Example of report on solar panel background

Environment, Electricity

Part 1. Solar Panel History

The history of Solar panels takes it beginning from the 7th Century B. C. Now, the energy sector of economy has the greatest impact on our lives. Power supply is the basis of the normal functioning of any production, and, consequently, the entire human civilization. Heat and light homes, work machines and units in production, traffic and rural suffering - all these many faces of Energy. Various technological advances have already become part of life for us, but they are possible only when adequate and affordable energy supply, due to the development of alternative energy sources, new technologies for the extraction and processing of primary energy. (The History of Solar)

Application of solar cells is considered one of the most important discoveries in the way of humanity to seek an alternative source of energy. As for the history of this technology, it starts back in 1839, when Edmond Becquerel invented the photovoltaic effect (the conversion of light into electrical energy). (Solar at a Glance 2008).

Almost fifty years later, another developer - Charles Fritts hypothesized as to what you can achieve a similar effect with a device made of gold and selenium, with an efficiency of approximately one percent. This idea has been used in solar cells, developed in the 30s by the Soviet scientists. Naturally, because of low productivity and high cost of materials for the commercial exploitation of the energy produced could not even walk and talk. Already in 1954, U. S. researchers have developed solar cells modern type, which are made of silicon - one of the most common crustal minerals. It should be noted that their effectiveness was approximately six percent.

Already at that time it was clear these shortcomings will be characterized by solar panels for the home.

Years passed, and the different directions of the development of solar energy moving towards each other: increasing the efficiency and the gradual reduction in the price. Today's solar equipment manufactured on an industrial scale, is characterized by the efficiency of about 25 percent, and innovative unique samples - up to 60 percent. Due to cheaper, and increasing the use of solar energy.

In addition, the energy of the sun has found its application in electronics. The most successful experiences are considered solar calculators that element (with an area of one square centimeter) can operate virtually forever.

Greater use of sun, especially in combination with the wind generator is observed when using solar water heaters for power industrial facilities and residential homes. It is particularly effective in the subtropical and tropical zone, where the year a lot of bright, sunny days (for example, most of the Mediterranean European countries). Standard solar panels placed on rooftops, because that's where they can work a maximum of self-empowerment. Latest technologies have provided an opportunity to make the ceiling and the window glass with the photoelectric effect, which greatly increases the efficiency of each building.

Part 2. Solar Panel Installation

Solar cell, solar module (PV) is a renewable source of electricity, which converts light energy from the sun into electricity.

Photovoltaic modules are used widely as an effective, environmentally friendly energy sources for various applications. This is primarily a network

system for transmitting power from the PEM in the overall network of the region through a network (grid tie) inverter. PV modules are used as well as renewable energy backup systems and autonomous power supply.

Given the 25 year warranty of the Sunpower panels, many additional preparations were required prior to the installation. (Industrial Laser Solutions, 2012).

Orientation and Angles of the PV Modules

The correct and proper installation of these systems are very important for the growth of the solar thermal industry (Miodonski, Bob. 2013).

PV modules are mounted on special designs that provide their optimum orientation to the sun and secure attachment to different types of surfaces on the ground Position: ground foundations, roofs and vertical surfaces. It is important to confirm that panels are properly installed – a seemingly simple concept, but one that can be tricky when taking into account the “ newness” of the industry as a whole. (Inland-Marine Review, 2013).

For maximum energy performance photovoltaic modules should be oriented so that the solar rays falling onto the working surface of the module at 90 º. Achieve this requirement is only possible with special designs with rotary biaxial sun tracking system - tracker. Such systems, in addition to the obvious advantages of maximizing the use of solar energy devices are fairly expensive, consume, albeit slightly, but constantly energy require large area site for installation as compared with fixed designs. Therefore usually compromise system performance and cost structure, and mainly in photovoltaic systems use stationary design.

PV modules optimum angle depends on the latitude, and can also be

changed, depending on whether to optimize the production of energy is needed to achieve. Thus, it can be reduced from the optimal value, if the PV system during summer (summer optimum), increased if the photoelectric system is operated mainly in autumn and winter, or accepted by the average value if the PV system is designed for year-round operation.

The simplified formula for calculating the optimum angle PV modules:

If latitude and 25 °, the numerical value of latitude, multiply by 0. 87.

If latitude between 25 ° and 50 °, the numerical value of the latitude multiplied by 0. 76, plus 3. 1 degrees.

Performance of photovoltaic systems depends on how properly installed and oriented photomodule chosen design for them. Selection and calculation of structures for photovoltaic systems is as important element for maximum energy output from it, as well as other elements of the system - photovoltaic modules and inverters.

Part 3. How Solar Panel Works

It is no secret that the p-n junction can convert light into electricity. In school experiments often conducting an experiment with a transistor with a sawed-off top cover to allow light to fall on the p-n junction. Connecting the voltmeter can be fixed, as the irradiation of light such a transistor allocates meager electric current. And if you increase the area of the pn junction, which in this case happens? During the last years of scientific experiments, experts produced a pn junction with the plates of a large area, thereby causing the birth of photovoltaic cells, called solar panels.

“ The panels harness the sun's energy to generate zero-emission electricity.

One megawatt hour of solar-derived electricity avoids about one tonne of CO2.” (Sunday Telegraph, 2011)

The principle of operation of modern solar cells survived, despite a long history of their existence. Improvement has undergone only design and materials used in manufacturing, to help manufacturers gradually increased such an important parameter as the ratio of the photoelectric conversion efficiency of the device or. It should also say that the magnitude of the output current and voltage of the solar battery depends on the ambient light level, which affects it.

Photvoltaic solar panels convert the energy provided by the sun into useable energy to provide power to a home. There are several key features of the solar panel itself as well as the circuit it is run on that allow for the conversion of solar energy into useable energy. (University of North Carolina, 2013)

The upper layer of the p-n junction, which has an excess of electrons, coupled with metal plates that act as the positive electrode, the light transmissive element and impart additional rigidity. The bottom layer in the solar battery structure has the disadvantage of electrons and is adhered thereto a continuous metal plate that performs the function of the negative electrode.

The technology on which the solar battery is manufactured influences its efficiency.

It is believed that in an ideal solar cell is close to 20 % efficiency. However, in practice and according to the specialist site www. sun-battery. biz it is approximately equal to only 10 %, while that to which the solar battery is

greater than that for any. Basically, it depends on the technology, which is formed by a p-n junction. Most common, and have the highest percentage of efficiency solar cells continue to be made on the basis of a single crystal or polycrystalline silicon. And second because of the relative cheapness are all common. What type of solar cell structures can be determined relates to the naked eye. Monocrystalline panels have only black and gray, and a model based on polycrystalline silicon allocates blue surface. Polycrystalline solar panels manufactured by casting, were cheaper to produce. However, in poly- and monocrystalline wafers has one drawback - the design of solar cells based on them do not have the flexibility, which in some cases can not hurt. (Exploring Green Technology. com)

The situation changes in the appearance of the solar battery 1975 based on amorphous silicon, the active element having a thickness of 0. 5 to 1 microns, providing them with flexibility. The thickness of conventional silicon cells is 300 microns. However, despite light absorbency amorphous silicon, which is about 20 times higher than the usual efficiency of solar cells of this type, namely, the efficiency does not exceed 12 %. For mono - and polycrystalline options with all this it can reach 17% and 15 % respectively.

Part 4. Why People Need Solar Panel?

The material from which the plate influences the characteristics of the solar batteries

According to Samantha Sweet, homeowners generally installed the panels because they wanted to use clean energy, but increasingly cost savings factor in

Pure silicon in the production of wafers for solar batteries practically used.

The most commonly used for the production of impurities plate, generating a positive charge, boron is used, and for negatively charged plates arsenic. In addition to them in the manufacture of solar batteries are increasingly used, components such as gallium arsenide, gallium, copper, cadmium telluride, selenium, and others. Thanks to them solar cells become less sensitive to extremes of ambient temperatures.

Most solar cells can store energy, representing a system

In today's world apart from other devices solar panels are being used less, often representing the so-called system. Given that the photovoltaic cells produce electricity only under direct sunlight or at night or on a cloudy day they become virtually useless. With solar systems all the way. They are equipped with a battery capable of accumulating an electric current in the afternoon when it generates solar battery, and at night, the stored charge can give consumers.

As was written by Ms. Sweet, " an average-size home solar system, which would cost roughly $15, 500 or less to purchase after federal tax credits and state or local rebates, could pay for itself in lower energy costs over eight to 12 years, said Jim Jenal, who runs a solar-installation business in Pasadena, Calif., but doesn't do leasing."

Alternative energy sources such as sunlight energy and wind energy used for water heating and geothermal heat from the earth - for heating and cooling buildings. Conversion of solar energy into electrical energy using photovoltaic occurs plates of silicon - the most abundant element on the planet. Solar cells based on silicon wafers have a long life resource - more than 25 years and, depending on the production technology, retain 80% of

its efficiency throughout the entire resource. The amount of energy obtained from solar panels varies and depends on the location and solar activity in different seasons. Energy conversion efficiency of solar cells have reached 20% and depends on the technology of their production and the purity of silicon. The technology is developing rapidly and performance indicator is constantly growing.

Part 5. Government Incentive About People Use Solar Panel.

In the federal program " Strategy for Sustainable Energy ", approved in 1995, as a priority for the Government provided assistance to promote and develop renewable energy sources in the United States in order to reduce the volume of the combustion of fossil fuels, environmental protection and global energy security for the future, and the dissemination of American solar energy technologies in other countries to expand the market and the use of renewable energy.

The government supports the green energy production. A good example of such support is SolarCity, the latest booming green company that has never recorded a profit. (The Wall Street Journal, 2013).

Practical implementation of solar energy technologies in the United States began in the mid 70s and actively developed in subsequent years. Between 1975 and 1990, the U. S. in this sector of Energy has invested more than $ 38 billion of government subsidies.

Currently, solar power provides more than 4 million GJ of low-grade heat for hot water, heating, water heating, swimming pools, air heating, drying of agricultural products, etc. The present government revised the price fith time to reduce the government's subsidy and even contemplating to revise

one more time as its import cost has gone highest every due to price hike of fuel in the international markets. (The Financial Express)

The infrastructure and energy sector carried out construction of numerous major energy facilities in various states.

For example, in the Mojave Desert (California, USA) successfully operates solar power plant with parabolic concentrators with total capacity of 354 MW, which takes in the summer peak electric load arising from the increasing demand for cooling, ventilation and air conditioning both industrial and residential buildings.

Solar photovoltaic power plants built in the town of Hesperia (1 MW) and near the nuclear power plant in Carisa Plain (7. 2 MW) was also successfully cover summer peak load increases.

In accordance with the legislation (adopted in 1977) in the United States carried out a long-term multilateral system of financial support and incentives for solar energy as consumers and producers of energy equipment. Given implemented over the past 25 years of work in this direction, the beginning of climate change on the planet, as well as international commitments in Kyoto (Japan), the United States moved to the next stage of large-scale implementation of solar energy technologies.

June 26, 1997, U. S. President Bill Clinton in his speech at the opening of the session of the United Nations Environment and Development announced a new initiative - the U. S. program " Million Solar Roofs ", which provides for the establishment of solar energy (photovoltaic and thermal) on the roofs of one million municipal and private homes in the U. S. by 2010.

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