

Analysis of the Use of Photovoltaic Solar Energy as a Source of Alternative Energy in Manaus City

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Abstract

The need for other sources of renewable energy is present, due to sustainable growth and aiming at the dull use of fossil fuels, which is a non-renewable energy responsible for the greenhouse effect and, in its end, can generate conflicts between countries, due to its dependence. . Brazil has an advantage, in front of other countries that already use this energy source frequently, because it is the country with the highest rate of solar radiation, is not enjoyed in abundance, because it is not so accessible due to poor incentives and lack of technology knowledge. As a clean and sustainable alternative photovoltaic solar energy becomes attractive. Based on these data, this work conducts an analysis of the photovoltaic solar grid system on grid (grid) system, to take as an alternative energy.

Keywords: Photovoltaic solar energy. Sustainability. Renewable Source;

1. Introduction

Expressly, humanity's incessant need for energy grows over time and is directly linked to development due to the remarkable use of new electronic devices. Nowadays, the search for renewable and non-polluting

energies is growing, because the sources of fossil fuels are finite. [4]

Brazil is quoted to reach 1,000 megawatts in 2017, according to the caveat of the Brazilian Association of Photovoltaic Solar Energy (ABSOLAR). 60 thousand residences, with 5 inhabitants in each. [3]

The application of photovoltaic solar energy connected to the electricity grid in homes would be a renewable alternative and would modify the energy scenario of our country, reducing CO₂ emissions on the planet. [7] states that several countries are investing in solar energy applications, investigating from the characteristics of solar radiation that reaches the Earth, including new technologies to make it technically and economically viable, making the most of this energy. "For the complementation of hydropower, an energy source with several particular characteristics is needed: clean (non-polluting), non-scarce, distributive and that can be used in homes, industries and commercial establishments.

To gear this system in Brazil requires aid, research, search for this photovoltaic solar system, market demand, for such events it is necessary assistance from the Government, creating a scope for its evolution. [9]

This system allows you to save money and involve the environmental issue, because in its energy generation, it does not emit pollutants, its fuel is sunlight and it does not emit any noise, while achieving energy autonomy. Reasons why photovoltaic solar energy is on the rise worldwide. Therefore, the advantages of using solar and photovoltaic energy such as: savings on energy bills, decreased demand for energy from the national system, thus delaying the construction of new hydroelectric, thermoelectric and nuclear plants - which generate numerous environmental impacts. - In addition to being a source of renewable and clean energy.

Therefore, this work is related to a research of the use of this photovoltaic solar system connected to the electric grid, in a single family residence, analyzing its operational efficiency, benefits, demand in the market.

2. Theoretical Foundation

2.1 Photovoltaic Solar Energy Scenario in Brazil

According to [5] photovoltaic solar energy is generated with sunlight, making this conversion of light to electricity, and this photovoltaic cell is made of a semiconductor material, one of those responsible for this effect.

In Brazil, there was an increase in the production scale related to photovoltaic energy in more developed technology markets, bringing a decrease in the price and increasing the application of clean energy, as stated. [2]

Still in Brazil, photovoltaic solar energy has always been tied to programs that propagate this system in regions where there is no access to conventional energy, isolated regions, with rural growth power. By the dissemination of these programs, in Brazil hears an amplification of the isolated system, in 2004, 30 thousand systems were appointed. [1]

The solar energy sector will undergo changes, due to actions taken by the Federal Government with encouragement from the Ministry of Mines and Energy, believe that by 2024, about 700,000 users in the commercial and residential area had the solar photovoltaic system, installed on their properties, lowering

their energy bill. [6]

Due to its tropical climate, Brazil has a solar irradiation of 2500 hours / year, making use of the isolated photovoltaic system, benefiting distant areas with conventional grid deficit, aiming at the environmental part, making society aware of the preservation of the environment, something of high relevance and use energy that brings a cost benefit to the social [7].

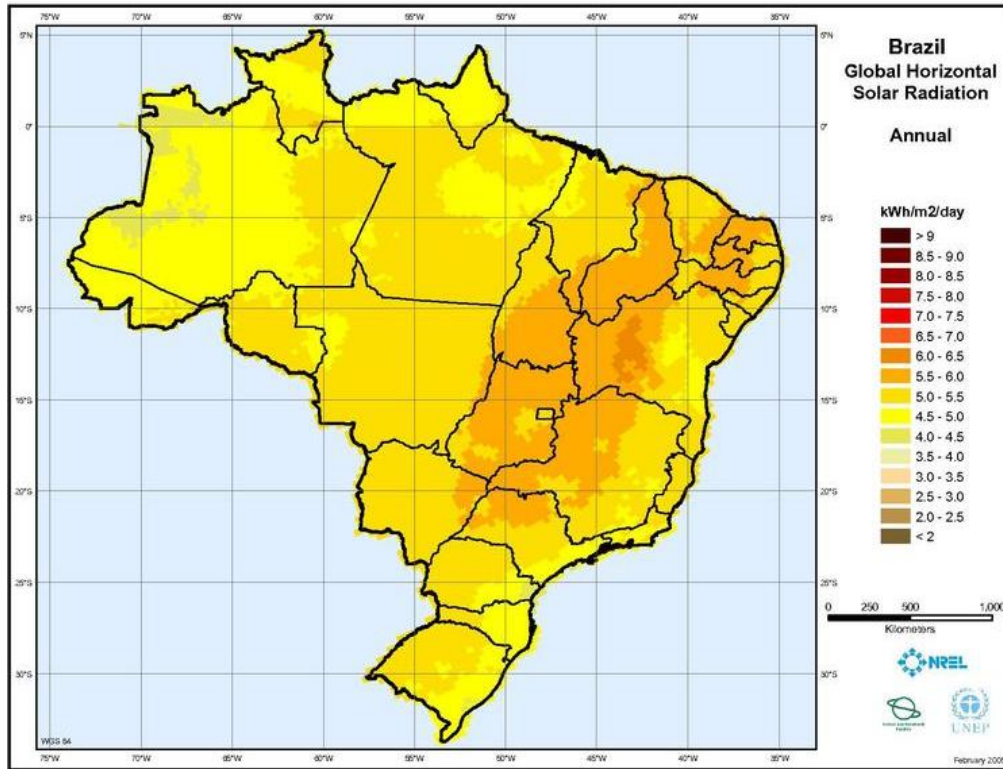


Figure 1- Solar Map of Brazil

Source – Global Horizon. (Brazilian Atlas of Solar Energy, 2019)

2.2. Environmental Impacts Caused by Photovoltaic Energy

The environmental impact caused by photovoltaic energy in the environment, results in toxic fluids and its installation requires large areas, causing major impacts to the natural habitat. [11]

Both solar photovoltaic and other power plants usually have positive and negative environmental impacts on the environment, which can be small and medium sized, since solar energy does not emit as many pollutants in its electricity generation as it does. the most common energy generating industries, as quoted [10]

In the execution of a photovoltaic solar plant, the loss of local vegetation is taken into account. Solar plants are not only built in areas considered desert, where there is no vegetation to be removed. chosen to build the solar plant. [13]

Materials such as glass and aluminum are major contributors to the environmental impact of pollutant emissions when it comes to photovoltaics, as these materials are a major contributor to the production of photovoltaic modules, and silicon removal also generates an impact. environmental. [8]

Na construção das usinas, o solo é descampado modificando a áreas no modo ambiental, a vegetação protege o solo de possíveis erosões, devido ações naturais como chuvas e ventos, a compactação da área pode vir gerar outro problema, o número de vazios diminui o deixando mais denso dificultando a infiltração

da água gerando modificação nos cursos de hídricos superficiais. [14]

2.3 Photovoltaic systems

To install any of these types of systems in homes there is no need to make changes to it, considered simple to perform the system adapts to the situation. [15]

According to [17] the technologies related to the modules have evolved and in the junction of the civil construction with the photovoltaic system there are no impediments, being possible to install glass modules in facades aiming the architectural question of the place, flexible thin film modules used in civil construction adapt. Depending on the surface, it is commonly used those installed on the roofs following the slope, and can be replaced by module tiles.

Photovoltaic systems are classified into three types: isolated, hybrid and connected to the grid, providing consumers with electrical independence, making their own power generation.

- Isolated systems: Used in hard to reach areas where there is no mains power supply.

Its generation is made with solar modules installed by capturing sunlight, with off grid inverter converting the continuous energy to alternate and all generated energy is accumulated and stored in batteries. [16]

[5] states are used for rural areas to assist in water pumping, urban street lighting installed on doors, home lighting.

- Network-connected systems: System to which the utility is connected.

This system connected to the network compared to the isolated one has advantages mainly in the cost aspect, 30% cheaper. [17]

It works as follows: the power kit is installed at home with the on grid inverter responsible for changing the energy captured by the modules, after this inversion the energy is directed to the light board responsible for the power distribution throughout the house. [5] Since this system does not use batteries to store energy, the clock is changed by a bidirectional, measuring the energy produced, consumed and surplus energy, directed to the utility accumulating credits for days of low production.

- Hybrid system: the difference between this system and the others connected to another power system other than the conventional connected to the grid, is connected to the wind. [18]

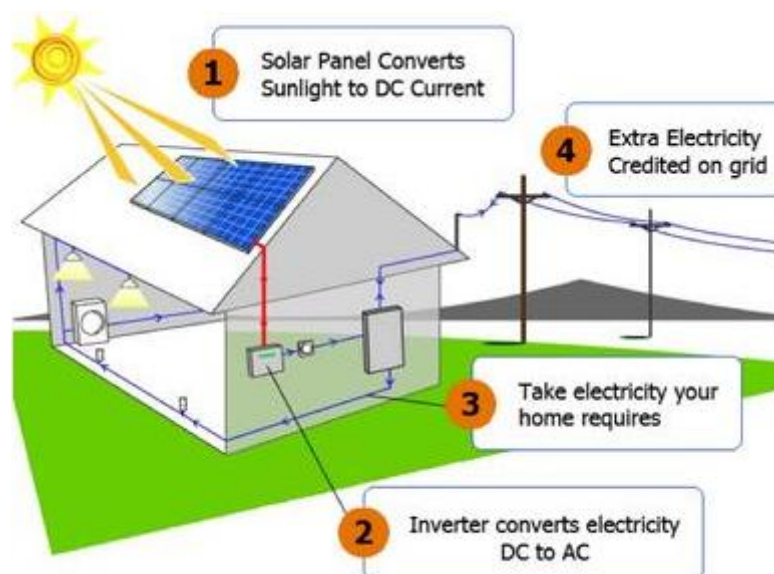


Figure 2 - System connected to the mains

Source - kewsolar, 2019

2.4 Feasibility of the system

In fact, the solar photovoltaic system is not popular for its market value even though it is not a new technology, but because of its high cost there is no considerable demand in the market compared to the conventional grid system, but with other program launches. countries, there may be a drop in value. [17]

It is possible to use photovoltaic solar energy and make a profit even with its value and make a comparison with the conventional system, which always suffers from readjustments, making your account more expensive, the establishment in question was paying a bill of 14 thousand reais the value of system implementation is 28 thousand reais. Data obtained from his study show that in 4 years, the owner could recover the amount invested in the system, knowing that it has a useful life of 25 years. [20]

[21] realized the photovoltaic system and a rural area, investment of 106 thousand reais, can be financed by the bank or with own resource, with its own income in 9 years was 20 thousand reais, over 25 years its income is of 989 thousand reais, financed by the bank in 11 years its free income is 83 thousand, at 25 years has an accumulation of 1 million.

3. Methodology

The research is characterized in exploratory research, conducted by case studies, [19] states that this type of research aims to make an analysis of content such as books, articles, interviews, case studies related to the research area, giving an insight on a particular theme revealing ideas and concepts, making room for further research.

The study arose from the dependence of society on electric energy sources of energy are the main drivers of the development of a country, the diversity of energies show the level of development of a certain place linked in the sectors, commercial, industrial and residential with regard to environmental issues. sustainable. Excessive consumption of fossil fuels can cause environmental problems such as extraction and use and may generate future problems in social issues when this resource runs out, another system that causes serious problems is the use of hydroelectric flooding nearby areas expelling inhabitants around them. , loss of fauna and flora disrupting the ecosystem.

With these data, bibliographical research began, analyzing the Brazilian context in relation to photovoltaic solar energy, showing the solar potential that it has to implement and invest in clean, renewable and not scarce energy, and may be equal to pioneer countries. In this technology, seeking quality of life for the whole, the use of this system in Brazil is minimal, due to its cost and lack of incentives for research and implementation and part due to lack of knowledge.

In view of this lack of knowledge I conducted a field survey of 13 (thirteen) people asking such a question: "What do you think about photovoltaic solar energy as a source of energy? ", After this question, 7 (seven) people did not know, 4 (four) people agreed that it could be a good choice to solve problems with existing sources, 2 (two) people do not agree for its value to be high and think that worth it, with that generated questions of the same about the system, in which I selected the most frequent, prepared a questionnaire with 11 questions.

Preparing the questionnaire with 10 questions, I sent this questionnaire by email to a company that works installing the solar photovoltaic system, located in Campinas in the state of Sao Paulo, CSE SOLAR.

3.1 Photovoltaic Solar Energy Questionnaire.

Questionnaire

1- What types of solar modules available in the market?

A: Monocrystalline silicon solar panels, polycrystalline silicon, thin film, amorphous silicon, cadmium telluride.

2- Which one has the best cost benefit?

A: For cost-conscious consumers the polycrystalline silicon panel is indicated, its average efficiency is 14 - 20%, and they are cheaper, but those who prefer to have better efficiency the monocrystalline is indicated, efficiency of 15 - 22%, but its value is higher

3- Installation value system connected to the mains, in a residence that has 4 residents?

A: The values vary, there is no standard answer, it depends on the number of panels, a house that consumes 500 kwh / month uses 10 to 12 260wp panels, to supply 100%, a complete installed system costs from 5,000 to 15,000 reais Kwp .

4- What is the cost of maintenance and time to perform?

A: They are very resistant, maintenance is to clean the panels with water, can be done about 4 times a year, depends on the location if there is a lot of dust.

5- System lifetime?

A: Systems connected to the mains have a service life of 30 to 40 years, 25 panels warranty, insulated systems have 2 years warranty and 5 years service life.

6- How do I get the solar photovoltaic system?

A: First, an analysis will be done on your electricity and consumption bill, after this analysis your project assembled according to your need, you buy this kit, the amount can be funded and the installments can be the value of your account or smaller.

7- What is the average return time after investment?

A: It depends a lot on the value of your system and region, but the estimate is 4-9 years.

8- How many days does it take to install?

A: It takes 2-3 days to perform the installation, interference with your routine is almost nil.

9- How to monitor what I am using and producing?

A: The company that makes the installation monitors its production make regular visits to ensure maximum production and or access the company's portal and can monitor production in real time.

10- What is photovoltaic solar energy?

A: It is the use of solar rays as a source of energy, captured by the panels that heat semiconductors generating electricity, photovoltaic is this conversion of light into electricity.

4. Conclusion

With this work, I intend to reach more public for photovoltaic solar energy research, is an important advance

for energy autonomy and sustainability issues in Brazil's energy matrix, with the support of the Government, this source will become easy. facilitating financing at its cost of implementation.

Analyzing all the issues mentioned in this paper, it is concluded that photovoltaic solar energy is promising, its environmental impacts are minimal in its production, but in its power generation is clean, does not emit noise and pollutants, in front of other pioneer sources in Brazil. We can analyze that when it comes to construction, we can seamlessly combine this energy with projects already consolidated or projects in plant, taking into consideration the aesthetics of the environment. The purpose of the questionnaire is to bring knowledge to people and answer frequent questions about this energy source, the lack of information generates consumer insecurity generating barriers to this energy source, the question directed to 13 people, where 7 did not know As far as photovoltaic solar energy was concerned and 4 knew it, 2 did not agree that it could solve problems, due to its high cost, this shows how much knowledge and investment is needed to expand this technology in our territory.

Finally, this work aimed to show that Brazil has sufficient solar irradiation capacity to invest in this source, reduce CO₂ emissions, barriers due to the lack of incisive incentives to reduce system costs, environmental impacts of energy and reinforcing the lack of knowledge needing to advance on this issue.

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