



An overview on the rising solar energy

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Abstract : *The renewable energy is the requirement of today's life. The demand of energy increases day by day. As there is high, demand for energy the use the fossil fuel increase with the same. As a result, we are running out of resources. Many researchers, common people, scientist working on the renewable energy. Most of them are focusing on solar energy. It is because the solar energy is available in large amount and it will not end. In the last few years, many people, researchers have studied solar energy and it shows that there has been a huge increase in the use of solar energy and solar equipment. We can say that the solar energy is the future of our life. This paper focused mainly on the growth of the solar energy.*

Keywords– Fuels, Renewable energy, solar energy, Solar Panels, Solar Power

I. INTRODUCTION

The energy generation and its utilization is the key issue now days. Throughout history, there are many discoveries done on energy. When we see in the past we find that before 1850, wood, straw, and dried dung was our main source of fuel for heating, cooking, and producing steam for powering steam engines for the railroads. Other sources of energy were water, wind, coal, and some manufactured natural gas. With the changing years many scientist have done research and find out the different ways for energy sources.

The large source of energy that we utilize is either from coal or from fossil fuel. We required energy for cooking, for electricity, for transportation. The fossil fuels are efficient but the source available for the same are limited. The only solution on these problems is use of energy, which either can be renewed and available to in huge amount. Solar energy is one of the non-renewable energy that was available to us from history. We can find the use of solar energy that have done by our ancient. The researchers are working on the solar energy and as a result, there is rise in use of solar power from last few decades.

II. HISTORY OF SOLAR ENERGY

Solar energy is actually nothing new. People have used solar power as far back in history as the 7th century B.C. In its most primitive state, energy from the sun has been revered and put to use almost as long as man has walked the earth. The earliest uses of solar power included focusing the sun's energy through a magnifying glass to start fires for cooking. By the 3rd century B.C., Greeks and Romans bounced sunlight of "burning mirrors" to light sacred torches for religious ceremonies.

In ancient times to capture solar energy for its natural warmth, the sunrooms invented. These usually south-facing rooms have captured and concentrated sunlight from the famous Roman bathhouses to Native American adobes, and are still popular today in many modern homes.

One legend in Greek solar history is of the scientist Archimedes setting fire to besieging wooden ships from the Roman Empire. The story goes that he reflected the sun's light energy of bronze shields, concentrating the rays and attacking the enemy before they made landfall. Think of it as a kind of ancient solar laser beam. Whether this actually happened in Archimedes' time or not. However, this experiment in solar power tested by the Greek navy in the 1970s. They did set fire to a wooden test ship 50 meters away using nothing but the legendary bronze shield and the solar light energy.

Albert Einstein had a role to play in bringing the world's attention to solar energy and its potential. In 1905, Einstein published a paper on "the photoelectric effect and how light carries energy". This generated more attention and acceptance for solar power on a broader scale.

The big leap toward the solar cells like the ones used in panels today came from the work of Bell Labs in 1954. Three scientists there, Daryl Chapin, Calvin Fuller, and Gerald Pearson, created a more practical solar cell using silicon.

As the space age developed, solar panels used to power various parts of spacecraft throughout the late 1950s and 1960s. The first was the Vanguard I satellite in 1958, followed by Vanguard II, Explorer III, and Sputnik-3. In 1964, NASA launched the Nimbus satellite, which ran entirely on its 470-watt photovoltaic solar panel array.⁶ It wouldn't be long now until solar energy's potential moved from outer space to homes and businesses on planet earth.

III. DEVELOPMENTS IN SOLAR ENERGY

The development of solar panel technology was an iterative one that took a number of contributions from various scientists. Naturally, there is some debate around when exactly they created and who should be credited for the invention. Some people credit the invention of the solar cell to French scientist Edmond Becquerel, who determined light could increase electricity generation when two metal electrodes placed into a conducting solution. This breakthrough, defined as the "photovoltaic effect," was influential in later PV developments with the element selenium. [9]

In 1873, Willoughby Smith discovered that selenium had photoconductive potential, leading to William Grylls Adams and Richard Evans Day's 1876 discovery that selenium creates electricity when exposed to sunlight. A few years later in 1883, Charles Fritts actually produced the first solar cells made from selenium wafers – the reason some historians credit Fritts with the actual invention of solar cells.

However, solar cells as we know them today made with silicon, not selenium. Therefore, some consider the true invention of solar panels to be tied to Daryl Chapin, Calvin Fuller, and Gerald Pearson's creation of the silicon photovoltaic (PV) cell at Bell Labs in 1954. Many argue that this event marks the true invention of PV technology because it was the first instance of a solar technology that could actually power an electric device for several hours of a day. The first ever silicon solar cell could convert sunlight at four percent efficiency, less than a quarter of what modern cells are capable of. [9]

Solar panels in outer space – Some of the earliest uses of solar technology were actually in outer space where solar was used to power satellites. In 1958, the Vanguard I satellite used a tiny one-watt panel to power its radios. Later that year the Vanguard II, Explorer III and Sputnik-3 were all launched with PV technology. In 1964, NASA was responsible for launching the first Nimbus spacecraft, a satellite able to run entirely on a 470-watt solar array. In 1966, NASA launched the world's first Orbiting Astronomical Observatory, powered by a one-kilowatt array. [9]

First solar residence – In 1973, the University of Delaware was responsible for constructing the first solar building, named "Solar One." The system ran on a hybrid supply of solar thermal and solar PV power. It was also the first instance of building integrated photovoltaics (BIPV) – the array did not use solar panels but instead had solar integrated into the rooftop, similar to the design for Tesla's new roof product. [9]

Achievements in solar conversion efficiency – Between 1957 and 1960, Hoffman Electronics made a number of breakthroughs with photovoltaic efficiency, improving the efficiency record from 8% to 14%. The next major achievement was in 1985 when the University of South Wales achieved 20% efficiency for silicon cells. In 1999, the National Renewable Energy Laboratory collaborated with Spectro Lab Inc. to create a solar cell with 33.3% efficiency. The University of South Wales broke that record again in 2016 when researchers reached 34.5% efficiency. [9]

Solar-powered airplanes – In 1981, Paul Mac Cready built Solar Challenger, the first aircraft to run on solar power, and flew it across the English Channel from France to the U.K. In 1998, the remote-controlled solar airplane "Pathfinder" set an altitude record after reaching 80,000 feet. NASA broke that record in 2001 when they reached 96,000 feet with their non-rocket aircraft. In 2016, Bertrand Piccard completed the first zero-emissions flight around the world with Solar Impulse 2, the world's largest and most powerful solar-powered airplane today. [9]

Solar-powered presidencies – In 1979, President Jimmy Carter had solar panels installed on the White House during his term as president. However, in 1981, President Ronald Reagan ordered the White House solar panels to be removed in 2010; President Barack Obama requested that solar panels and a solar water heater be installed on the White House. Both were installed during Obama's first term.

IV. RECENT TRENDS IN SOLAR ENERGY

The solar energy industry is part of a very dynamic market. Many factors — including government policies, fossil fuel costs, solar energy technology advances, commodity prices, and even public awareness of the climate crisis — impact solar energy deployment across the globe.

4.1. Solar battery prices are falling

Solar energy is an intermittent energy source. This means that solar panels produce power when the sun is shining and not when it is not. Energy storage allows the solar system to supply power when the sun has set or in cloudy weather, expanding the capabilities of solar energy systems.

There are two main types of solar batteries: lead-acid batteries and lithium-ion batteries. The latter is far more advanced, longer lasting, and requires less maintenance. Not surprising, lithium-ion batteries have a higher upfront cost, but the price has been decreasing significantly in recent years. The cost of lithium-ion battery storage fell 35 percent from the first half of 2018 to now (December 2019) and 76 percent since 2012. This downward price trend is good news for renewable solar energy in 2020 — and it is likely to continue. [5]

4.2. Electric vehicles boost electricity demand

Surprisingly, electricity demand in most advanced economies has leveled or even decreased in recent years. However, global electric vehicle sales expected to reach 11 million units in 2020 and then surge to 97 million vehicles in 2025. In addition, these vehicles require electricity to power them.

An increase in peak energy demand will create a shift in the energy market, boosting the demand for new power generation. Renewable energy sources, like solar, may help meet that demand. Because many electric vehicle owners are eco-minded, many are installing solar systems so their cars can run-off of 100 percent renewable energy. In fact, many solar installation companies also install electric vehicle chargers and this trend is growing. [5]

4.3. Demand for solar with battery storage increases

Solar systems with energy storage are surging in popularity for a few reasons. The cost of solar batteries is decreasing; meanwhile, the prevalence of grid outages has climbed. There was a 30 percent increase in grid outages between 2009 and 2019, with 37 million people affected in 2019. Blackouts can cause property damage, including frozen pipes and flooded basements.

Hundreds of thousands of customers lost power in Wisconsin and Dallas County in 2019 due to severe thunderstorms, resulting in millions of dollars of damage. In California, intentional blackouts have been utilized to prevent wildfires. [5]

V. CONCLUSION

From 1873 to 2020, we can see many developments in the solar energy. In history, the solar energy was used just for lighting fire or cooking purpose. The scientists and researchers in the use of solar energy have done the development day by day. The work can be seen in the form of product of solar power. People now are using solar charged cars, solar-based homes, solar water heater etc.

Still there are many researchers working on the solar energy. The solar energy is available to us in a huge amount. The only condition was the availability of solar power. Scientists have carried out solutions by use of battery as well as developing the use of battery. In future, the maximum energy that will be used in our daily life will be solar energy for sure.

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