Solar Energy Production in the United Kingdom Analysis

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Abstract

Solar Panels produced as high as 8.48 Gigawatts of energy in the United Kingdom in 2017. Almost one-fourth of the electricity needs were fulfilled by solar panels throughout the country in 2017; National Grid ensured further application of solar energy-producing tools to balance the supply and demand of electricity in the country even after the government's cuts on solar power generation in 2016. This paper discusses the significance of solar energy production and solar system application in the United Kingdom. Bright sunny skies and low demand in summer offer favorable conditions to plan solar system applications and predict the number of solar energy productions. Government statistics from 2017 depict that the country's capacity for solar energy has increased to 12.1 from 11.4 Gega Watts during the year and is capable of catering to the power demand of 3.8 million houses. The United Kingdom aims to replace fossil fuels with solar system applications and reduce carbon dioxide by 80% in the year 2020.

Introduction

The national grid, despite a Government subsidy cut over solar power generation in 2016, is determined to apply the available tools to enhance the capacity of solar energy to maintain a balance between demand and supply. Buckley, the day-to-day operations manager at National Grid suggests that they could handle a much higher power proportion from solar energy as the power stations producing energy from gas could be ramped down (The Guardian, 2017). The country has recently been looking at improving its energy efficiency, moving away from fossil fuels, and becoming more dependent on solar technologies like solar energy. The United Kingdom (UK) is composed of Wales, Northern Ireland, Scotland, and England. Altogether the size of the UK is about 234,610 km2, which is about the size of the state of Oregon in the United States. Even though it is a small country, the population density is about eight times that of the United States, and 100 percent of its citizens have access to electricity. This paper will discuss Solar power as an alternative to fossil fuels energy production in the United Kingdom, Its benefits, aims, impacts, pros, and cons of using solar energy in the United Kingdom

The United Kingdom is an industrialised country, the Industrial Revolution in the late 1700s, created a boom in their economy. Industries grew and created jobs for people from diverse backgrounds, new colonies were established near factories and manufacturing plants and the country became

industrialized, producing a hunger for energy. As the population grew, the demand for energy and resources increased with it. The fossil-fuel production and consumption rose as well, however, a couple of decades before, environmental concerns started becoming a priority worldwide and the burning of fossil fuels causes many greenhouse gases ultimately contributing to the global warming phenomenon. To counteract this aspect, the United Kingdom has started looking for alternative resources to produce energy such as solar power tools. Wind, solar, and tidal power are the main types that will allow the UK to switch their fossil-fuel dependence. Self-promoting legal documentation also ensured the practical switch from fossil fuels to solar energy instead of just talking about it. By passing legal bills, the UK is bound to proceed with the switch from conventional sources of energy to solar tools and continue with those. Already industrialized, the country does not need to depend on fossil fuels for energy and is capable of applying solar systems efficiently. The UK still needs power, like all other countries, but it no longer needs to rely on conventional fuels (Boyle, 2004).

Britain's Feed-in tariff is the first time in a year, and in the UK solar panels are getting more popular than ever. Government statistics reported that 78 Mega-Wp, or installations of more than 28,000 solar panels (average of 2.7 kilowatts) during the period from 1 April 2010 to 31 March 2011. More than 90% of this is in the rest of England, Scotland, and Wales (Northern Ireland consumers cannot ask for the FiTs).

Current Energy Portfolio

The primary source of energy production in the country has been fossil fuels. In 2012, the United Kingdom received 87% of its energy consumption from fossil fuels, which included coal, oil, and gas, and 11.9% of its energy consumption from low-carbon sources, such as nuclear and solar energy (wind, hydro, and bio-fuels). Tidal power is a form of marine renewable energy generated from the movement of tides; it is not a solar resource. The most favored areas for research and implementation of tidal turbines would be the southeastern, southwestern, and western parts of the UK. These areas have the most robust tides and will, therefore, produce the most energy. The UK currently stands as the leader in tidal power and is home to the most substantial amount of tidal stream devices. Within the past year, the tidal energy sector has seen a lot of activity in the UK. There have been twelve full-scale prototypes deployed or operating, which is more than the whole world combined(CompareMySolar, n.d.).

Another dominant source of energy in the UK is natural gas, which has a share of around 41.9% of all the primary energy supplies. Oil accounts for 31% of the TPES, which makes it the second-largest energy source for the UK. Oil and natural gas are the two significant sources of energy because they are reliable, cheap, and locally extracted. The UK produces about 45 percent, 92.421 Mtoe, of its total consumption by using oil, natural gas, coal, and biofuels. About 48 percent of all UK production comes from oil, and about 40 percent comes from natural gas(Mearns, 2015).

The United Kingdom's consumption outweighs production by more than 50 percent. Therefore, about

75.52 Mtoe are imported into the UK. The UK consumes 203.6 Mtoe, where 34 percent of that consumption is made up of natural gas consumption, while 33 percent is made up of oil consumption(Mearns, 2015).

The residential sector has the highest energy consumption, accounting for 32% of the total and transport is a close second, accounting for 30%. The total energy production for the UK, as of 2012, was about 1,505.55 TWh, whereas the consumption was approximately 346.15 TWh(Mearns, 2015).

Figure 1(CompareMySolar, n.d.)

It is apparent that each person is utilizing around 5.52 MWh of electricity and 1,159.4 TWh of power is being wasted and released. Because the UK population grew rather than declined over this period, energy-demand projections should not assume a falling population; transportation and residential use still account for a large share of energy consumption. This decrease in fossil fuel consumption and the increase in solar energy will set the UK on the right track to reaching its near future goals.

Brief Comparison

The United States consumed about 2,208.8 Mtoe in 2012 while producing approximately 1,557.36 Mtoe. In comparison, the United Kingdom consumed about 203.6 Mtoe in 2012 with a production of approximately 92.421 Mtoe in 2012. The US consumed ten times more and produced 16 times more energy than the UK in the same year. The primary fuel in the United States was oil, which accounted for approximately 37 percent of the overall consumption. Natural gas was slightly behind as second with approximately 29 percent of the total US consumption. In comparison, the UK consumed 33 percent oil and almost 34 percent natural gas. However, the United Kingdom, as of 2012, was using more solar energy toward their energy demand than the United States. Although it is not much, the UK used about 4.10 percent of solar energy while the US utilized about 2.29 percent of solar energy (Mearns, 2015).

In comparison, the United Kingdom produces about half of the GDP/$2000 and half of the carbon dioxide amounting to 7.06 tons per capita that were 16.94 tons in the United States. These numbers are reasonable when comparing the sizes and populations of these two countries(Mearns, 2015).

Potential Energy Supply

The United Kingdom holds a few oil, natural gas, and coal reserves. Currently, they rely mostly on natural gas and oil for their energy demands, but those natural resources are ending rapidly. At the end of 2012, there were only a proven 0.2 trillion cubic meters of natural gas (Table 3),

Reserves hold 3.1 thousand million barrels of oil and 228 million tonnes of coal, and in 1992, there were about 0.6 trillion cubic meters left which by the end of 2012, shortened to 0.2 trillion cubic

meters. There was a slight jump from 1992 to 2002 in proven reserves, and this is most likely due to improved technologies and more efficient ways of retrieving natural gas. In comparison, the oil reserves have been shrinking each year. In 1992 there were a proven 4.6 thousand million barrels of oil reduced to 3.1 thousand million in 2012.

Figure 2(Mearns, 2015)

The United Kingdom has the most advanced technology and diversity in tidal-powered devices, which are currently under development (Simon, 2009). Being an island, the UK has many research areas best suited to understanding the tidal and current power and how to harness all of its potential and build tidal-powered turbines for implementation of prototypes to determine what will work best for the future. An estimated 5 percent of the United Kingdom's energy could be provided just by harnessing the tidal power located in the Severn estuary in the southwest of England (Hooper, 2013). Also, combining the output of tidal barrages of four bays in northwest England would meet about half of the United Kingdom's present energy needs for the whole region (Hooper, 2013).

Figure 3(Mearns, 2015)

The UK has been experimenting with wind power too. The wind speeds in the southern part of the UK are not ideal for wind turbines, but the north and northwest areas are considered excellent. In Quarter 2 (winter) of 2013, wind generation increased by 62 percent because of high winds and the capacity to capture onshore and offshore winds (DECC: A, 2013). Offshore wind has been estimated to be the most significant potential contributor to the UK's energy demands. The European Wind Energy Association estimates that about 150 GW of offshore wind can be useful in 2030 and this would supply approximately 14 percent of Europe's energy demand (Wieczorek, 2013). The United Kingdom has seen a consistent increase in wind and solar power because the capacity levels have increased (DECC: B, 2013). The country's largest solar farm was built, commissioned, and connected to the grid on a former World War II airfield. This site was built in April 2013 and consists of about 130,000 solar photovoltaic (PV) panels (DECC: A, 2013). The city of London also has the world's largest solar bridge, which has more than 4,400 solar PV panels and produces approximately 900,00 KWh of electricity per year (DECC: A, 2013). This solar bridge contributes about 50 percent of the electricity needed to run London's Blackfriars Subway Station. Solar potential has been proven to be more beneficial in the southern parts of the country. These areas have the best solar radiation and would, therefore, contribute more to the energy demand. Implementation of solar panels in these areas would provide the highest amount of solar energy for the UK. Overall, the United Kingdom is on the right path to creating a more sustainable and solar country(Boyle, 2004).

Problems regarding the use and introduction of

solar energy

Providing solar energy is the main pole of war, and the British government is in favor of low-carbon and increased energy systems in conjunction with coal, nuclear, gas, and energy efficiency world. However, as relatively new bands and new technologies, solar energy sources tend to be more expensive than the current production of fossil fuels.

Due to the potential rise in future fossil fuel prices and the potential impact on supply safety, there is no cheapest option. Nevertheless, it is necessary to achieve the goal while minimizing the impact of sustainable economic growth energy policies, and climate change on consumer accounts. The UK is taking measures to maximize profitability and cost(Kreith and Kreider, 1978).

- Regular review of technical costs: The cost of solar technology is expected to decrease with time. We are responsible for ensuring that developers have sufficient incentives to promote early adoption, but they do not exceed the cost of consumers.
- Dealing with the non-financial barriers and supporting supply chains: adopt measures to support domestic investment in the supply chain to reduce operating costs and increase production competition and proximity to the point of installation.
- Work within the framework of public expenditure and accessibility: manage the policies to stay within the limits of costs as sustainable economic growth, achieve goals, and reduce the impact on consumer accounts.
- Electricity market reform: A reform package in the electricity market was developed as the most cost-effective way to achieve energy and climate change goals. It is expected that it will increase in the coming years, electricity bills, due to some, due to a wholesale price rise for electricity and carbon, but our reforms are for local consumers not because it means that there is a possibility of limiting the increase for the local people. It consumes a lot of energy(Şen, 2008).
- Improve energy efficiency: Our goal is the percentage of total energy consumption. If we can reduce consumption, the need for implementation will decrease. Reducing energy consumption also reduces the impact of invoices. In addition to these steps aimed at reducing domestic labor costs, we can cooperate with European partners in the field of solar energy source deployment. This can be an important protection mechanism for British consumers if the country’s deployment costs are not adequately reduced and alternative countries and opportunities are inexpensive in other countries where the UK can “trade” through the scheme. Flexibility in the solar energy directive(Kreider and Kreith, 1981).

This should not be seen as a unilateral practice. Trading is an opportunity for the UK. We have abundant wind resources, and we can also export energy generated in UK waters to neighboring member countries. We strive to import the solar energy sources that will guarantee the greatest interests to the UK, to ensure that according to the flexibility mechanism, had the authority necessary for the export of solar energy does.

In the previous year, the Office of Solar Energy Deployment made efforts with the financiers, industry, the Devolved-Administrations and other organizations to recognize the latest trends in the deployments of solar energy in the United Kingdom, and the pipeline of schemes that would move forward earlier to the year 2020, in addition to the obstacles that are required to be overwhelmed to allow these schemes to be completed effectively and in the cost-effective manners. The Roadmap is the 1st of its type. At the same time as it sets out a complete agenda of action, it further identifies that the obstacles to the deployment, technological costs, and revolution advances would alter with the passage of time. The Roadmap has established the procedure of evaluation and monitoring that would permit us to regulate the tactic(Turner, 1999).

Pros of solar technology

Solar Panels produce solar energy

Solar panels use solar energy as the source, the Sun. The Sun is the solar energy source since it will never run out, unlike the present main source of energy, fossil fuels (oil, coal, gas). Experts have predicted that the sun will give light for around 7.5 billion years. To compare it to the United Kingdom's reserves of fossil fuel which might be exhausted in as little as five years and the present universal reserves which might be finished or vanished by the year 2088 if more people don't consume solar energy sources such as solar energy. Solar panels are the approach of investing in future generations as the sun delivers plenty of energy for the population of the world each year and would endure doing so for the whole time, humans populate the Earth("Solar generation | Energy UK," n.d.).

Solar panels produce clean energy

The electricity which is produced by the solar panels is clean energy. Clean energy means that there are no harmful or undesirable effects on the surroundings. Solar panels don't produce any harmful by-products or any pollution. Solar-panels don't contribute towards the increasing emissions of carbon dioxide as the fossil-fuels do. Solar panels are also very silent, so they don't contribute to noise pollution. There is a certain quantity of carbon dioxide and pollution that is generated in the early manufacturing and transportation of solar panels, though studies have publicized that this early environmental cost is counterbalanced with the help of clean energy that the solar panels produce. It is further proposed that the solar panels compensate for the energy that is required to produce them in 4 years, with comparatively rapid paybacks for the structure that tends to generate clean energy for more than five decades.

Solar panels could save money

The use of electricity produced from solar panels means that people are not using too much power from the National Grid. This would meaningfully decrease the energy bills. It would further lessen the manufacturing price of the products and improve the country's economy. A person could be looking to save around 125 pounds each year in the energy bill (centered on the 3.5kW system on the standard family house). This doesn't include the money that a person might make from the installation of the solar panels. The total sum that a person could save is probable to increase from year to year as the price of energy has set-out to be continually increasing, with experts believing we could see a 50% rise by 2019.

Solar panels can also make you money

The installation of solar panels on the roof of a home or building could save money. To inspire more and more individuals to invest in solar panels and systems, the government has announced the Feed-in Tariff (FiT). With the help of FiT, a person can earn money in two ways.

In the 1st method, the government should pay for all the power that a person has produced, even though a person is using it for himself, it is known as the Generation Tariff. The present rate is around 4.39p per kWh; this sum could be around 400 pounds per year from the average system of 4kW. The 2nd way in which a person could generate electricity with FiT is by automatically selling the power that a person does not use back to the National Grid or the government, this is known as the Export-Tariff. At the present rate of around 4.85p per kilowatt per hour, a person might presume to earn back around 60 pounds each year from the selling of the energy(Banfill and Peacock, 2007).

One of the most important things about the FiT is that it is guaranteed at a similar rate for two decades, and all of the payments are free of taxes. To take into consideration the reserves on the electricity bills and the payments of FiT, the typical house can look to earn around £8,080 pounds over the two decades, that is around 2,000 pounds in revenue on the initial costs. However, as more and more people are installing solar panels and taking advantage of this system, the prices are lowering with the passage of time. This means that if a person is bearing in mind the installation of solar panels, now is the correct time to go ahead with it to benefit from these expenses.

Easy installation and maintenance

Solar panels are easy to install as compared to other solar sources. Solar panels can be installed on any roof in a few days, and from the next day, you can use clean and solar electricity.

The mechanism that is used in the solar panel system is straightforward, which means that maintenance is easy. There are no moving parts, which means that most systems have a long service life. Many combinations guarantee their drawings for about 2.5 decades. The only part of the system

that may require more attention is the investor. Cleaning and maintenance of solar panels are rare and inexpensive.

Increase the value of your house

Low-energy accounts from homes with solar panels can be very attractive to potential buyers if you are planning to sell your home in the next decade. Revenue from the cost of the supply and sale of surplus electricity to the network is transferred to future owners. These factors can increase the value of your home. It's hard to say how many solar panels can be added to the property value because there are several factors to check (area, installation date, system type/power, etc.). One of the reasons that people in the past have been damaged by the installation of solar panels is to reduce their property due to the surprising appearance of this panel. However, modern solar panels are becoming more delicate, slender, and beautifully pleasant. Studies have shown that people are willing to pay more for homes that already use solar panels to use cheaper bills and pay fees.

Benefits of PV Systems

Photovoltaic solar panels have many benefits. Some of the benefits are given below

- Safe Installation and operation
- Very Simple to install
- Very little need for maintenance and have no moving parts
- No pollution and emissions
- Capability to incorporate into new and existing structures and buildings
- High durability, dependability, and a very long life (of around three decades)
- Soundless working and having no environmental effect

Disadvantages of the Solar Energy

Cost

The early cost of buying a solar system is very high. The government of the United Kingdom has presented several schemes to promote the implementation of solar energy sources, such as procurement duties, but still must cover the initial costs. This includes payment for solar panels, inverters, wiring, batteries, and installation. However, solar technology is constantly evolving, and it is safer to undertake that the cost of solar panels will fall in the upcoming("Advantages & Disadvantages of Solar Energy (2018) | GreenMatch," n.d.).

Weather dependent

It is still possible to get solar energy during a cloudy day or rain, but the effectiveness of the solar panels and system is declining. Solar panels utilize sunlight to efficiently get solar energy. Consequently, some rainy or rainy days could have perceptible effects on the energy system. Likewise, note that you cannot collect solar energy at night. On the other hand, if it is necessary to resolve feed water heating even in the night-time or in winter.

The storage of Solar energy is expensive

Solar energy must be used immediately and could be kept in a large battery. These power-saving batteries are used in off-grid solar systems that could be shipped during the day for the power that is used at night. This is a nice solution to using solar energy throughout the day. However, it is also very costly. In the majority of cases, it is prudent to use solar energy during the daytime, and you can withdraw the grid from the grid during the night (possibly only when the solar system is linked to the network). Fortunately, our energy demand is usually higher than during the day, so we can use most of the solar energy.

Use a lot of space

The more power a person wants to generate, the more solar panels a person would require so that they could have more energy from the sun that is converted into electricity. Solar panels need lots of space, and some of the ceilings are not sized to fit the number of solar panels you receive. Instead of installing some panels in your garden, you need to get the sunshine. Anyhow, if a person doesn't have space for all of the panels that a person requires, he could get and further meet some needs of energy("Advantages & Disadvantages of Solar Energy (2018) | GreenMatch," n.d.).

Related to contamination

Contamination related to the solar system is much lower than other energy sources, but solar energy may be related to pollution. Relocation and installation of the solar system are related to greenhouse gas emissions. There are also harmful substances and harmful substances used during the photovoltaic process that may ultimately disturb the environment. However, solar contamination is much lower than that of other alternative sources of energy.

Market effects and analysis

Global solar energy is estimated to reach $ 422 billion. The United States will spend $ 86 billion by 2022. In 2015, the United States will have a CAGR of 24.2% in 2016-2022. Solar energy is the solar

radiation energy used in various technologies, such as solar thermal, photovoltaic cells, and others. An effective form of non-traditional energy and a corresponding solution to solar energy sources is to increase greenhouse gas emissions and global warming.

The increase in the solar market is associated with an increase in environmental pollution, the introduction of government incentives, and a reduction in the tax on the installation of solar panels. Also, reducing water consumption in solar systems has led to an increase in demand in the electricity sector. The demand for solar cells has increased significantly due to the increased number of surface installations and the increase in the number of applications in the architecture sector. Also, demand for equivalent drainage and solar power towers in electricity generation is expected to increase demand for centralized solar systems.

Based on technology, the global solar sector is divided into photovoltaic and concentrated solar energy systems. Photovoltaic cells are also divided into inorganic and organic cells, and splicing systems are divided into solar towers, among others. According to the solar module, the market is classified as monocrystalline silicon cells, polycrystalline silicon cells, cadmium silicon telluride cells, amorphous silicon cells, and so on. Typically, the market is divided into the first, second, and third generations. The programs in this research include agriculture, horticulture, transportation, architecture, and so on. Geographically, the market is analyzed in North America, Europe, the Asia-Pacific, and Lama.

Polycrystalline and Monocrystalline-silicon-cells, especially in domestic applications, are in great demand. Amorphous silicon and cadmium-triumph cells are expected to provide an opportunity for development, due to the low cost of materials. An increase in the number of solar applications has led to a demand for the 1st generation-cells, which includes polycrystalline and monocrystalline silicon-cells. The 3rd generation sector is predicted to show a high growth rate due to continuous research and development as well as the increased effectiveness of solar panels. The development of solar systems in residential applications and architecture has given profitable market opportunities. However, the geographic coverage of the solar energy market has been affected, but increased investment in R&D and expansion of the use of solar storage systems will increase the demand for solar systems.

Developing countries, for example, Japan and China have expressively improved the manufacture of solar technology through the government’s support, and the integration and purchase of local producers. Also, Europe and North America focused mainly on research to maximize solar energy. Africa and the Middle East have grown more important as energy, agriculture, and architecture have increased as a result of increased solar energy use.

Market dynamics

Drivers

Competition among manufacturers has increased significantly, due to the development of photovoltaic-based power distribution systems. Also, prices for solar modules in Europe and the Asia-Pacific region are very different, as the demand market is compromised. Also, the profitability of the module manufacturers and the purchase of market stress lead to lower solar panel prices. Also, the variable price of silver, the main raw material in the solar module, sets the demand for solar panels and promotes the development of the solar energy market.

Restraints

Photoelectric technologies have little effect on factors for example reliability, global production, and competition. Also, weather conditions and global latitudes limit the development of the solar energy market, particularly in snow-prone areas

Opportunities

The advancement of photovoltaic (PV) systems is vital for increasing the power of photovoltaic systems to replace existing conventional sources. As demand for solar installations increases, storage space usage is expected to increase, which will increase the demand for a lithium-ion battery to save on solar energy and increase the growth of the solar market.

Providing a favorable market plan, government incentives, and environmental problems due to demand for carbon dioxide emissions in the solar energy market. Also, the development in the installation of solar panels has led to an increase in the demand for photovoltaic cells. Also, the growth in demand has led to an increase in demand for central solar systems. The effective transformation of solar power to energy forms has increased the demand for single-crystal and poly-crystalline cells of silicon. Thin films, such as cadmium tellurium and non-crystalline silicon cells, have experienced growth due to lower costs associated with production. Also, ongoing research and development to develop a new type of solar cell, such as biofeedback, increases the limitations on energy adaptation. The requirement for solar panels has been raised in the agriculture and farming sectors, providing opportunities for the growth of the market of solar energy. Furthermore, the horticulture and agriculture sector also shows an upsurge in demand for solar panels to improve the cultivation of crops.

In developing economies, such as Japan, China, and Africa, the demand for solar energy is rising, as demand in residential and non-residential areas has increased. China has strengthened enterprises, and the growth of government tax incentives has led to an increase in the market for solar energy, especially in India. Also, the lack of an electric grid has increased the potential for market growth in distant places in Latin America and Africa.

The impacts of solar energy schemes

This research has discovered that the advantages and benefits of solar energy schemes could be deliberated in terms of economic benefits, direct impacts on the economy, and huge social effects. The baseline set-up for the installation of solar photovoltaics on the building each with the energy generating capacity of around 1,900kWh each year corresponds to savings of six hundred and fifty tonnes of carbon dioxide from solar energy. This will be a total of around 16,300 tonnes in the next two-decade era of the scheme(Mearns, 2015).

Social impacts and benefits

Social effects and benefits

With the innovation of solar technology, solar panels take energy from the sun and use that energy to produce electricity and power for buildings, homes, and cities. The Solar-panels make maximum use of land resources and save energy. Though, numerous social advantages could be attributed to the usage of solar energy in the U.S.

Create job

When cities and companies construct and operate photovoltaic power generation facilities, the project often helps to create a lot of jobs. For example, workers are required to plan projects, develop and implement projects, construct solar plants, manage facilities, and operate facilities. Thus, as a result of cities or states using photovoltaic facilities to power the area, workers can achieve many new jobs and help reduce unemployment in designated areas.

Economics

There are many ways to use solar energy to stimulate affected areas and the economy of the United Kingdom. More and more people have the investment to contribute to the economy of the country if more people can find jobs due to the increase in the total sum of jobs that are created by the operation and development of solar panels. Solar manufacturing is cheaper as compared to that of burning fossil fuels, which is the conventional way of producing electricity. Therefore, if a company or household decides to use solar energy to flow power in buildings or homes, the electricity bill may be much lower than when using fossil fuels. Over the long term, monetary differences of cheaper electricity bills will become very large, allowing families and businesses to put more money into the economy.

Health

Solar energy is a cleaner energy source than burning fossil fuels because solar panel power generation has very little contamination in the air. Therefore, cities and areas that use solar energy to operate the building will enjoy the clean air quality of the area, making citizens and local workers healthier. Furthermore, the research shows that the combustion of fossil fuels helps to promote global warming. However, since solar panels release very little dangerous pollution into the atmosphere, solar energy does not harm the atmosphere and does not cause global warming. Therefore, if the area decides to use solar energy for power generation, the switch helps to alleviate the effects that global warming has caused for example the rise of sea levels and storms (Clancy, 2017).

Dependence on oil

In the U.S., power plants that burn fossil fuels and produce energy for households and businesses rely on oil for power generation. As a result, the United Kingdom relies on oil to generate electricity, sometimes the money the United Kingdom pays for foreign oil is used for the support of terrorism. However, if the United Kingdom adopts policies and conducts more solar energy programs, the amount of oil purchased from overseas countries from the United Kingdom will be less than what is required in the country. Therefore, when households and businesses generate solar energy instead of fossil fuels, their reliance on foreign fuels will decrease.

Environmental impacts and benefits

The Use of Land and Environmental Impacts

In the area of electricity generation in municipal areas, solar energy facilities require large areas to generate energy. In this regard, facilities can disrupt existing land use and may affect the usage of places for example desert management or recreation areas. As the system of energy can affect the Earth through exploration, extraction, production, and disposal of materials, energy paths can gradually increase. Thus, some of the earth can be used for energy, so it requires a disturbed state before it returns to a significant contribution of energy time, or both, while other uses also have irreversible dramatic variations(Clancy, 2017).

Effects on air resources, water, and soil

The building of solar plants on vast tracts of land provides cleaning and sorting, leading to soil compression, changes in drainage passages, and bigger erosion. The System Central tower needs the use of water to cool it, which is concerned in dry conditions because the increase in water demand can lead to an abundance of available water resources, as well as leakage of chemicals from objects

that may lead to groundwater or surface pollution from Earth.

As with the progress of the larger manufacturing facility, the making of the plants' solar energy may pose a threat to the quality of air. These intimidations include polluting emissions of soil pathogens and lead to an upsurge in the number of particles in the air, which affects water pollution.

In addition to the above-mentioned environmental impacts, solar bodies can also have other consequences, for example, affecting the socio-economic status of the region. The construction and operation of solar facilities on a beneficial basis in the region will lead to direct and indirect economic consequences.

Direct exposure will happen as the outcome of spending on salaries and wages, in addition to the purchase of services and goods that are needed to build and operate the project.

Indirect effects will arise in the form of expenditure on the purchase of wages and salaries of enterprises generating additional income from labor, income, and taxes. The establishment and operation of the facility will require the resettlement of workers, affecting housing, public utilities and the work of local authorities.

Recycling of solar panels

Currently, recycled solar panels face a big problem, in particular, not enough space to reprocess or recycle the older solar panels, and not sufficient solar panels to make them further parsimoniously viable. The usage of solar panels is especially significant, as the resources are used in the manufacturing of rare and precious metals, which consist of silver, indium, or tellurium. Because of the limited recycling of the panels, these recoverable minerals can be wasted, which may lead to problems in future resource shortages.

For example, when looking at silicon, a resource that is essential for the creation of modern photovoltaic cells and which is presently present in plenty, but in solar silicon cells require loads of energy in the process of manufacturing, the main source of that power, which mostly determines how big carbon footprint cells is.

The absence of awareness in the way of production of solar panels and the problem of disposal of the solar panels, in addition to the lack of significant exterior pressure are the reason for the inadequacy of significant changes in the processing of materials used in the manufacture of solar panels, the business in terms of energy already has a great environmental reputation.

Solar energy: solar energy is the most obvious source of unlimited and rich energy. If you can capture all the sunlight on the floor for an hour, there will be enough energy to force the whole world for a year! This resource does not remove anything from the environment and does not require complicated extraction or drilling: everything that is needed, including a few pieces of equipment and a set of cables before the building is equipped with its power supply.

Reducing carbon emissions: Commercial and residential buildings account for about 39% of total carbon emissions in the United Kingdom, and the average household emits approximately 20 tonnes of carbon per year. However, solar energy contributes 96-98% to greenhouse gases less than coal electricity. After installing a solar system, a typical two-person home can reduce carbon dioxide emissions from three to four tonnes per year. As more people install solar panels in their homes, the demand for fossil fuels will fall across the country, which will significantly reduce carbon emissions.

Improving public health: supporting the decrease of the emissions of carbon dioxide and the burning of fossil fuels and the integration of solar energy into public health. In areas where a large amount of solar energy and other solar sources of energy, chronic bronchitis, respiratory, cardiovascular, and heart disease has declined significantly, leading to a reduction in the number of days lost and a long life expectancy and lower mortality rates,

Reducing water consumption: Coal, unlike nuclear plants, can consume from 20 to 60 liters of water per kilowatt-hour of electricity, so solar energy needs virtually no use. Production, installation, and removal of solar energy consume less than 86-89 percent of the water compared to that of the coal-fired power plant. This reduced the amount of water potentially contaminated by the production processes.

This contrasts strongly with the high amount of toxic by-products leaking into the freshwater of the oil refining process. Turning to solar energy, the energy sector will devote more clean water to irrigation and use in residential areas, reducing competition for water and leaving more and more people and the surrounding ecosystem("First CO2 rise in four years puts pressure on Paris targets – BBC News," n.d.).

Reducing land use: coal-fired power plants, maintenance stations, and refineries require huge amounts of land to manage massive production lines. While these large areas may be needed to maintain their traditional systems and to manage enough fossil fuels for locals, these areas occupy another large area.

Alternatively, these spaces can be used for other buildings, such as homes or businesses. These plants also tend to pollute the area around toxic gases and products, which negatively affect the local environment.

Solar energy, on the other hand, requires less than 20% of the area required for traditional plants. Solar panels in a residential area usually do not occupy additional space on the roof, and commercial solar panels occupy less space than the refinery's average.

Rigid materials: solar panels have a very long lifetime compared to other energy-generating mechanisms with a guaranteed useful life of about 25 years. Some of the first solar panels in the 1950s still work and are produced today! This means that the acquisition will take decades.

Since 2015, 13 percent of US electricity has been produced from solar energy. 0.6% of the total

energy released by the solar energy source. However, at lower prices for solar panels, more and more people are investing in solar energy, and this percentage is slowly rising. This amazing tool to generate electricity together with other solar methods can be used to reduce greenhouse gas emissions in the world and create a better future for the planet, its ecosystems, and its people.

Economic impacts and benefits

Lesser investment in the installation: in addition to the preliminary investment in the solar panels, there are no other costs associated with the making of solar energy. The savings you get when leaving the off-grid could simply be capitalized in the other schemes. This is possible not only for the different types of industries but also for people. Commercial solar energy projects are useful for numerous industries to guarantee the usage of solar energy for the management of various equipment and machines(Hertin et al., 2003).

Energy in remote or distant places

there are several places, such as forests, mountains, and islands that do not have energy. Solar energy is really a blessing for camouflage in these areas. In remote areas and rural areas, you can start various development projects in the area. As a result, educational and medical institutions in these areas increased with the introduction of solar energy.

Low energy cost

for many developing and developing countries, the rising cost of fuel and energy is a serious problem. The socio-economic status of the individuals that are living in these places is not natural. Therefore, it is necessary for these people to have cheap energy. In these areas, the government is looking for options, such as solar energy, to start a better, more suitable source of energy. It also helps the citizens to increase economic development.

Power in the hands of the masses

The regulation of power or energy and its production is presently at the table of capitalists, and the misuse of the masses is growing. The major weapon which is on the table of the capitalists is power and energy. Solar energy converts this energy into masses. There, communities and small groups can easily get out of the network.

With the advent of various technologies, the benefits of solar energy are increasing. Research and development at many solar plants provide an understanding of equality among the various economic groups in the world.

Political impacts and benefits

Many countries have recognized that dependence on fossil fuels has a noteworthy undesirable impact on the supply of energy and climate change. The technologies of solar energy play a significant role in the socio-economic growth of nations, communities, and regions. Governments and Politicians take into account the growing economic advantages of the solar industry. The industry is expanding employment and employment opportunities, creating new state and federal tax revenues, and helping to revitalize communities in difficult circumstances. Stronger government policies and incentives for the development of solar energy are the shares of the political viewpoint. To assess this viewpoint, the effect of these standards, such as the regulation (or deregulation), policies, of electricity markets, national research and development, compliance with laws and standards, and visualization of electrical networks, could be better understood("The politics of solar power – Magazine – Jerusalem Post," n.d.).

Policy

The solar policy is usually local or national and can represent the failure or success of a source of solar energy. The sub-criteria of the policy is security, support of solar energy and energy efficiency (for example, FIT and RPS), national independence of energy (from fossil fuels), local supply, five or ten years for solar energy or energy efficiency, New energy integration/replacement of existing installations.

Deregulation/ Regulation of energy markets

The market for the generation of electricity is changing with the help of a political process, a combination of deregulation, and some aspects of regulation. This innovative model influences both the traditional production of fossil fuels and the production and distribution of solar energy. Electricity market norms can include this signing on behalf of the RPS, which requires a clean solar target, FIT for consumers, reverse energy saving in the grid, measurement of energy prices through tariff structures (this is the common type of FIT), grants (for example tax-credits, Tax loans, etc.), the carbon-tax (as the penalty for pollution of carbon dioxide), director and the trade (further called as "emissions trading" or the "pollution credits", which allow pollution of loans in Brittany) and promotion of central or decentralized authorities in accordance with the climate of policies(Hewitt, 2017).

Government / Governmental Framework for Research and Development

The government could play a significant role in accelerating the implementation and development of solar energy technologies through research funding and the provision of a sustainable research and

development infrastructure. For instance, in the U.S., the majority of national laboratories have been researching and developing solar energy for decades, particularly the National Solar Laboratory (NRL). This standard consists mainly of three features or sub-criteria: support to national governmental laboratories, expansion of transferring of technology to the private sector, and development of a strategical technology roadmap or plan(Curwell et al., 1999).

Codes / Standards and Compliance

Compliance with established norms and morals is a critical feature of protecting consumers from solar energy and ensuring supply and demand. Currently, policies for setting standards are being developed and implemented. The basic sub-criteria of this standard are the United States law, national and international standards, and environmental and environmental standards.

Position of perception/benefit

In the U.S., The services are both political and commercial organizations because they are organized and have strong political pressure. In fact, lobbying fossil fuels (also called the “dirty fuel lobby”) is among the most influential and interesting collections in the U.S. Access, and non-participation in the development of individual solar technologies is an insurmountable aspect. The funds would not require using a source of energy that does not match their present radical and administrative structures. They can postpone tactics to advance their position. Therefore, the sub-criteria of this standard is compliance with current legal, political, and administrative structures and their administrative pressure.

Security

Over the last ten years, national security has been at the head of numerous societies and governments. Security is the obligation of the administration and is the main issue of public policy. Security comprises stabilizing the supply of energy and stabilizing energy prices. These are the two standards that include the safety standard. A violation of energy supplies could pose a threat to the country’s economy. Policies should be developed for alternative energy sources such as solar energy or the storage of national fossil fuels. Although governments could not regulate the supply (particularly in the case of fossil fuels), they might have to control prices by giving grants, as history has shown that rising energy prices could lead to civil disturbances. In the assessment of solar energy technologies, these sub-safety standards should be considered for sources of raw substances for tools, such as rare metals with limited overall amounts used in some thin photovoltaic cells.

Conclusion

The United Kingdom is heading in the right direction with regard to clean and sustainable energy. They have been setting goals for themselves shortly to lower their greenhouse gas emissions and move off their dependence on oil and gas. Even though much of their energy comes primarily from gas and oil, they have been working to promote solar energy technology to meet much of their energy demands. Compared to the United States, the United Kingdom has much lower values concerning carbon dioxide output. They also have a much smaller population and can more efficiently switch to solar energy. They have such large potential in their tidal industry, and the solar industry has just recently started to boom. With such a high population density, it seems fitting that solar energy would be easy to work with the system and still reach 100 percent of their citizens. They hold much of the technology to harness tidal power and are currently the leaders in harnessing tidal power. Even though the implementation of tidal power is still in the works, the United Kingdom is ahead in the initial technology and is progressing toward the next step, which is implementation. They are working toward improving the space for solar energy and working toward the implementation of wind power. They are converting areas that are not currently used to meet their solar energy goals. The country's 2020 target was for 15 percent of final energy consumption to come from all renewable sources, not solar energy alone; solar was one contributor to that broader target.

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Appendix 1

Policies Governing Energy Resources in the UK

The United Kingdom should be focusing on how to lower its greenhouse gas emissions. They do not need to focus on industrializing, but more on how to continue to progress economically in a smart and environmentally friendly way. The UK has decided to reduce its greenhouse gas emissions by 50

percent from 1990-2027 and by 80% by 2050. Wind and tidal power are readily accessible based on their location and therefore should be taken advantage of. They have also been working toward the implementation of more solar PV panels to add solar as another form of solar energy. The UK had a legally binding target for 15% of final energy consumption to come from renewable sources—not solar energy alone—by 2020. At the time this passage was written, the UK was working toward this target through wind, tidal, solar, and other renewable sources. The UK must continue to explore its solar options to decrease its greenhouse emissions and meet this target. Compared to the US, it is easier for the United Kingdom to reach more people with a solar energy site because of its population size and population density. While taking steps to reach the 2020 target, the UK produced about 4 percent of its energy from solar in 2012. They still have a way to go with the implementation of solar energy, but they certainly have the potential to reach the goal and soar above it(Johansson and Burnham, 1993).

Another way to mobilize solar energy is that the government plans to implement a contract-for-difference feed-in tariff model. This would potentially improve the revenue certainty of solar projects. Also, due to the rapid decrease in solar PV prices, the government implemented a reduction in the feed-in tariff, which would be payable to new PV projects that exceed 50 kW and they expect to continue to provide cuts for smaller projects. The IEA also states that any new nuclear power will be financed by the private sector rather than public subsidies. The private sector, however, is waiting for the government to open back to public subsidies once they realize that nuclear is a low-carbon way to produce electricity. The issue with nuclear is more of an economic issue rather than a political or social issue(Mendonça, 2011, p.).

Proposed Portfolio

To ensure that the United Kingdom is doing all that it can to lower greenhouse gas emissions and still supply energy to all its citizens, it must continue to explore its available solar sources of energy. So far they have been experimenting with tidal power in their territorial seas, with the wind power in the northeastern parts of the country and offshore, and with solar power in the southern parts of the country. They must continue to harness these types of solar energy and reach the point where they are not so dependent on oil and gas as their main staples of energy production, especially if electricity becomes available to 100 percent of their citizens(Lovell, 2005).

Figure 4(“Five charts show the historic shifts in UK energy last year,” 2015)

One problem that may arise with regard to solar energy is that the United Kingdom contains many old and historical buildings. Adding solar panels to the tops of these buildings could potentially cause structural damage, and the electrical units inside the buildings may not be able to withstand solar panels. They have still been able to exploit solar potential in areas like bridges and open spaces that have been abandoned or areas that are not actively used anymore. Much of the total energy production goes into the heating and cooling of large buildings. Therefore, another type of climate

control for buildings could be placing vegetation on rooftops to create a more natural type of insulation, but this solution may have the same issue as well. The old and historical buildings might not be able to withstand vegetation on the rooftops. However, these historical buildings only make up a small percentage of the overall structures in the UK. Therefore, solar panels and natural insulation could be a viable solution to balance out the energy demand. Moving these large buildings to be more efficient would cut down on energy costs and consumption(Foster et al., 2009).

Rate of adoption of policies in the UK

Great Britain has enormous and diverse resources in the field of solar energy. The best winds, waves, and tides resources in Europe. Solar energy provides enough energy for more than 2.5 million homes. But the UK could do much more than that. Our mission is to reduce and increase costs. The UK's first solar energy roadmap – provides a common approach to the release of the potential of solar energies. This is where the "timetable" in the UK has already taken: financial support for the solar energy mechanism, the Green Investment Bank helps companies to invest in infrastructure, green and stimulate solar power. Solar energy is not just electricity, but this year the UK is working to create the world's first initiative to support the widespread use of solar energies. The new financial mechanism facilitates the installation of equipment such as thermal pumps and biomass boilers, reducing emissions and supporting 150,000 jobs in the UK's thermal energy industry. Likewise, support for new fuel and the absorption of low-carbon vehicles will provide support for more than GBP 400 million to reduce CO2 emissions for transport. Published by the Government of Britain at the end-of-life strategy at the end of this year, giving a clear indication of the role of cost and heat energy sustainability energy, transport, and electricity, which is almost half of the overall goal of the launch. Many of them are already in the UK, but use other opportunities for energy efficiency, which will be the main focus of the efficiency of the new Office of National Energy, will cooperate with the Office of Solar Energy Deployment in collaboration with the Devolved Administrations(Foxon et al., 2010).

Figure 5(CompareMySolar, n.d.)

Solar energy has already given jobs to more than a quarter of a million people and by 2020 more than half a million. Creating jobs in the solar energy sector, investing in new production capacity, and direct and indirect benefits of the transition to the green economy. Information on solar energies in all parts of the United Kingdom can result in more energy and energy savings – helping us to fluctuate the price of fossil fuels. The investment will ensure the long-term relevance of the availability of solar energy sources as part of a low-carbon combination. Along with energy efficiency and storage, solar energy, nuclear energy, and help reduce carbon dioxide emissions in the UK, in line with budget carbon emissions, and help overcome the goals of 2050 – 80% reduction. The British Climate Change Commission published the scenarios for solar energy sources by 2030.

The UK government will respond to these recommendations by the end of this year. This response, along with the annual energy Statement and the fourth carbon Budget, is certainly one of the most

important sources of energy. Solar sources. It’s time to make big strategic announcements. In the UK, “Roadmap Solar Energy” is a comprehensive set of targeted and practical measures to accelerate the development of solar energy, encouraging innovation and introducing a wide range of solar energy sources. This will help the UK government reach the EU 2020 target and ensure that the costs of solars are reduced over time. These side events will complement and reinforce indirect activities in Wales, Scotland, and Northern Ireland, each setting goals and aspirations and facilitating the implementation of solar programs. Working with each other, cleaner, greener energy can be built next year. This roadmap for solar energy in the UK will help you follow the path.

Solar photovoltaic technology has increased significantly in recent years, thanks to ongoing technological advances and reduced capital costs. At the end of May 2011, approximately 38,000 solar modules were imported into the United Kingdom at tariffs. The enthusiasm for solar photovoltaic technology is based on global leadership led by some major international markets, and this huge revenue-generating role plays an important role in reducing costs. Modules and adapters account for more than half of the cost of the final installation; we know this is the biggest potential for reducing costs. However, the international solar market is relatively small, and Britain is certainly “expensive” – we use less overall costs. The government believes that solar PV can play a potential role in releasing large UK energy resources in the future, although this depends on many factors. The first is that it is necessary to ensure a sufficient reduction of costs to ensure that the sustainability of the project cannot be based on substantial support. Industry shows that this point is accessible in this decade. To demonstrate our commitment to solar power generation in the UK, the government is now supporting technology through its commitment to solar energy. The speed is such that photovoltaic solar panels can support and assist in the mass production of solar energy sources and stimulate cost reduction to increase their competitiveness compared to proven technologies. Solar energy commitments will be revised this year, and new rates will be implemented. Also, the Feed-in tariff program supports the production of solar energy, such as solar panels.