefit ($/year)
Saving from using biogas as alternative of natural gas	0.252 m^3	$1.6 per L	420
Biogas production	39.42 m^3		
Amount of the Biogas equivalent to natural gas	17.09 m^3		
Surplus of the biogas after using	16.39 m^3	$1.5 per m^3	24.58
Spent slurry (bio-fertilizers)	10.7 kg/ day	$0.11 per Kg	429.61
Environmental and waste management	0	0	0
Total			**874.19**

In another study by Dania Maraka, a financial analysis of the construction of a family biogas unit fed about 12 kg daily of animal manure produced 234 kg/month of manure and a quantity of bio-gas equivalent 12 kg –bottle of LPG (Maraka,2014).

Table 14: Costs of constructing family biogas unit (Maraka, 2014)

Requirements	Costs (NIS)
1500 L tank	420
1000 L tank	370
Gas and fertilizer valves and connectors	200
Metal base	180
Plastic Pipes	80
Miscellaneous	50
Total	**1300**

Table 15: Monthly Running Cost :(Maraka, 2014)

Hiring Fixing bio gas unit	120 NIS/year = 10 NIS monthly
Water 12 kg/day	2
Total	**12 NIS**

Al Sadi (2010), at the Nablus Industrial School where a 100-liter unit wear used, carried an experiment. It wear filled with 30 kg of organic waste, 30 liters of water (total liquid mix of 60 liters), 4.98 kg of biogas over the 30-day period, the experience that each kilogram of organic waste can produce 0.166 kg of biogas. The study included the following financial analysis (Al Sadi, 2010).

Table 16: Requirements and costs for constructing the family design (Al Sadi, 2010)

Requirements	Cost (NIS)
Digging operation	500
1/2 cubic meter drum(0.4mm)	500
2 rigid plastic pipes	50
Gas valve and connectors	200
Steel non return valve)	200
Miscellaneous	100
Total	**1,550**

In a study of the utilization of the Zahrat al-Finjan waste dump in Jenin, the study estimated that the amount of gas biogas that can be produced by waste quantities in 2013 reach about 980 m^3/h. The study predicted that the production of gas in 2017, about 1,170 m^3/h. The study presented the following financial analysis (Integrated Skills Limited, 2013).

Table 17: Capital Costs (USD) (Integrated Skills Limited, 2013)

Item	USD
Commissioning	$150,000
Pipe work and wells	$140,000
Installation costs	$300,000
Drilling	$225,000
Compressor	$12,000
Shipping of equipment	$30,000
Construction of Gas Utilization Compound	$30,000
Ground flare	$15,000
1X 500 kW Engine	$340,000
1x1MW Engine	$450,000
Electrical Connections (see above)	$230,000
Contingency	$78,000
TOTAL	**$2,000,000**

Table 18: Annual Operating Costs (USD) (Integrated Skills Limited, 2013)

Item	USD
Engineer / Manager (including accommodation)	$80,000
Laborer (high quality)	$25,000
Maintenance costs	$100,000
Gas analysis	$20,000
Engine oil analysis	$10,000
Consumables (engine oil etc.)	$15,000
Transport	$15,000
Other overheads (telephone, insurance etc.)	$20,000
TOTAL	**$285,000**

Economics of Bio-Energy

The amount of biogas that could produced from organic waste depends on two elements namely the nature of waste and the design of the digestive system. Some plants can produce 20 m3 of biogas from a ton of waste, while others can produce up to 800 m3 / ton. Thus, each ton of waste can produce 20-800m3 of biogas. On the other hand, Each 1 (m3) of biogas contains 6kWh. However, when converting one biogas into electricity it produces about 2kWh of usable electricity, and 4kWh turns into heat that.

The 2kWh is enough to run the 100W lamp for 20 hours, or the 2000W hair dryer for 1 hour (www.biogasworld.com).

According to the above discussions, organic waste produced in Palestine per year is as follows: Wood and Charcoal 2,7917 tons, Organic municipal solid waste 7,325,741,5 tons, Olive peat 476,921 tons, Oils and Lubricants 1,083 tons, Animal manure 628,660 tons, the total is 74,391,996 tons. The amount of biogas that could extracted from organic waste, depends on the waste itself and the design of the digester system, it ranges from 20 m^3 per ton to 800 m^3 of biogas per ton. Each cubic meter (m^3) of biogas contains the equivalent of 6kWh of calorific energy (www.biogasworld.com).

In Palestine: 74,391,996 tons* 20 = 1,487,839,920 m^3 of biogas produces (8,927,039,520 kW).Which consist of (2,975,679,840 kW) electric energy, and (5,951,359,680 kW) thermal energy.

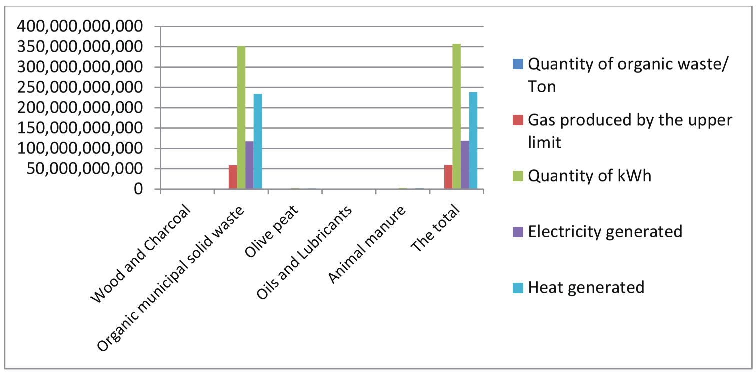
Or

74,391,996 tons*800 = 595,135,96800 m^3 of biogas produces 3,570,815,80800 kW, which consist of (119027193600 kW) electric energy, and (238054387200 kW) thermal energy.

Table 19: Economic of Bio Energy

Item	Quantity of organic waste/ Ton	Gas produced by minimum M^3	Quantity of kWh	Electricity generated	Heat generated	Gas produced by the upper limit	Quantity of kWh	Electricity generated	Heat generated
Wood and Charcoal	27,917	558,340	3,350,040	1,116,680	2,233,360	22,333,600	134,001,600	44,667,200	89,334,400
Organic municipal solid waste	73,257,41 5	1,465,148,30 0	8,790,889,80 0	2,930,296,60 0	5,860,593,20 0	58,605,932,00 0	351,635,592,00 0	117,211,864,00 0	234,423,728,00 0
Olive peat	476,921	95,384,20	57,230,520	19,076,840	38,153,680	381,536,800	2,289,220,800	763,073,600	1,526,147,200
Oils and Lubricant s	1,083	21,660	129,960	43,320	86,640	866,400	5,198,400	1,732,800	3,465,600
Animal manure	628,660	12,573,200	75,439,200	25,146,400	50,292,800	502,928,000	3,017,568,000	1,005,856,000	2,011,712,000
The Total	**74,391,996**	**1,487,839,920**	**8,927,039,520**	**2,975,679,840**	**5,951,359,680**	**59,513,596,800**	**357,081,580,800**	**119,027,193,600**	**238,054,387,200**

Figure 9: Economic of Bio Energy



Challenges and Obstacles

In the light of the Palestinian experience in the field of bio-energy, it is clear that the law governing renewable energy and the relevant policies is the obstacle facing bio-energy in particular and renewable energy in general. The law is the main obstacle and challenge to the development of the sector, especially since the Israeli occupation does not control the vital energy sector because the Palestinian-Israeli agreements that restricted all the Palestinian development sectors did not mention this sector. The negative role of the Israeli occupation is concentrated in the procedures of importing equipment for projects, as well as in the licensing of projects in area C. If they are large, but these facilities could established in areas B, and the small facilities for bio-energy not allocated for trade in do not need any permits whether in area B, or, C.

The following are the main obstacles and obstacles facing the bio-energy sector in particular and renewable energy in general.

There are problems in the field of licenses and procedures of the carrier companies have failed to complete their projects before obtaining licenses from the Energy Authority, which they consider evidence of the complexity and slow procedures (Itmaizeh, 2017).

To obligate all those who invest in generating electricity from the sun for their own consumption to donate 25% of the surplus produced monthly to the benefit of the electricity distribution companies. In addition, whoever establishes a solar power generation system in a different area from the consumption area is obliged to waive 10% of the total production of electricity companies, in addition to the share of 25% (Rantisi, 2016).

Every person who invests in generating electricity from the sun for his own consumption shall be obliged to donate 25% of the surplus produced monthly to the benefit of the electricity distribution companies. In addition, whoever establishes a solar power generation system in a different area from the consumption area shall be obliged to waive 10% of total production for electricity companies, in addition to the 25% share (Rantisi, 2016).

The law forbids the same company to produce and distribute electricity, provided that the project contract with the distribution company, although there is a conflict of interests and strong resistance by the electricity distribution companies to the idea of renewable energy investment, because everyone will turn them will dispense with the services of these companies (Itmaizeh, 2017). Some electricity distribution companies refuses to deal with electricity generation projects because this reduces their subscribers. Of the five distribution companies, only two have cooperated with energy generation partners – because investing in alternative energy contributes to its loss (Marzouk, 2016). To oblige everyone who invests in generating electricity from solar energy, to be sold to national transportation companies. The price that he offers is less than the price we buy from Israel by 10%, that is to give preferential price to the Israeli Electricity Company instead of granting this preferential price to the local investor in the context of the Authority's efforts to reduce dependence to Israel in supplying electricity (Rantisi, 2016).

Energy projects need large funding, and Palestinian banks cannot provide this funding, and if provided will be of high interest and repayment period does not exceed 6 years. This is not enough time for the project to return its expenses (Rantisi, 2016).

Marginalization of Renewable Energy Facilities in Resolution No. 14 of 2015 on Renewable Energy and Energy Efficiency, seven institutions wear considered fundamentally related to the renewable energy sector, including power generation facilities. Namely, the Palestinian Energy and Natural Resources Authority, the National Electricity Transmission Company, the Palestinian Center for Energy and Environment Research, the Electricity Regulatory Commission, the Energy Services Companies, the Distribution Companies and the Renewable Energy Facility. Authorities wear allocated to different institutions except for energy generation facilities whose role is to adapt to policies and to make decisions. The law did not give them the name of companies, although the costs of the facility, if huge, could reach millions of dollars.

Under Article 4: The Palestinian Energy and Natural Resources Authority and in cooperation with the relevant authorities: To develop the energy strategy, national plans and general policies related to the development of the renewable energy sector and to improve the energy efficiency and review it periodically and to submit it to the Council of Ministers for approval. Identify geographical locations where the potential for renewable energy sources can be exploited and prioritize the development of these sites in line with the renewable energy strategy. Develop and adopt mandatory technical specifications, standards and instructions related to renewable energy sources and energy conservation systems, granting licenses for the establishment, management, operation, and maintenance of electricity generation projects, from renewable energy sources. Prepare proposals for regulations and regulatory procedures and means to rationalize energy consumption and improve its efficiency, and its placement to the Council of Ministers for approval. Setting the electricity tariff, incentive conditions, subscription fees, linkage costs, extensions, insurance and other services related to renewable energy projects and submitting them to the Council of Ministers for approval. Issuing and modifying the network code and distribution code and complying with them. To approve energy services companies to carry out the energy audits, licensed by the Ministry of National Economy, issuing the instructions on the conditions of granting the licenses and the conditions for submitting competitive bids. Issuing instructions for renewable energy projects provided by the direct offer, which granted grants and assistance or loans for easy financing and placement to the Council of Ministers for approval (A.L.B, 2015).

Article 5: The Electricity Sector Regulatory Council shall monitor the implementation of policies relating to the generation, transmission and distribution of electricity generated from renewable sources of energy monitor the implementation of its agreements and comply with the conditions stipulated in the licenses. Recommend to the Energy Authority to accept, deny, renew, withdraw or assign licenses to renewable energy facilities. Recommending to the Energy Authority the regulations and regulations governing investment in renewable energy projects and the sale of electricity generated from renewable energy sources and facilities. Recommendation to the Energy Authority to determine the electricity tariff, incentive conditions, subscription fees, linkage costs, extensions, insurance and other services related to renewable energy projects. Setting the regulations regulating the sale and purchase of electricity generated from renewable energy facilities and systems, setting instructions for net measurement (A.L.B, 2015).

In accordance with Article 6, the National Transport Company shall study transport networks. Prepare the network code and submit it to the Energy Authority for approval. Determine the map of the projects of the construction of power stations associated with the switching stations and the implementation of purchase agreements, and linking these facilities to the transport system (A.L.B, 2015).

Under Article 7, electricity distribution companies shall specify technical standards in renewable energy facilities linked to the low pressure of applicants to sell electricity produced from renewable sources of energy for linking them to distribution networks. Studying the distribution network and signing the necessary agreements and contracts with the applicants for the sale of using the net measurement system in coordination with the Energy Authority and the Council (A.L.B, 2015).

In accordance with Article 8, the Palestinian Center for Energy and Environment Research shall conduct studies. Research and experimental projects for the development of renewable energy sources, means and guidelines for energy conservation and assessment of the environmental impacts associated with their uses, in cooperation with universities, scientific research centers, ministries and related institutions. Cooperation with relevant ministries, and local, regional, and international research centers, and review of studies and atlases and national plans for renewable energy and energy efficiency, direct local manufacturers and importers to upgrade the efficiency of the electrical appliances used in the domestic, commercial and service sectors. Review the procedures and data of the energy audit of the establishments in different sectors, carried out by distribution companies and licensed energy services companies. Identifying the energy label and its categories, in cooperation with the relevant authorities. To disseminate knowledge and awareness of the applications of renewable energy, and means of energy conservation in all sectors, and cooperate with the Ministry of Education. To introduce the concepts of energy conservation in school curricula, and to guide charities, and civil, and religious organizations to adopt these programs and activate them in different sectors, preparing training courses in the field of renewable energy and energy efficiency for all concerned parties. Recommend to the Energy Authority the regulations governing the procedures and means of energy conservation and improvement of efficiency in different sectors (A.L.B, 2015).

Under Article 10, licensed electricity distribution companies and the transport company must link the renewable energy facility and load the electricity generated from it on its own network under the regulations issued to implement the provisions of this resolution by law. The loading rules specified in the network code or distribution code shall be complied. Law (A.L.B, 2015) shall determine the costs of linking the renewable energy facility to the transport system or the distribution network and its mechanism of payment under the regulations issued to implement the provisions of this resolution.

The law distinguishes the powers of all institutions, except the power generation facilities that are located in the recipient's site for the policies and decisions of other institutions, which these institutions can support or weaken. Some of the above institutions are government, some are private and some are mixed, and there are interests that wear reflected in their entirety negatively on the power generation facilities. “There is strong resistance from electricity distribution companies to the idea of investment in solar energy, because everyone who is going to switch to solar energy will miss the services of these companies," (Itmaizeh, 2017).

As well as the statement of the director of the Hebron Electricity Distribution Company, "There is no doubt that investment in alternative energy, and increasing reliance on it contributes to our savings. Nevertheless, we support all those who wish to use alternative energy from our subscribers from a national perspective and to contribute to the independence of the energy sector from Israel" (Marzouk, 2016). Based on the above, out of five distribution companies in the West Bank, but only two companies that cooperate with power generators, and the other three refuse to cooperate (Marzouk, 2016).

The idea in the previous paragraph raises another issue that constitutes another impediment to the renewable energy sector, including bio-energy. The law lacks guarantees. In other words, the paragraphs that wear already quoted from the law relating to the powers of institutions do not have mechanisms to obligate institutions. The objectives stated in Article 2 of the law, which states that the law aims to: Encourage the exploitation and development of renewable energy sources, and benefit from their applications to increase their contribution to the total energy in the energy balance and achieve the increase of the safe in accordance with the strategy of renewable energy. Maintaining energy through its optimal use in different sectors and contributing to meeting the requirements of sustainable development, protecting, and preserving the environment. Encourage local manufacturing and utilization of high-efficiency energy consuming equipment and equipment and renewable energy applications systems.

The final point of this study is that the price of selling electricity from bio-energy is much lower than the price of selling electricity from solar or wind energy, which would have a negative impact on investment. This is clear from the table, which is the Palestinian cabinet decision for 2012 on regulating the use of renewable energy in Palestine. Table 19 shows the prices of purchasing renewable energy in various branches according to the decision of the Palestinian Council of Ministers.

Table 20: Decision of the Palestinian Council of Ministers, for the year 2012 on regulating the utilization of renewable energy in Palestine. No. (16/127/13 / MW / SF)

Distinctive tariff for electrical energy produced from solar energy using solar cells	
Combined capacity	Price (NIS / KWh)
15-50 kilowatt	0.90
50 kilowatt-5 Megawatt	0.72
More than 5 Megawatt	0.68
Distinctive tariff for electrical energy produced from solar energy using solar cells Concentrated heat	
Combined capacity	Price (NIS / KWh)
Up to 5 megawatts	0.73
Up to 20 megawatts	0.71
Distinctive tariff for electrical energy produced from wind power	
Combined capacity	Price (NIS / KWh)
Up to 1 megawatts	1.07
More than 1 megawatt	0.44
Distinctive tariff for electrical energy produced from biogas from waste dumps	
Combined capacity	Price (NIS / KWh)
Up to 6 megawatts	0.29
More than 6 megawatt	0.18
Distinctive tariff for electrical energy produced from biogas resulting from animal manure	
Combined capacity	Price (NIS / KWh)
Up to 50 kilowatt	0.29
More than 50 kilowatt	0.20

According to the director of the project of bio-energy production of al-Jabreeni dairy products, one of the disadvantages of the project is very high cost compared to solar energy, and the sale price of kilowatts of electricity, because the project is very low investment price of purchase, which makes the period of capital recovery requires 12-14. Generators need to renew every six years (Anabtawi, 2017).

Because of the aforementioned obstacles, investment in alternative energy tools and technologies has declined due to the poor feasibility of investing in renewable energy in Palestine, although such projects could be highly feasible according to experts because of the availability of the sun almost every day of the year. The development of projects in this area is blocked. The owner of a company that was investing in alternative energy tools and technology attributed the shift of the group, after years of its inception in 2006, to "the reluctance of citizens to use alternative energy and equipment as “useless” them, he said, “. The recovery of the price of the system was achieved within 3 years, but today it needs 7 years.”(Itmaizeh, 2017).

In 2012, the Council of Ministers approved the National Renewable Energy Strategy for the Regulation of the Exploitation of Renewable Energy in Palestine, which aims at exploiting renewable energy sources, to increase its contribution to total energy by 25% by 2020. Director General of the Palestinian Center for Energy Research "The share of renewable energy from the volume of consumption will be 5% until 2020. Even the origin of this volume should be encouraged to invest in this sector through legislation and laws, in the general strategy of renewable energy." (MAAM, 2016).

Finally, despite the passage of 8 years of the National Renewable Energy Strategy on Regulating the Exploitation of Renewable Energy in Palestine, the renewable energy investment projects registered with the Energy Authority amounted to 13 projects producing more than 30 megawatts of power in various areas in the West Bank. Including existing electricity distribution networks, while the remaining 10 projects wear implemented, in addition to the projects carried out through municipalities and local councils (Itmaizeh, 2017).

The start of the Palestinian and Jordanian experiments coincided with the establishment of solar power generation projects together, but the results were different. In Jordan, renewable energy currently accounts for 7% of the electricity consumption mix in the Kingdom, while only 0.5% in Palestine. Observers attribute the limited renewable energy projects in Palestine to the absence of a legislative environment and incentives for private investment in these projects. And the weakness of management and follow-up by the Electricity Sector Regulatory Council and the Energy Authority, the Energy Authority, in addition to the lack of real financial facilities at competitive prices and competition for investors (Rantisi, 2016).

Conclusion

There are two main points: Bio-energy technologies that wear based on the transformation of waste into energy are economically viable. The second point is that the facilities that carry out this operation do not need permits either from the Israeli side or from the Palestinian government. Hence, its presence is very necessary in Palestine because of the suffocating economic crises, and of a crisis in dealing with waste and high costs of burning or burying waste.

In Palestine, there are real opportunities to invest in bio-energy from four sources, namely organic waste, olive oil, used oils, and animal manure. On the one hand, the first three sources wear characterized not only by their availability, direct profit from the price of electricity generated, and the cost of fertilizer produced by the process. By the indirect benefits of providing high costs for the disposal of municipal waste, the production of energy from animal waste saves the costs of importing chemical fertilizers. Animal waste in its normal state produces foul odors that lead to dependence on chemical fertilizers. Send them a foul odor and can therefore become a good choice for farmers.

The Israeli occupation does not control the vital energy sector because the Palestinian-Israeli agreements that restricted all Palestinian development sectors did not mention this sector. The negative role of the occupation The Israeli occupation is concentrated in the procedures for importing equipment for large projects, Were large, but these facilities could be set up in B areas. Small non-commercial bio-energy facilities do not require any permits, whether they are in B, or C.

There is a Palestinian consensus, on the need to pay attention to renewable energy in general, including bio-energy. Development of ambitious strategies achieved on the ground far from the ambitious goals because of a set of legislation and policies and decisions of government institutions, private and mixed, which gave them powers without guarantees on achieving the desired goals.

Often, the logic behind this system of legislation and policies is the fact that the State of Palestine has relied almost exclusively on customs and taxes related to import operations in general, and the importation of energy in particular, in addition to the fees levied on government transactions. While production, whether industrial or agricultural or energy-related is not a key element of revenue. Financial policy has overcome economic development strategy.

The reason for the problems mentioned above is that the State of Palestine relies on customs and taxes resulting from imports rather than on the idea of self-sufficiency. Customs and fuel taxes are among the most prominent revenues of the Palestinian Ministry of Finance. Hence, the law supported companies that import energy, and placed the burden on investors in generating power, hence potential investors found the law a hindrance, in addition to policies related to investment promotion did not include the power generation sector.

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