Research paper on solar power use in the united states

Environment, Electricity

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Solar power use in the United States

Solar energy is considered a solution to the world’s energy problems. Compared to fossil fuels, productions of power using solar energy is considerably more expensive due to the cost of producing the solar cells. However, this cannot be compared to the efficiency and sustainability of solar energy. In the US, solar power is one of the most dependable sources of renewable energy with numerous utility scale solar power plants across the country. The US has the largest installation of solar power in California known as the Solar Energy Generating System. The plant has a capacity to produce a total of 354 megawatts. Other plants producing significantly large amount of electricity include the Nevada Sola One, the Copper Mountain Solar Facility, Long Island Solar Farm, and Desoto Next Generation Solar Energy Center. Other facilities producing even larger amount of electricity

are currently under construction in various parts of the country. This paper develops an in depth discussion of solar energy in the United States while making comparison to fossil fuels. The paper further highlights on the impact of solar power generation and use, the efficiency and ability to store solar energy, cost of production of solar panels, and advances in manufacturing that make solar energy more cost effective.

Advantages and disadvantages of solar energy over fossil fuels

Solar energy, despite the method used to produce it is a new form of energy that shows sustainability compared to fossil fuels. It therefore has a high potential to supplement or replace fossil dependence on fossil fuels. Solar energy has several advantages over fossil fuels. The first advantage is that it is clean and free. The only cost in the production of solar energy is making the solar panels. After which, generation of electricity is free at no financial cost. In addition, the panels do not generate any waste in the process. Basically, the panels depend on sunlight during the day to generate electricity and there is no external fuel needed to get sunlight.

The second advantage is that solar energy does not rely on limited resources. As long as the sun will continue shining during the day, production of electricity through solar energy will always be possible. However, fossil fuels depend on limited resource which is depleting at an unsustainable rate. Fossil fuels primarily involve coal and oil. These resources can easily be withheld from the markets but sunlight cannot be affected by such market forces. Thirdly, the power system in a solar energy

generating plant requires low maintenance. Compared to other power systems, solar power system contains just panels with no moving parts. As a result, the cost of maintenance is very low as parts do not easily wear out. Users do not have to think about money for maintaining the system. On the contrast, power plants that rely on fossil fuels to generate electricity require constant and regular maintenance.

Lastly, solar energy can easily be used for emergency power supply and also easily serve as remote power source. Electrical infrastructure can be damaged by natural disasters. In such cases, solar energy is the most suitable alternative source to promptly power essential buildings. In addition, connecting power grids to remote areas may be costly. Solar energy can be used to address such a situation by setting up solar panels in the remote areas to generate electricity.

Environmental impact of solar power generation and use

Every form of energy production and transmission has some kind of impact of the environment. Markedly, conventional forms of energy have more negative impact to the environment compared to renewable sources. Fossil fuel is known to affect the climate and other environmental resources while nuclear energy is known to have the potential of emitting harmful radiations. Solar energy provides environmental advantage compared to oil, coal, and nuclear energy. The negative impact it has to the environment is very minor. One way in which it affects the environment is through the glares from the panels. This has an impact on the aesthetics of building especially when a panel is installed at a specific position on e a building. The chemicals used in

the manufacture of the panels can also be accidentally released into the environment thus causing harm. In cases of large scale production, a lot of land is required for installation of the panels. This can be an issue if the land used is cultivable land or land used for other essential income generating activities.

Efficiency of and ability to store solar energy

The efficiency of solar energy is a result of the fact that it is a renewable source of energy. It depends on sunlight to generate electricity thus making it renewable. This is unlike conventional sources such as fossil fuels which depend on earth supply of resources such as oil and coals. These resources can be depleted depending on how they are exploited. However, solar energy does not deplete any of the earth’s resources. Solar energy is also efficient because it is simple to distribute electricity generated from the panels. It is easy to make a connection to an electrical grid. As mentioned earlier, solar energy is efficient because it is affordable.

Since solar energy is unavailable at night, energy storage is a necessity for the solar energy system. Solar energy cells have the ability to store energy for up to 15 hours. The power plants in the US for instance, use Concentrating Solar Power system which is simply a tracking system that concentrates or focuses large area of sunlight into a beam. Heat received from the concentrated light is then used as a source of heat for the power plant. The systems also have photovoltaic cells that transform light energy into electricity through a scientific concept called photoelectric effect. Storage of sunlight can also be in the form of heat energy which is later

converted to electricity. The media for electricity storage include Glauber's salt and paraffin wax. These media of storage are effective because of the low cost. In addition, their specific heat capacity is high, able to deliver the right amount of energy for the power systems. Lastly, the storage is made efficient using rechargeable batteries. These are used for storing excess electricity produced.

Cost of producing solar cells/panels

As mentioned earlier, productions of power using solar energy is considerably more expensive due to the cost of producing the solar cells. In the US, the government heavily subsides the power plants in order to keep them running. This is mainly because of the high cost of large scale production. The issue of cost is still a major challenge despite the fact that solar energy technology has been in use for a long time now. The main issues making the cost of production high include: capital cost, the fact that the power can only be harvested during the day, an effective storage system that stores energy when light is interrupted during the day, and tracks of land for setting up the panels.

Advances in manufacturing

Despite these challenges, a lot of technological research is underway to improve the situation. Engineering solutions seek to make large scale production of solar energy is made effective and cost efficient as possible. Furthermore, recent manufacturing technology focuses on producing solar electricity for less than the cost of daytime retail electricity. It focuses on the making it cheap for house holders to install solar panels on their roofs rather

than buying more electricity from the grid. In the currently used solar panels, there is a lot wasted silicon. Spreading the silicon further to reduce the cost and also increase the exposure of the silicon to the sun. Advances in manufacturing seek to make it possible for solar cells and panels to be used in portable gadgets such as mobile phones. Solar panels have also been made transparent for installation on windows of buildings hence reducing the aesthetic impact.

Conclusion

This paper has developed an in depth discussion of solar energy in the United States while making comparison to fossil fuels. The paper has highlighted on the impact of solar power generation and use, the efficiency and ability to store solar energy, cost of production of solar panels, and advances in manufacturing that make solar energy more cost effective.

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