

Photovoltaic Sun Energy Supporting the Health Services

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ABSTRACT

Background: In Cuba, all health services are covered by the fiscal resources. That’s why the Cuban government most takes heavy decisions to support transportation and electrician services for health services. The majority from the electricity generated in Cuba is obtained by gross petroleum. Then, the health services and the patient’s satisfaction are close related to the importation of gross petroleum to support the electrician and the health services transportation demand. The use of photovoltaic (PV) sun energy contributes to reduce the electrician demand generated by fossil fuel, to reduce the importation of gross petroleum to generate electricity and the save in international currency obtained may be used to cover the importation costs related to transportation services for the health services. **Objective:** The objective of the study was to value the use of PV sun energy to support the hospital services in Havana. **Materials and Methods:** Was made a descriptive research about the benefits utilizing the photovoltaic sun energy supporting the hospital services in Havana. As theoretical methods were utilized, the inductive – deductive, the comparative, and the historical – logical. As empiric methods were used, the document and bibliographic research and the arithmetic calculus. **Results:** If these hospitals considered should install 5000 PV cell, they should generate 236.25 MW during 350 days at year. This electricity represents the substitution of 65677.5 MT of this fossil fuel annually. **Conclusions:** PV sun energy shows several benefits for developing countries in tropical zones as Cuba. The example showed before should be taken account in the health systems of tropical countries as an example to reduce the health services costs and increase patient satisfaction too.

Key words: Efficiency, health services management, photovoltaic energy

BACKGROUND

The Cuban health system plays a decisive role in social and human develop. Its value is over the national limits because of the good results obtained out of Cuba. These reasons are justifying the need to guarantee the supporting and continuity from these services.^[1]

These conditions are especially significant during hurricanes and other weather disturbs. In a case like these, the support from the electrician services can be relevant in the health services sustainability. However, the instability and absence in some cases

from the electrician services during hurricanes, for example, put limitations to the health system capability to offer their services.^[2]

In Cuba, all health services are covered by the fiscal resources. Then, the Cuban government most take heavy decisions to support transportation and electrician services for health services. These conditions are especially significant in Havana, the capital.^[3]

In this region, health services are more demanded because the capital has the biggest population. This condition is more relevant during the recuperation process from the coronavirus disease-19. Furthermore, inside the health institution is usually that transportation services are more demanded than the institution capability.^[4]

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The conventional transportation equipment used carry to increase the use of fossil fuel. Close to the increasing demand of electrician services in hospitals, the Cuban economy must increase the importation of gross petroleum to support the transportation and electricity services for hospitals. This condition may mean an important pressure over the Cuban economy with evident consequences over the patient's satisfaction.^[5]

The majority from the electricity generated in Cuba is obtained by gross petroleum. Then, the health services and the patient's satisfaction are close related to the importation of gross petroleum to support the electrician and the health services transportation demand. However, the viability of international currency to cover the importations is always limited. In consequence, the health services support are given by this real viability too.^[6]

As Cuba, the most developing countries are in tropical zones. This means that Cuba is receiving more sun energy. Agree to this condition, the highest Cuba management is promoting the use of photovoltaic (PV) sun energy as a complement and substitution of the electrician energy obtained by gross petroleum. In this case, the use of PV sun energy contributes to reduce the electrician demand generated by fossil fuel, to reduce the importation of gross petroleum to generate electricity and the save in international currency obtained may be used to cover the importation costs related to transportation services for the health services.^[7]

Objective

The objective of the study was to value the use of PV sun energy to support the hospital services in Havana.

MATERIALS AND METHODS

Was made a descriptive research about benefits utilizing the photovoltaic sun energy to supporting the hospital services in Havana, Cuba. As theoretical methods were utilized, the inductive – deductive, the comparative, and the historical – logical. As empiric methods were used, the document and bibliographic research and the arithmetic calculus.

RESULTS

Cuba industry produces PV cell to generate electricity. Agree to the technology characteristic and the Cuba conditions, each cell may generate 135 Kw at day if are front of the south. Each cell has an area of 1.6 m². Considering the necessary space between each cell, the whole area needed is close to 2 m² by cell.^[8]

Havana's hospitals as "Calixto García," "Salvador Allende," and "10 de Octubre" have the especial condition for intensive

use of this technology. These hospitals are using extensively the land where are localized. Much from the floor area is free and may be able to use PV cell to generate electricity. The electricity obtained should cover partially the hospital consumption and should reduce the fiscal spends by this way.^[9]

If these hospitals should use 10000 m² of area to install 5000 PV cell, this means the generation of 236.25 MW during 350 days at year. The Cuban electrician system needs 278 g of gross petroleum to generate 1 Kw. The electricity obtained from the PV cell represents the substitution of 65677.5 MT of this fossil fuel annually.^[10]

The expected tendency from gross petroleum in the international market is to increase. If these hospitals could have these PV cells installed ending 2020, for example, the save because of the no importation of gross petroleum should be around 300 thousand USD. This amount should be sufficient to cover the importation of electric car for health services support the transportation services of these hospitals. The electrician obtained from the PV cell should cover the electric cars demand and the other electricity produced should contribute to reduce spends in electricity generated with gross petroleum.^[11]

This situation does not mean that these hospitals will be necessarily self-sufficient in electricity consumption. Nevertheless, all benefits obtained from the intensive use of the sun energy to generate electricity motives to utilize it strategically to reduce the health services costs and as save cause in international currency too.

CONCLUSIONS

PV sun energy shows several benefits for developing countries in tropical zones as Cuba. The example showed before should be taken account in health systems of tropical countries as an example to reduce the health services costs and increase patient satisfaction too.

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