

Alternative renewable energy solar panels research paper examples

[Environment](#), [Electricity](#)



Alternative Renewable Energy: Solar Panels

The problem on climate change and the rapid depletion of national energy sources have been a standing problem for the world since the 19th century. Current natural energy sources, mainly fossil fuel and coal, are starting to run out due to the increasing human consumption of both developing and developed countries. While it provides electricity and power to various human activities, the usage of these natural energy sources causes severe environmental hazards that are now apparent in society and ecosystem. In response to the growing hazards of continuous use of fossil fuels/coal and its depleting supply, several proposals had been placed to utilize alternative energy sources that would not harm the environment and continuously sustain power to the planet without depleting its supply. One of the oldest proposed alternative renewable energy sources is harnessing the power of the sun, or solar power.

Solar power has long been used by human kind since the early prehistoric era. According to Bradford (2006), harnessing the power of the sun was considered a mythical power for humans as they could use it against their enemies. In some recounts of known 3rd century scientist Archimedes, solar power was used to stop Roman invasions in Syracuse by using solar mirrors to set ships on fire. Archimedes' retelling of the Syracuse inspired several inventors to create their own mediums of harnessing solar power. Leonardo da Vinci, for example, designed a bowl mirror of four miles across in size that can be used for industrial usage. While Da Vinci's creation was not put into action, his creation mirrored the several means on how solar power is harnessed to the present time. Solar technology became rampant in the 19th

century as three inventors debated on how they could effectively use the power of the sun with the use of present technologies. The ideas of these three inventors inspired the creation of the solar panel which uses light energy to generate electricity through a photovoltaic cell .

According to the Colorado River Commission of Nevada (2002), the world's fossil fuel reserves are consumed by three countries: the United States, Russia and China. Collectively, these three countries produce 31% of the entire fossil fuel reserve of the globe, but they also consume 41% of the entire fuel reserves. While some nations have already utilized the power of renewable energy, it is visible that nations still depend on fossil fuel to power the country. Table 1 signifies the estimated years left for fossil fuel, natural gas, and coal to dwindle. It is noted that it would take 98 years for the total petroleum reserves to deplete, 166 years for natural gas and 230 years for coal .

Table 1: World Fossil Fuel Reserves and Project Depletion

In the analysis done by Eastwood (2011) regarding America's power generation through fossil fuel, it is noted that 50%, or 3, 101 TWh, of American electricity is produced by fossil fuel and coal. In turn, America's power generation through fossil fuel increases the country's carbon emissions up to 40% each year. However, studies note that solar power is capable of producing 6600 times more electricity than the conventional electricity generation rate through fossil fuel . According to Boxwell (2011) one solar panel cell can produce 14-18 volts worth of electricity, enabling the system to charge a 12-volt battery or a regular automotive battery.

Collectively, one solar panel can produce 100-320 watts worth of power. Depending on the capacity of the solar panel and the location of the solar farm, it is said that a panel can produce 230 watts of power. . Considering that the United States generates 3, 101 TWh worth of electricity out of fossil fuel, the country would require an estimate of 750 million solar panels capable of producing 230-320 watts per panel.

The current electric grid of the United States is considered a century old. According to Rahm (2010), the US electric grid consists of several centralized power plants run by utilities or power producers before it is distributed to the consumers. Electricity transfer is done through the use of substations, transformers and then to transmission lines. When electricity reaches substations, utilities or power producers would not be able to follow the distribution of electricity to transmission lines. This makes it hard for power producers to identify which locations would have power shortages unless calls from consumers are done. Currently, the US grid comprises 9, 200 electric generating units, capable of transmitting 1 million MWs of power to 300, 000 miles worth of transmission lines. The US grid is run by the Independent System Operators (ISO) to ensure that locations are provided with electricity through the grid. ISOs normally are in charge of one or two states to ensure that each state is supplied by the US electric grid. With the current debate in applying solar panels to generate electricity in the country, it is plausible to use the same electric grid system for solar power distribution. If a solar panel farm is built in South Dakota, the electricity could be transmitted into a “ power producer or utility” through a transmission grid despite the distance of the solar farm to the consumer.

Solar farms are done away from civilization or cities since the outskirts of states would allow sunlight to enter panels without hindrances. While in the transmission grid, utilities can transmit the electricity to substations before electricity is transmitted through transmission lines. In this case, electricity coming from substations would direct the power to a manufacturing plant in Boston without delay .

With the notions of the benefits of solar power and the current problems facing countries utilizing fossil fuel to generate energy, discussions of implementing energy development is proposed around the globe. In consideration of the number of fossil fuel infrastructure needed to be removed in nations, it would be crucial to identify the number of citizens that would be affected with the elimination of the fossil fuel structure. Backup plans must be created to ensure that the state would continue to have electricity while removal of fossil fuel plants is done. Toxic chemicals must also be disposed properly from these plants. Eliminating fossil fuel infrastructure could open up locations for alternative energy infrastructure to establish their own structures to generate power. It can also reduce the amount of emissions in the region, which contributes to global warming. However, removing fossil fuel infrastructure can also present disadvantages because development of alternative energy structure and realigning power grids to the system can take months or years to do. Job loss would also be a disadvantage for removal of fossil fuel infrastructure unless the infrastructure to be placed in the site would rehire them again.

After the elimination of current energy infrastructure is done, plans on how to optimize the creation of solar panel farms to generate power is put into

play. Several nations have already proposed their own means to transform their energy systems to solar power. Ideally, before a solar panel farm must be designed, it is crucial to identify the location which has access to the highest solar radiation each year. Figure 1 notes US states which has high access to direct solar radiation .

Figure 1. Direct Normal Solar Radiation Map. This figure illustrates the US states receiving direct normal solar radiation.

With the location noted, the next step is to identify the amount of land needed to generate the required electricity for the location. For a city with 100, 000 citizens, several acres of land would be required to establish solar panels with the capacity to generate 320 watts per panel mirror. The land's location would also be judged according to its capacity to receive sunlight without interference from infrastructure or human influence. Once the land and location is determined, the type of solar panel to be used must be taken into consideration. Currently there are different types of solar panels based in their material and wattage capacity. Collectively, the type of solar panel used would determine the overall capacity of the panel to generate electricity. Establishment of solar panel in regions can enable the production of cheaper electricity compared to those produced by fossil fuel. Emissions would also be reduced significantly as solar power will not emit carbon as the power comes directly from the sun's rays. Unlike fossil fuel, solar panels are capable of continuously producing energy since it receives its power from the sun. However, the cons of establishing solar panel infrastructure would remove lands that could have been used to generate food from agriculture

or housing. The cost of establishing solar panels is also a disadvantage as the power producer would have to purchase specific solar panel to optimize electricity generation. There is also the establishment of distribution plants for solar power, which may cost a lot of dollars as it would need to be calibrated to accustom to current transmission lines.

With the current debate as to how development of solar panel farms would take into place, questions regarding the capacity of solar power in developing jobs are raised by the public. Supporters of transferring to green energy such as solar power note that if solar power is approved, additional jobs would be open to the public. According to Glazer (2009), green energies can produce engineering related job openings and also blue-collar jobs.

Some of the examples noted are electrical engineers, mechanics, welders, fabricators assemblers, operators, labourers and construction managers .

Supporters also noted examples of successful solar power users and how they developed jobs for the public. Mallon (2006) noted Spain as his example on how many jobs were created due to solar power. In Spain, the public strongly supported renewable energy because of its capacity to generate jobs. When Spain introduced the concept of solar power to the public, 4, 000 people were provided employment. Three-quarters of the 4, 000 people employed worked as maintenance and operation staff for solar farms. The remaining workers were employed in photovoltaic cell manufacturing.

Graduates of high education courses related to technology benefited in the job openings in Spain in solar power . Opponents to the solar panel energy move denote that job loss would happen if nations move to alternative energy.

Given that the nation would push for solar energy generation for their citizens, it is crucial to know which solar panel manufacturer is capable of providing the required number of solar panels the market demands. Goodall (2010) noted that, in the United States, the largest solar panel manufacturer is First Solar. The company develops thin film photovoltaic modules and also caters to the creation of PV power plants and how it is to be managed. The company develops its PV cells in various locations in the United States, such as in Ohio, and in sub-plants in Frankfurt, France, and Malaysia. China and Japan are also known manufacturers of solar panels, competing against US and European solar panel manufacturers .

In consideration to the application of solar power development, several considerations and implications must be given attention before the government could transform their energy generation to solar power. In the natural sciences, questions such as how to optimize fully solar power from solar farms and how it could the optimal solar radiation be received from the sun through the solar farms is raised considering the sun's variability.

According to Chiras (2010) solar energy rates tend to differ each day due to the solar patterns and weather conditions. Scientists have yet to develop a medium that would allow PV systems to generate electricity 24 hours a day if most of the time, the Sun is blocked by weather systems or it is located in the other side of the hemisphere. Engineers also question as to what kind of medium or storage instrument can be used to store solar energy must be used to ensure electricity generation. While the process of inventing and developing ideas over storage of solar power is taking place, proposals such as solar surpluses from other solar farms is being studied by experts to

ensure complete electric coverage. Scientists are also looking at the health effects that can be acquired through the solar panel farms due to the current studies that solar radiation can cause cancer and other skin diseases.

In the social sciences sectors, questions of solar power's aesthetics are regarded by experts since the public would require an alternative energy source to be cheaper than fossil fuel, and if it is easy to generate in their own homes. There have been cases that some neighborhoods have banned PV systems in consideration that its not an effective means to save money from electricity bills. Conservatives also believe that solar power would not be efficient in today's society and due to the layout of homes. Social science experts are also concerned as to the costs of using solar electric systems with the variety of solar panel systems available in the market. If the government would be generating power from these solar panels, how much of the budget would be used to purchase these solar panels alone? Legal considerations are also raised as the government would have to impose policies and guidelines to ensure operations of solar plants in various states. The national government must also set standards on the price increase or price deductions so solar power producers would not overcharge their consumers. The application of solar power would also cause implications to politicians who will support its establishment because for a country such as the United States, it is crucial to locate an alternative power source to stop the blackouts caused by the current US electric grid. Finally, in the field of humanities, considerations on how to depict solar power to the future generation is put into debate. Who should be considered the pioneer of developing the globe's first solar panel technology? Which country is

considered the first nation to transform their electricity generation system to solar power? Finally, the question “ What makes Solar Power different from the other alternative energies?” is also put into play considering that there is still a lot of things humans have yet to discover regarding the sun.

Depending on the solar panel utilized and the capability of solar farms placed in vital installations throughout the nation, solar panel electricity would be capable to replace 20-40% of fossil fuel generate energy given that solar power farms and plants are placed in strategic locations capable of accessing direct sun radiation. Currently, the Obama Administration aims to utilize solar power for his all-of-the-above-energy strategy. According to the Department of Energy (2012) article, the Department of Energy and the Department of Interior launched several solar power campaigns covered by the Programmatic Environmental Impact Statement (PEIS). The Solar PEIS covers the development of six southwestern states that are noted by studies capable of harnessing the highest estimated solar power. These southwestern states are Arizona, California, Colorado, Nevada, New Mexico and Utah. The article noted that the Obama administration approved 17 utility-scale solar energy projects capable of producing 5, 900 megawatts of power. The power is estimated to be capable of powering 1. 8 million American homes. The Administration also aims to set up 17 Solar Energy Zones, covering 285, 000 acres worth of land from the 6 identified states with high solar contact. In addition to this, the Administration also aims to develop additional solar zones in variance areas outside the 17 SEZs to create 23, 700 megawatts worth of power for 7 million American homes. If it is successful, the Administration aims to locate additional SEZs across the

continent to power up the entire country .

With solar power creating new possibilities to curb the use of fossil fuels, debates as to the pros and cons of using such power are still discussed by experts. As noted by Chiras (2010), solar power is considered one of the cheapest forms of electricity, also the cleanest. Solar panels are capable of reducing the contribution of the country to environmental risks that contributes to global warming. Solar panel farms and power are also cheap in the sense it would not require governments to utilize billions of dollars to manage and create. Solar panels are also clean in a sense that they do not produce waste. Solar power is also free in the extent that it would not run out. Moving to solar panels is also easy to do as a small system could serve as the test drive and once the location sees the benefits, then they could add additional systems to expand the solar panels. The downside to solar panel moves is the capability of solar panels to generate electricity due to the variability of the sun's radiation. There is also the cost of each solar panel available in the market even for a small device .

For transition from fossil fuel to solar power to work flawlessly, it is ideal to utilize the present electric grid and create distribution grids for solar power to distribute its share of electricity to the public. This will enable power producers to dismantle fossil fuel infrastructure and replace them with solar power once the current grid is capable of sustaining solar energy. Power producers can also utilize the present electric grid to identify the amount of electricity generate in each power plant, both fossil fuel and solar power, to determine how much solar panel should be placed to achieve fossil fuel electricity generation rates in the plant. Like in the given example for the

South Dakota-Boston situation, transmission grids can be used to generate solar electricity before it is transmitted to sub stations for the public. In terms of utilizing bridge fuels to ensure that plants are working nonstop, power producers can utilize other forms of renewable energy such as wind and hydro fuel.

With the Obama administration launching full-scale proposals in increasing the country's Solar Energy Zones across the continent, it would take the United States up to 2060 to replace fossil fuel power to solar power.

Depending on the succeeding administrations, budget and projects that would open solar power to the public, the US would gradually turn to solar power or any other renewable energy source to assist in combatting global warming and the depletion of fossil fuel. As of today, solar power is still incapable of replacing fossil fuel 100% given the cost of transforming present technologies (ex. cars, refilling stations, and machinery) to utilize solar power and the creation of facilities that offer solar energy, from the creation of one solar panel to a farm filled with solar panels. Replacing automotive and machinery that utilizes solar power would also be expensive because the technology is still experimental. While there are several disadvantages of solar power that has yet to be addressed, solar power can still replace 40% of a nation's use of fossil fuel if policies and infrastructure are in place for solar power generation.

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