Potential Ways to Lessen Dependency on Foreign Energy Sources in the Palestinian Territories of the Gaza Strip and the West Bank

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**Abstract:** To meet their own power needs, the Palestinian territories (PT) rely on outside resources. They obtain roughly eighty percent of their electrical power from nearby nations. Notwithstanding the fact that the cost of various fuel types is driven up by this dependence, individual usage ranks as the least expensive. With the explicit intention that a greater degree of reliability and stability in the supply of energy may be reached, the objective of this attempt is to lessen the nation's dependence on foreign energy sources. This essay will make an effort to describe the existing energy requirements in the PT and assess the various options for lowering the dependency on outside sources of electricity. The initial phase in reaching this aim is to implement straightforward and transparent energy policies, leading to initiatives and plans of action designed to promote the use of energy generated from renewable sources. Among these solutions is investing in clean energy sources, as PT has a strong chance for ultraviolet rays, large quantities of carbon dioxide, high gusts of wind in some locations, and experience using thermal power for household purposes.

**Keywords:** Foreign energy; Gaza strip; Palestinian territories; Household sector consumption.

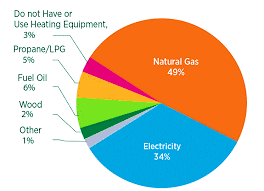
# Introduction

The general public's ability to survive depends on electricity. Accessibility is significant in relation to the development of comfort and complexity in residents' standards of living, and it serves as a benchmark for a country's financial performance. In fact, it plays a crucial role in speeding up the economic wheel. Owing to the prolonged military rule of Palestine, the financial sector of the Palestinian territory is badly neglected. The PT's facilities, including the provision of energy, were gravely ignored throughout this time. This really led to a variety of energy issues and prevented any genuine advancement in relation to various resource conditions. The Palestinian Territory (PT) is separated between the southern portion of the West Bank and the border with Gaza. The PT map is shown in Fig. 1. Throughout WB, GS, and East Jerusalem, the latter of which is also a component of WB, there is no architectural consistency. Additionally, other PT regions are negatively impacted by militarized rule, colonization operations, and administration. Based on the OSLO Protocol, the land in WB has been separated into three different sorts of areas: A, B, and C, with area C being the majority of the total territory [1]. No initiative in this region can be carried out without the Israeli government' prior consent. The creation of a solid foundation for the electricity industry and the other linked operations is nearly unthinkable given these enormous constraints. Numerous Palestinian towns endured years of hardship due to depleting or unavailable sources of energy. As a consequence, such towns' growth in revenue is negatively impacted, and the cost of fossil fuels has soared in comparison with their nearby neighbours [2,3].

In addition, awareness of and usage of clean energy sources are not at a suitable level, and environmental contamination from traditional energy sources truly endangers several facets of society. Other potential applications in the field of renewable energy are quite restricted due to insufficient funding in this area, with the notable example being solar hot water heaters. The Israeli Electromagnetic Service supplies the vast majority of the electric power to the Palestinian areas. This power grab has an impact on electricity prices and deficits, and the possibility of an energy crisis is on the horizon in the not-too-distant future. Many tiny, rural settlements in the PT are without a power source [3]. Given that the majority of such settlements are in Region C, reconnecting them to the current grid is challenging owing to geopolitical and budgetary restrictions. Diesel-powered generators are occasionally utilized to temporarily power a portion of these settlements, usually overnight. In addition to having a high cost of production, these little diesel generators damage the environment with their emissions. The creation of the sector of sustainable energy to meet the higher demands of the energy market is obviously beneficial and attracts a great deal of attention due to the multiple challenges (economic, political, geographical, ecological, and infrastructural) in the electricity sector in the PT. Because the resources that are not needed to enable the mining and extraction of petroleum-based products are merely scarce, accelerating the growth of the environmentally friendly power industry is valuable [4,5].

# Energy demand

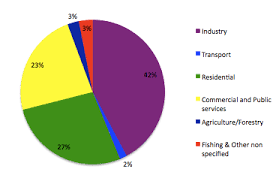
The PT has a 6569 km2 region, compared to 56324 km2 for the WB and 375 km2 for the General Service. Israeli forces encircle the bulk of PT. Genuine Israeli authority extends to other minor areas along the borders. The PT is situated in a climate zone that transitions from the waters of the Mediterranean to desert and tropical areas. The climate in Israel varies greatly. In PT, you'll find four distinct climate zones: the river Jordan valley, mountainous hills, and coastal locations. Whereas the mountainous regions of B.G. get chilly winters with mild summers, the coastline zone experiences pleasant winters and hot, humid, scorching summers. The winters are cold, and the summers in the Jordon Basin are both hot and humid. Although thermometers tend to be lower in highland places than in coastal ones, they are usually higher in the Jordon Basin. The net exporter of petroleum goods and oil is Israel. Although the PT is thought to have the least overall energy usage in the area, its expenditures are very expensive in contrast to its neighbours. The domestic sector is where the vast majority of this intake is used. The majority of the various transported petroleum-based substances used in PT come from Israel, with the remaining amounts being obtained from Syria and Gaza. Figure 1 shows the different types of heat energy used for household [6].



**Fig. 1** shows the different types of heat energy used for household

# Electricity sector

In the past ten years, the percentage of PT houses connected to the electricity grid has grown, rising from 96.7 percent in 2000 to 96.56% in 2022. However, a significant portion of homes experience power outages. Additionally, the power grid has large distribution expenses, a sign of poor supply. Below is content that displays the number of homes that were grid-connected in various years between 1999 and 2021. Electricity systems in PT are classified as distribution lines, with the energies that cross them ranging from 0.4 kV to 33 kV. The networks in question get an electrical voltage of 26 kV or 39 kV through Iso. Egypt and Jordan provide two more points of access to PT networks. The amount of electricity that can be provided from both of those connection sites is constrained. The link with the Jordanian infrastructure is in Jericho, West Bank, whereas the point of entry for the Egyptian infrastructure is in Rafah, West Bank. The three different sources of electrical power combined cannot supply the PT with the necessary power. For instance, the current capacity installed for the WB is expected to be used up by about 800 MW, whereas the IEC only produces about 730 MW of power. This deficit hinders growth in the economy by affecting the growth of infrastructure. Figure 1: Palestinian Territory Map Sustainable and Alternative Energy Review, 28 (2013), 117–129 119 activities by M.S. Shafi et al. That motivates the investigation of potential solutions to meet these demands. Four companies—Jerusalem Regional Electric Company, Southern Energy, North Electrical Transmission, and Tubas Districts Electrical Company—provide energy to Palestinians in the West Bank. These businesses buy power from IEC and Jordan and then sell it to the Palestinians. By acquiring power through IEC and Egypt, for example, the Palestinian Electrical Corporation performs this function in GS. Only a small percentage of GS's energy requirements are met by the Palestinian Electricity Businesses relatively meagre power generation in GS. IEC is the principal source of energy. Although following image provides information on monthly power purchases, Fig.2 outlines the supply of electricity that various sources obtained for the Tp power systems in 2022 [7].



**Fig. 2** shows the electricity used in different types of sectors

# Household sector consumption

In the PT, homes are regarded as the most energy-intensive industry. In order to gain insight on various power-consuming devices utilized in houses, electricity use, and consumer behavior, the Palestinian Central Bureau of Statistics (PCBS) performs a specific household power survey three times every year. The results of the home fuel census provide multiple pieces of statistical information on fuel and power usage by families as well as societal trends by resource category. For the month of January 2011, various information on residential energy consumption is available. The average home usage of different kinds of energy in January 2011 is shown in Figure 2. The chart makes it clear that the median energy usage of the various varieties is fairly modest. The same holds true for using power [15-20]. Figure 2 displays the typical home energy use for a while between 2020 and 2022 to highlight the usage patterns for both WB and GS. The average monthly use of power in the month of January 2010 was 50.2 percent kWh, which is approximately 650 kWh annually. When compared to nearby nations, where the mean yearly power use per person in the Arab world is around 3300 kWh, it is extremely low. From country to country, this percentage fluctuates. The amount of power used by households in the PT is impacted by several variables [21-25]. Although it is impossible to make generalizations about energy usage in Palestine, there is a pattern that shows that summertime electrical usage is higher than that of other seasons. The affordability of a power source during the week, the accessibility of renewable power sources that may be employed for the generation of lighting, the widespread implementation of air conditioners in previous seasons, and the use of solar heating systems in warm weeks to generate hot water without using power are some of the primary variables influencing the amount of electricity used [8].

# Renewable energy applications

` Energy sources, including sunlight, wind, and bioenergy, are accessible on Palestinian territory and have exciting prospects at various locations. However, their role in electrical balancing does not account for this accessibility. Developing these assets to increase electricity dependability and reduce ecological effects while also taking financial factors and energy security challenges into consideration is one of the objectives of the Palestinian administration [26-29]. In fact, it is going to end with a more autonomous Palestinian electricity sector. The Philippine government must be equipped with both large and tiny alternative energy sources to fulfil this goal. The affordability of resources from nature and the necessary technologies supports the realization of such initiatives, notwithstanding technical as well as monetary challenges. In the PT, a variety of governments and nonprofit organizations (NGO) are involved in both the energy and environmental industries [30-35]. The Palestinian Electricity and Conservation Research Institute, the Palestinian Electricity Authority, and several educational places, among others, are some of them. One of the national college’s academic places, the Energies Research Unit focuses on study and development in several subjects related to renewable energy sources. The authors of Reference undertook research with the goal of estimating the percent of green electricity creation that will contribute to the total electrical energy use of the PT. Researchers came to the conclusion that these contributions may substitute for around 35% of the PT's necessary energy needs [36-40].

## Solar energy

Palestinians are blessed with strong ultraviolet (UV) capacity and year-round high levels of sunlight. The mean yearly radiation from the sun on horizontal surfaces is around 5.8 kWh/m2, and there are roughly 3100 hours of sunlight overall. These numbers are fairly substantial and favourable to the utilization of sunlight for solar panel programs, sunlight for heating water, and various other uses. The monthly mean of the everyday ultraviolet (UV) rays impacting on a vertical surface at a site in the northern part of the Western Bank is shown in Fig. 2. PV construction faces a variety of difficulties, whether it is on a small or large scale. Such challenges could prevent the method from spreading [41-44]. Any rooftop solar power development typically needs significant financial and technical assistance, access to highly skilled individuals for design and setting up, availability of floor space and infrastructure for battery storage, reserve energy sources, if necessary, and connectivity to the grid. Smaller freestanding PV installations are typically much simpler to fund. The strategy for capitalizing on solar energy technologies must commence with modest projects since the successful completion of these pilot-size developments will encourage more investments in larger-scale programs [9, 45-50].

## Solar water heaters

One of the keys uses for this kind of energy is the conversion of sunlight into thermal power. Fruits and veggies are dried and preserved using PT, in addition to vacuum warming and extraction of water [10]. Around 69.7% of all families in the PT use sun lamps. In the case of the PT, it had been in use since 1970. The thermosyphon looping structure is its most extensively utilized form and is found throughout the PT [11]. The accessibility of its essential supplies on the Palestinian marketplace is one of the factors contributing to its expansion within the PT. Its expenses are reduced because it is installed and produced domestically [12, 51-54]. Its overall price (local marketplace value) is roughly $250 when installation is included. For roughly nine months out of the year, use of this system is adequate to meet the regular warmth needs of a household of 6–10 people. In these instances, additional water heater types that use gas, electricity, or fuel and have significant fuel expenses can be eliminated [13]. In reality, the basic payback times for these kinds of daylight heating are short. Utilizing heat from the sun lowers household’s usage of petroleum-based fuels and electricity [14]. The above is viewed as a huge benefit as it eliminates the need to buy such petroleum products from Israeli enterprises.

# Conclusion

The PT will become less dependent on its neighbouring nations for its demands in terms of power and fossil fuels as a result of investing in clean energy infrastructure. Any business operation in the PT's energy industry must overcome several financial, technological, and legal obstacles. Part of these challenges are rendered less important by the reality that certain uses for renewable power can be regionally begun. Such small-scale business projects seek to get over governmental and geographic constraints, and because their expenditures aren't too large, it's simple to secure local or international funding. If such endeavours are successful, more funding for future research may be encouraged. This phase is crucial for ensuring Palestine's sovereignty in terms of energy suppliers. The dependence on domestic energy sources will additionally assist in preserving Palestinians' way of life and boost their economic development, particularly in more distant locations where the availability of electricity resources allows them to develop their own economic systems. The availability of electrical power in faraway locales helps indigenous individuals survive because they believe that their own particular territories are perpetually in danger of being taken from them.

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