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STUDY AND EVALUATION OF THE ECONOMIC FEASIBILITY OF THE PHOTOVOLTAIC SYSTEM FOR SOME AREAS LOCATED ON ONE LATITUDE OF IRAQ

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Abstract

This paper presents the application of photoelectric system in provinces of Iraq with the same latitude: Babylon, Karbala, and Kut. The work was simulated using HOMER software to find out the economic feasibility and material costs of the photoelectric system, calculated the total net cost of the system, the total annual cost of the system, the cost of the capital, the capacity to convert power in the transformer, the power generation capacity in the panels, the cost of power, the extent of battery productivity, battery life, the number of batteries, the self-charging of the battery, the extent of the production of the solar panel, the excess electricity, and the lack of capacity for these provinces. The results have been very close for all those provinces

Keywords: Photoelectric System, economic feasibility, HOMER, power generation

1. Introduction

The world as a whole is moving to work and invest in the field of photoelectric system, and according to available types (solar, wind, hydraulic, living mass). It is possible to install solar energy at home, which leads to savings in the bill and can be considered an investment in this area by reselling surplus electricity. The average life span of solar systems is estimated at about 25 years in residential applications. It is non-contaminated, does not contain moving parts that may collapse, require little maintenance and without supervision, and operating and maintenance costs are low. Remote areas can easily produce their own electricity supply by creating a small or large system as needed and is cheaper than others [1] and independent also provides an important source of energy for remote rural areas not connected to the main grid[2]. Solar panels can be used to reduce costs for water heating [3]. Photoelectric system is a promising and possibly important technology and the future of the sustainable energy of human civilization in the near future [4], the main determinant of the system is the efficiency of the solar panel and the amount of radiation energy, which in turn depends on the hours of day, months of the year, longitude and latitude. Renewable energies are an important option not only forOil-poor countries but also for oil-rich countries, as fossil fuel sources are nearing depletion. Increased advances in solar cell efficiency and reduced cost-effectiveness, and clean energy initiatives in solar energy production with Japan[6] from the problem facing the photovoltaic system in the cost of manufacturing, which is expensive and almost inevitable to operate only [7]. Solar energy is important for all countries because of the growing energy needs of the rapid depletion of fossil fuels as well as the pollution caused by fossil fuels, which is known as the main energy sources, which is why countries have begun to give critical importance to renewable energy source[8].Energy means a major obstacle to present-day civilization, i.e. the lack of enough food, warm shelter and internet access. The development of modern energy trends requires promising new technologies and even new physical and chemical processes to create and operate effective power generation systems, assemble, convert and transfer to different forms.Not all Arab countries rely solely on fossil fuel energy, including negative health and environmental impacts, and have turned to clean, low-cost energy. The photovoltaic system was applied using Hybrid Optimisation Model for Electric Renewables (HOMER)to calculate the cost and economic feasibility of the Hospital of the Friends, and self-charging of the battery, for the total net cost of the system, and the total annual cost of the system.

2. Theoretical Part

The economic feasibility and material costs of the photoelectric system were calculated through the elements of the system available in Iraq using HOMER, a program that is a model of renewable energy with specific loads of 100kW), HOMER is the renewable energy system for the total costs of installing and completing the system during the period, a program used with a combination of generation and electricity storage techniques and by the independent or connected network.Photoelectric systemconverts solar energy directly into electricity [9]. The complete system usually consists of solar cell panels, batteries, transformers, load controls, circuit breakers and wires[10]. This system relies directly on sunlight and affects the value of solar radiation falling on a horizontal surface: location or latitude, seasons of the year (winter or summer, for example), weather factors such as clouds and dust, temperature, time during the day.The photovoltaic system consists of solar cells and is an electronic device produced from the sun's bright light on the solar cell both the electric current and voltage of electric power generation[11] which in turn converts solar energy into electrical energy. Within this range, UV light is distinguished from visible light to the human eye and infrared lightphotovoltaic system batteries: The battery converts chemical energy into electrical energy[12]. It is the element responsible for storing electrical energy produced from panels during the presence of solar radiation and is then used during the absence of the sun or even in daylight if the capacity of the electric loads to be operated is greater than that of the solar panels[12].In this study we selected a type of 12-Volt battery available in Iraq and a suitable price and good work.

The power adapter's mission is to process and control the flow of electrical power by providing voltages and currents in a suitable form for the load.

Net system cost: Including all amounts paid for both solar system construction, tensile and switching costs, repair and operation costs plus cost of purchasing energy from the grid.

3. Results and Discussion

To match the results obtained in the Tables (1-4)and the Figures (1-4) for all the provinces selected for the study we can collect in order to distinguish the similarity between the results.

Table (1) Daily load as opposed to the main components

Daily pregnancy Day/ *kW*	***kW*h/$**	**Power generation capacity in panels**	**Power conversion capacity in the transformer *kW***	**Number of batteries *kW*h**	**City name**
1-100	0.064-0.488	1-26	1-14.5	3-12	Babylon
1-100	0.488-0.064	1-26	1-14.5	3-12	Karbala
1-100	0.488-0.063-	1-26	1-14.5	3-12	Kut

Table (2) Daily load as opposed to the economic feasibility of the extent of solar panel production

Daily pregnancy Day/Kw	Lack of capacity Kwh/year	Excess electricity Kwh/year	Solar panel production Kwh/year	City name
1-100	0-1874	5472-1379	1792-46591	Babylon
1-100	0-1821	5500-1375	1795-46662	Karbala
1-100	0-1830	5525-1380	1793-46606	Kut

Table (3) Daily load against the economic feasibility of battery productivity

Daily pregnancy Day/Kw	Number of batteries kWh	Battery life year	Self-charging battery year	Battery productivity Kwh/ year	City name
1-100	3-12	6-10	179.71-718.85	33-9225	Babylon
1-100	3-12	6-10	179.71-718.85	34-9289	Karbala
1-100- 1	3-12	6-10	179.71-718.85	30-18988	Kut

Table (4) Daily load against the material costs

Daily pregnancy Day/Kw	The cost of capital$	Cost per Year $	Net total cost $	City name
1-100	1693-23000	128-1799	2280-28769	Babylon
1-100	1693-23000	128-1799	2277-28886	Karbala
1-100	1699-23000	128-1799	2277-28818	Kut

We find that all the results of all sites are close and there are no significant differences, allowing us to take the rate as in Figure (1). Figure (1) shows the convergence of the elected provinces using HOMER, the optimal system of PV power system for daily carrying (100-1kW/d in terms of batteries, power conversion capacity in converted, power generation capacity in panels) PV panel, energy costs (COE) and values are (12-3 kWh,1) up to 14.5 kW, 26-1 kW, (0.0635 - 0.488 kWh) respectively. The results of the Table (2) we find that all the results of all the sites are converging allowing us to take the rate as in Figure 4 .

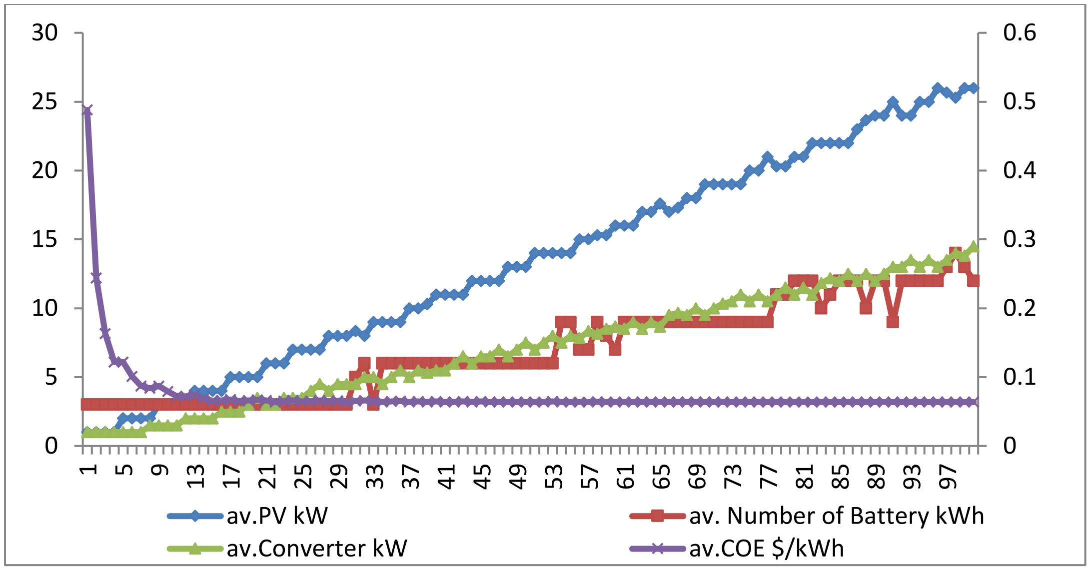

Figure 1 Rate in daily pregnancy versus the rate of the main components

Figure (2) showsthe convergence of the elected sites using HOMER, the optimal system of PV power system PV for the relationship between daily load (1-100) kW /day and the following technical standards (power board production, lack of capacity and excess electricity) for the provinces studied in Iraq are Babylon, Karbala, Kut, respectively. Similar in the three provinces vs. loads (1-100) kW/d, the production of the tablet is (1733.34 to 44620.67 (kWh/year), and the lack of capacity is (0 to 1832.667 kWh/year) and electricity is excess (1957.667 to 5499) kWh/year for daily load (100-1k/w.1/ /kwh).

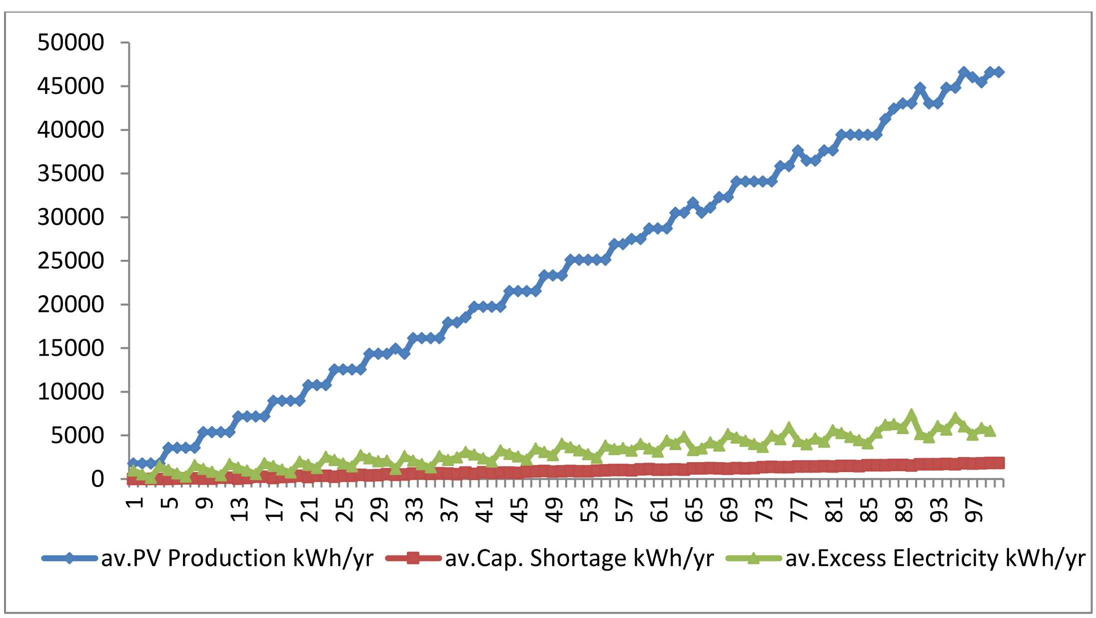

Figure 2 average between daily load and the economic feasibility of the extent of solar panel production, excess electricity, and the lack of capacity for all selected provinces.

The results of the Table (3), we find that all the results of all sites are converging, allowing us to take the rate as in figure 6 .

Figure (3) shows the relationship between daily load (1-100) kW /day and (battery productivity, battery productivity, battery self-charging and battery life) for all sites studied: Babylon, Karbala, Kut, respectively.

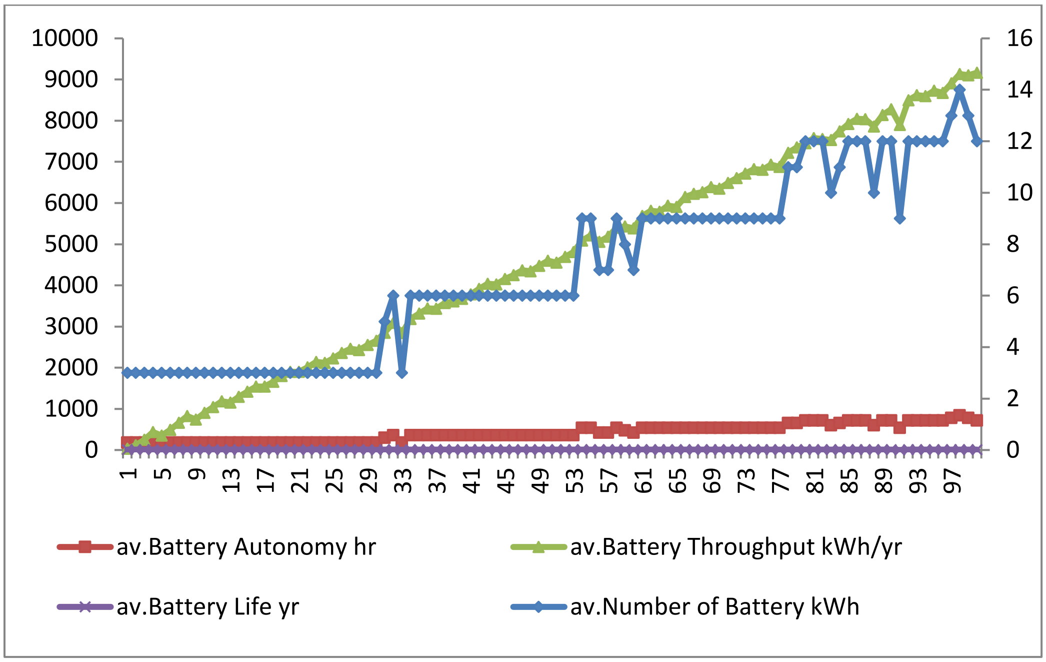

Figure 3 Daily load rate versus the economic feasibility of battery productivity

The results of Table 4, we find that all the results of all sites are converging, allowing us to take the rate as in Figure4.

Figure (4) shows the relationship between daily load change between (100-1) kW / day and material cost information for all the sites studied: Babylon, Karbala, Kut respectively. Total Net Present Cost (Total NPC) total cost 2277 to 28818 $ and total annual cost (Total Ann. Cost)128 to $1,799 for daily load (1-100) kW/day respectively .

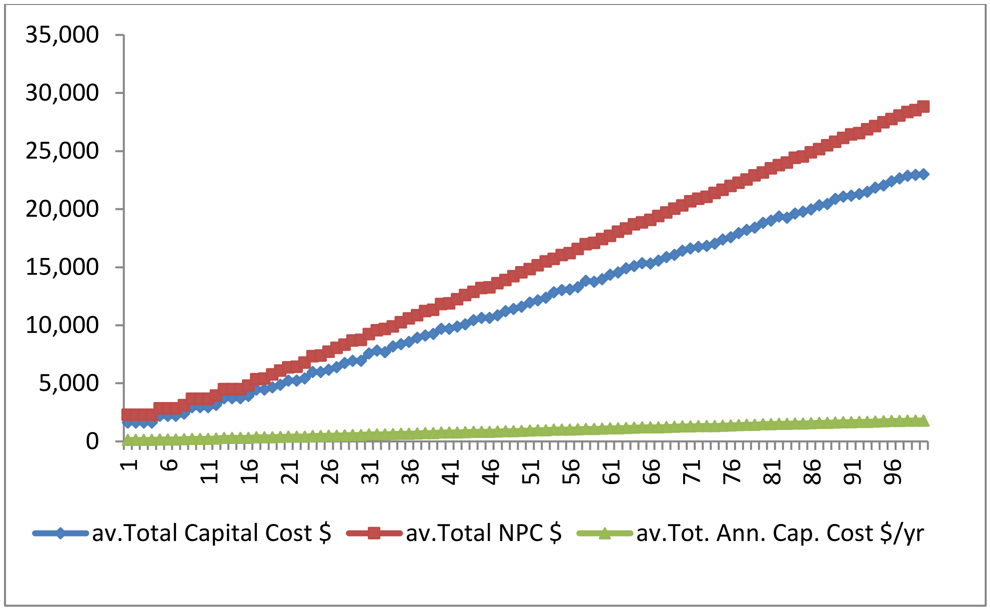

Figure 4 Daily load rate against the material costs of the photoelectric system

Conclusions

1- The results of the provinces studied were very close and this allows us to make a photoelectric system at the same cost and economic feasibility as of these provinces.

2- The solar radiation of these provinces is almost the same as the impact and this makes all the results very close and leads to this to provide the same photoelectric system for the provinces studied.

3- These results encourage the researcher to access a lot of information in the photoelectric system that is located at the same latitude within a daily load (1-100) kW/d.

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