Study of Solar Energy as a Substitute for Fuel's Like Petrol and Diesel

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Abstract— **A phrase "GLOBAL WARMING" also referred to as climate change is the observed century scale rise in the average temperature of the earth climate system and its related effects. In year 2013, the intergovernmental panel on climate change (IPCC) fifth assessment report concluded that "it is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century." The large human influence has been emission of green house gases such as carbon dioxide, methane and nitrous oxide. Climate model projections summarized in the report indicated that during the 21st century the global surface temperature is likely to rise a further 0.3 to 1.7 0 c (0.5 to 3.1 0F) for their lowest emissions scenario and 2.6 to 2.8 0c (4.7 to 8.6 0F) for the highest emissions scenario. Therefore the day by day the human beings are looking for the answer to our deteriorating limitations of petrol, diesel and other fossil fuels in nature will create a resource crisis in future. Development of a solar-powered car has been an engineering goal since the 1980s. The World Solar Challenge is a biannual solar-powered car race, where teams from universities and enterprises compete over 3,021 kilometers (1,877 mi) across central Australia from Darwin to Adelaide. In 1987, when it was founded, the winner's average speed was 67 kilometers per hour (42 mph) and by 2007 the winner's average speed had improved to 90.87 kilometers per hour (56.46 mph). The North American Solar Challenge and the planned South African Solar Challenge are comparable competitions that reflect an international interest in the engineering and development of solar powered vehicles. Some vehicles use solar panels for auxiliary power, such as for air conditioning, to keep the interior cool, thus reducing fuel consumption. In 1975, the first practical solar boat was constructed in England. By 1995, passenger boats incorporating PV panels began appearing and are now used extensively. In 1996, Kenichi Horie made the first solar-powered crossing of the Pacific Ocean, and the Sun21 catamaran made the first solar-powered crossing of the Atlantic Ocean in the winter of 2006–2007.There were plans to circumnavigate the globe in 2010. In 1974, the unmanned Astros Flight Sunrise airplane made the first solar flight. On 29 April 1979, the Solar Riser made the first flight in a solar-powered, fully controlled, man-carrying flying machine, reaching an altitude of 40 ft (12 m). In 1980, the Gossamer Penguin made the first piloted flights powered solely by photovoltaic. This was quickly followed by the Solar Challenger which crossed the English Channel in July 1981. In 1990 Eric Scott Raymond in 21 hops flew from California to North Carolina using solar power. Developments then turned back to unmanned aerial vehicles (UAV) with the Pathfinder (1997) and subsequent designs, culminating in the Helios which set the altitude record for a non-rocket-propelled aircraft at 29,524 meters (96,864 ft) in 2001.The Zephyr, developed by BAE Systems, is the latest in a line of record-breaking solar aircraft, making a 54-hour flight in 2007, and month-long flights were envisioned by 2010. As of 2016, Solar Impulse, an electric aircraft, is currently circumnavigating the globe. It is a single-seat plane powered by solar cells and capable of taking off under its own power. The design allows the aircraft to remain airborne for several days. A solar balloon is a black balloon that is filled with ordinary air. As sunlight shines on the balloon, the air inside is heated and expands causing an upward buoyancy force, much like an artificially heated hot air balloon. Some solar balloons are large enough for human flight, but usage is generally limited to the toy market as the surface-area to payload-weight ratio is relatively high. By using this technology only need one time investment, no more need to burn coal or fuel, reduce the dependency of foreign oil and a big advantage of pollution control without any affects of human life**

Index Terms— **Solar cells, Charge controller, Battery, Inverter, Gird tied system, electronic medium vehicles.**

I. INTRODUCTION

India has a roads network of 42, 45,805 Km in 2011.the second largest road network in the world. According to a survey of all India study conducted by M/S Nielsen (India) Pvt-Ltd for petroleum planning and analysis cell (PPAC) of petroleum ministry has thrown up interesting data about use of diesel and petrol sold across various states. As per the all India study report submitted to PPAC(2011-12), 70% of diesel and 99.6% petrol is consumed in the transportation sector alone. The total diesel sale, the highest consumption of 28.48% is by cars, utility vehicles (UVs) and three-wheelers. it was also revealed that private cars &UVs account of 13.15% commercial cars and UVs 8.94% and 3-wheelers 6.39% of the diesel sold in the country. In case of petrol, 99.6% is consumed in the transportation sector if this majority consumption of 61.42% is accounted for by 2-wheelers while cars use 34.33% followed by 3-wheeler at 2.34%. it was also revealed that in the states of ODISHA,BIHAR & RAJASTHAN, petrol consumption by the 2-wheeler exceeds 70%. The consumption by 3-wheelers is very low in state like DELHI, HARYANA, GUJARAT & ODHISA where consumers have shifted to CNG or Diesel. Limitation of petrol, diesel and other fossil fuels in nature will create a resource crisis in future. Pollution (Co2) and global warming is creating continuously environment changes even for the survival of human life. So that the importance of solar architecture or solar thermal stations is a better concept to replacing these all traditional fuels which is currently used across the nation. Solar roads is a another option to replace these fuels but it is not better as comparing to solar power station in Indian country because the surface topography will observed different in every 100km. secondary solar road may get easily damaged due to condition like earthquake and uncertainty of loading on the road surface & land slide. The

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initial cost of solar road making process is very high because solar energy needs to storage system as well as large number of solar panels needed and vehicle must converted into electronic medium which is not possible for any growing country like India. Thus the Demand of solar power station is increasing day by day due to mentioned reasons.

II. WHY THE SOLAR STATION REQUIRED

India has a second largest roadway networks in the world. According to road survey of India in year 2011, the total area of network approximately 42, 45,805 Km which was classified in following are-
National Highway - 70,934 Km
State Highway - 1, 63,898 Km
Major/Minor District Roads -25, 77,396 Km
Rural Roads - 14, 33,577 Km
In year 2012-13 a survey by the all India study conducted (M/S Nielsen) was present a surprising report against of this network is the total Diesel sold in the country was 69,080 TMT (thousand metric tons) & Petrol was 15,744 TMT while Diesel constitutes of petroleum 44% of total consumption of petroleum products in India, petrol account for 10% out of total petrol & diesel sale in the country. More the 99% petrol and 90% of the diesel is sold through retail outlets (petrol pump) for which there is no system of capturing the consumption data of the sector and category based on their end use. However the sector wise consumption of Diesel sold directly by the oil marketing companies (OMCs) is available. The data related to sectoral consumption of these products is an important input for any policy formulation. As the growth of road networks and vehicles, the consumption of fuel demand raise day by day which produce the toxic gases in our environment and pollute the water and air continuously.

III. PHOTOVOLTAIC CELL & SOLAR ENERGY

Photovoltaic's (PV) is the field of technology and research related to the application of solar cells for energy by converting sun energy (sunlight, including sun ultra violet radiation) directly into electricity. Due to the growing demand for clean sources of energy, the manufacture of solar cells and photovoltaic arrays has expanded dramatically in recent years. Photovoltaic production has been doubling every 2 years, increasing by an average of 48% each year since 2002, making it the world's fastest-growing energy technology. At the end of 2008, the cumulative global PV installations reached 15,200 Megawatts. Roughly 90% of this generating capacity consists of grid tied electrical systems. Such installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building, known as Building Integrated Photovoltaic or BIPV for short. Net metering and financial
Mostly import-independent resource, incentives, such as preferential feed-in tariffs for solar generated electricity; have supported solar PV installations in many countries including Australia, Germany, Israel, Japan, and the United States. A semiconductor diode device that convert the energy of sunlight into electricity by the photovoltaic effect, which is a physical and chemical phenomenon. A device whose electrical characteristics, such as current, voltage or resistance very when exposed to light. The first Pv cells were made of silicon combined with other elements to affect the behavior of electrons or holes, other materials such as copper indium dieseline (CIS), cadmium Telluride (CaAs) have been developed for use in Pv cell. Two basic types of semiconductor material, called positive (P type) and Negative (N type) and the physical boundary between them is called the P-N junction. Pv systems have long been used in specialized application's and standalone and grid-connected PV systems have been in use since 1990's. They were first mass produced in 2000, when German environmentalists and the euro solar organization got government funding for a ten thousand roof programs. Advance in technology and increased manufacturing scale have in any case reduced the cost, increased the reliability and increased the efficiency of photovoltaic installations. More than 100 countries now use solar photovoltaic system.
Recently in year 2015-16, A solar aircraft, manufacturing by solar impulse in Switzerland named solar impulse-2 had successfully Departure from ABU DHABI in united Arab Emirates. The aircraft was scheduled to return to Abu Dhabi in August 2015 after a multi stage journey around the world. This kind of achievement introduces the power of solar energy and also introduced about its future scope while the world suffering from global warming like crisis. The largest magnitude of solar energy available makes it a highly appealing source of electricity. The United Nations development programmed in its 2000 world energy assessment found that the annual potential of solar energy was 1,575 - 49,837 exajoule (EJ). This is several times larger than the total world energy consumption, which was 559.8 EJ in 2012. In year 2011, the international energy agency said that "the development of affordable inexhaustible and clean solar energy technology will longer term benefits". It will increase countries energy security through reliance on an indigenous, inexhaustible and enhance sustainability, reduce pollution, lower the cost mitigation, global warming and keep fossil fuels prices lower than otherwise. Hence the additional cost of the incentives for early deployment should be considered learning investment, they must be widely spent and need to be widely shared.

IV. THEORY BEHIND SOLAR STATION

All general research on "ENVIRONMENT STUDY" in term of Asian Countries like India never found the fulfil on their eco-friendly conditions. Asian countries mostly where the population is very high and they have burn Galion of fuel for only their daily needs, may arising the condition of seminar in Global Warming like serious topics. What are the reasons behind that we are discussed such serious issues in a closed room? Need to think about it.
India like country which was famous for the Agriculture in the world where more than 70% land was used in Agriculture field, today faced the problem of global warming just because millions of acres land equipped by the industries like ply board factories, steel factories, tier factories, lather factories, Number of vehicle & fuel burn by them and many others whose continuously 24*7 produce the carbon Di Oxide (Co_2) in open atmosphere .If take the light of current scenario of our Agriculture field may found the surprising results ahead, Because today we are fail to maintain that temperature which is suitable for Agriculture and result causing Poly house like situations. Currently country facing the two major problems, the first problem is reduction in greenery plantations and increasing the percentage of Co_2 in our atmosphere and sun

light doing the work as a fire at the same time in our Glaciers and secondary large amount of fuel consumptions in transportation sector. India has a well defined country where the mostly states are standing as better opportunity a solar stations.

Solar power in India is a growing industry. As of 30 April 2017, the country's solar grid had a cumulative capacity of 12.50 GW. India quadrupled its solar-generation capacity from 2,650 MW on 26 May 2014 to 12,289 MW on 31 March 2017. The country added 3.01 GW of solar capacity in 2015-2016 and 5.525 GW in 2016-2017, the highest of any year, with the average current price of solar electricity dropping to 18% below the average price of its coal-fired counterpart.

In January 2015 the Indian government expanded its solar plans, targeting US$100 billion in investment and 100 GW of solar capacity (including 40 GW from rooftop solar) by 2022. About India's interest in solar power, Prime Minister Narendra Damoder das Modi said at the 2015 COP21 climate conference in Paris: "The world must turn to (the) sun to power our future. As the developing world lifts billions of people into prosperity, our hope for a sustainable planet rests on a bold, global initiative." India's initiative of 100 GW of solar energy by 2022 is an ambitious target; since the worlds installed solar-power capacity in 2014 was 181 GW. In addition to its large-scale grid-connected solar PV initiative, India is developing off-grid solar power for local energy needs. The country has a poor rural electrification rate; in 2015 only 55 percent of all rural households had access to electricity, and 85 percent of rural households depended on solid fuel for cooking. Solar products have increasingly helped to meet rural needs; by the end of 2015 just fewer than one million solar lanterns were sold in the country, reducing the need for kerosene. That year, 118,700 solar home lighting systems were installed and 46,655 solar street lighting installations were provided under a national program; just over 1.4 million solar cookers were distributed in India. In January 2016, Prime Minister Narendra Modi and French President Francois Holland laid the foundation stone for the headquarters of the International Solar Alliance (ISA) in Gwal Pahari, Gurugram. The ISA will focus on promoting and developing solar energy and solar products for countries lying wholly or partially between the Tropic of Cancer and the Tropic of Capricorn. The alliance of over 120 countries was announced at the Paris COP21 climate summit. One hope of the ISA is that wider deployment will reduce production and development costs, facilitating the increased deployment of solar technologies to poor and remote regions. The automobile industry is one of the key drivers of the Indian economy. Since the liberalization of the sector in 1991 and allowing of 100 percent FDI through automatic route, Indian automobile sector has come a long way. Today, almost every global auto major has set up facilities in the country. Different types of vehicles are produced in India, broadly classified into Passenger Vehicles and Commercial Vehicles The manufacturing of automobiles including truck, buses, cars, three wheelers/two wheelers etc. in India risen at a very high pace. Now, India is the one of the largest producers of automobiles in the world. The total production of Passenger Vehicles (PVs) was 669719 in the year 2001-02. It increased to 3233561 in the year 2012-13, recording an average annual growth of 34.8% during 2001-02 to 2012-13. The total production of Commercial Vehicles (CVs) was 162508 in the year 2001-02. It increased to 831744 in the year 2012-13, recording an average annual growth of 37.44% during 2001-02 to 2012-13. The production of Two Wheeler in India was 4271327 in 2001-02. It increased to 15721180 in 2012-13, recording an average annual growth rate of 24% during 2001-02 to 2012-13. The production of Three Wheeler in India was 212748 in 2001-02. It increased to 839742 in 2012-13, recording an average annual growth rate of 27% during 2001-02 to 2012-13.As per the latest data, the automobile production during 2013-14 is as follows:

Category-	**2013-14**
Passenger Vehicles -	30, 87,973
Commercial Vehicles -	6, 99,035
Three Wheelers -	8, 30,108
Two Wheelers -	1, 68, 83,049
Grand Total -	2, 15, 00,165

This status of vehicles is forced to think about the pollution percentage which is dissolved in air and directly contact with our lungs through air. According to world health organization (WHO), Delhi tops the list of most polluted cities. Among the world's 20 most polluted cities in the world, 13 are in India. India is in the group of countries that has the highest particulate matter (PM) levels. Its cities have the highest levels of PM10 and PM2.5 (particles with diameter of 10 microns and 2.5 microns). At the level of more than 150 micrograms, Delhi has the highest level of airborne particulate matter PM2.5, considered most harmful. These figures are six times more than the WHO "safe" limit of 25 micrograms. Uncontrolled vehicular traffic seems to be the primary reason.

V. 2011 FUEL SURVEY RESULTS

AS around 99.2% of all petrol sales are form retails outlets, the segment-wise consumption for retail sales is considered for total consumption also.

RESULTS OF THE SURVEY
ANNEXURE-1

DIESEL(REATAIL+DIRECT)

Aggregate results for diesel based on survey conducted by Nielson (India) Pvt.Ltd for retail Sale and data on direct sales by oil companies.

Sectors	**End-use segments**	**% share**
Cars/UVs(Passenger vehicles)	Private	13.15
	Commercial	8.94
	3- wheelers	6.39
	Trucks.HCV/LCV	28.25
Commercial Vehicles	Buses/ S.T.Undertaking	9.25
	Aviation/Shipping	0.48
	Railways	3.24
Other Transport Railways		
Sub- total transport		**70.00**
Agriculture	Tractor/Agriculture impl. Agriculture pump set	13.00
Sub- total transport		**13.00**
Industry- genset	Gensets	4.06
Industry- other	Industry	4.96
purpose	Mobile tower	1.54
Mobile tower	Crusher/Construction/Boring	6.45
Other	Drilling/Private imports	
Sub- total transport		**17.00**
Grand Total		**100.00**

PETROL(Retail) **Annexure-II**		
Consolidated results for petrol based on survey conducted by Nielson (India) Pvt-Ltd for retail sales.		
Sector	**End – use segment**	**% share**
2/3 wheelers	2 wheelers 3 wheelers	61.42 2.35
Sub Total 2/3 wheelers		**63.77**
4 wheelers	Cars Utility Vehicles(included SUV's)	34.33 1.51
Sub Total 4 wheelers		**35.84**
Others	Others (included informal resale)	0.39
Grand Total		**100.00**

DIESEL (ONLY RETAIL) **ANNEXURE-III**					
Aggregate results for Diesel based on survey conducted by Nielson (India) Pvt-Ltd for retail sales.					
End use segment	**North**	**East**	**West**	**South**	**All India**
PASSSENGER VEHICLES					
Cars & UVs – Private	13.73	17.79	14.40	17.13	**15.13**
Cars & UVs –Commercial	10.02	9.37	11.17	9.96	**10.29**
3 wheelers	3.83	8.47	10.48	7.65	**7.36**
COMMERCIAL VEHICLES					
HCV/LCV & Buses	35.72	37.50	47.37	41.60	**40.80**
AGRICULTURE					
Tractors	12.32	7.04	4.27	5.03	**7.65**
Agriculture Implements	5.09	2.28	1.88	2.26	**3.13**
Agriculture Pumpset	4.55	4.33	2.26	1.98	**3.33**
OTHERS					
Industry – Genset	6.42	2.82	2.18	5.58	**4.34**
Industry other purpose	3.17	1.72	0.98	2.44	**2.11**
Mobile tower	1.82	2.57	1.45	1.60	**1.77**
Other (genset for non industry purposes) & others	3.35	6.11	3.59	4.77	**4.08**

PETROL(ONLT RETAIL) **ANNUXURE-IV**					
Aggregate results for petrol based on survey conducted by Nielson (India) Pvt-Ltd. For retail sales.					
End Use Segment	**North**	**East**	**West**	**South**	**All India**
Cars	40.17	27.39	34.72	27.71	**34.33**
UVs	2.94	2.79	0.43	3.77	**1.51**
2-Wheelers	54.72	61.66	63.70	60.76	**61.42**
3-Wheelers	1.84	6.48	1.10	6.53	**2.34**
Others	0.33	1.69	0.06	1.22	**0.39**

VI. SITE LOCATION

In India mostly States are able to generated self solar power stations because the atmosphere of climate is more suitable for the production of solar energy. Only few states that's may or may not couldn't create self solar energy but such state buy the solar energy from other nearby state in cheap prices as comparing to fuels like petrol or diesel.

The solar panels sitting on top of the station generate energy that is being measured and if needed lights are slightly dimmed, but never go off. However with modern technology, much of the energy generated might come in excess and therefore be transferred to the national grid. Transmission line tower may help to transfer energy from one state to another state & it may also increase the economy of state government by selling solar energy. Being a developing country with a huge burden of fuel import, the need of solar energy research and development in India cannot be over-emphasized. The geographical location of India is also quite favourable for solar energy implementation. However, a densely-populated country like India, with a fragmented electricity market, poses endless challenges to the scientists and entrepreneurs. The nature of Indian electricity market is quite unique, and cannot be compared directly with other countries. The whole working of solar station is depends on the value of higher temperature & In India temperature at summer season generally very high many of states and normal in winter season. Hence the huge opportunity of solar power stations in India especially that places where the maximum temperature reaches to 45 or more in degree.

VII. OBJECTIVE OF PROJECT

The solar power station will be built in modular fashion such that different technologies can be utilized/tested for generating power. The modules will be designed not only as a demonstrator of existing technologies but also to explore cutting edge research technologies that have potential for economic viability.

VIII. SOLAR CELLS

The PV cells are manufactured by hundreds of manufacturers worldwide and there are several different technologies available. There are three main type of commercially available PV cells viz.

1. Mono crystalline silicon PV
2. Polycrystalline silicon PV
3. Thin film amorphous silicon PV

At present the first two categories dominate world markets constituting 93% of it the last one account for 4.2% of the market. There are other types of solar cells but are less in use viz. concentrated photovoltaic, hybrid solar cells, multi junction solar cells etc. However, their production is lower because of less usage till now and thus they are truly not commercial.

The solar cells are the foundation of any solar power system. A collection of individual solar cells comprise a solar panel. Each cell creates electrical energy when exposed to light. Depending on the nature of the connection between solar cells, solar panel system can achieve a number of different combinations of volt and ampere ratings. Consequently, solar panels can have a number of different power output ratings. If you have a number of different solar panels, you may need to combine their outputs with a combiner box.

IX. CHARGE CONTROLLER

The power output of a solar panel system fluctuates depending on the amount of sunlight it receives. Because the sun moves across the sky over the course of a day, panels output a different amount of power throughout the day. When cells receive no sunlight, they output no power. If you power a device directly from a solar panel, the device may not receive enough power to sustain operation. Therefore the power must be stored in a battery. However, before it goes to a battery, it should travel through a charge controller. The charge controller is a device that regulates the power coming from the solar panels with the right voltage and current to the battery. This is important for safe and efficient battery charging.

X. BATTERY

Traditionally, batteries are the storage technology that is considered for backup power. In a battery, the electrical energy is stored using a chemical redox couple whose free energy is increased while the battery is being charged, and the decrease in free energy is used for supplying current during discharge. The chemical redox couple, which is the fuel for the battery, is usually in the solid form and are enclosed along with an ion conducting electrolyte. The battery life is determined by the number of charge-discharge cycles and the entire unit (redox couple/electrolyte) needs to be replaced after certain number of cycles. In contrast to this approach, it is possible to have electrical storage devices in which the chemical redox couple (i.e. the fuel) are supplied continuously and such devices are called fuel cells. The periodic replacement of the storage unit is not necessary for a fuel cell. Due to this and other factors, there has been a resurgence of interests in fuel cell technology as a potential replacement for batteries, especially when the backup requirement is quite large. A battery stores the power from solar power system based on its amp hour rating. Amp hours denote the amount of amps of the current that a battery could output in one hour before needing a charge. Typically, a solar power battery is not discharged quickly over the course of an hour, but slowly over the course of a number of hours. Many amp hour ratings assume a 20-hour discharge time. For example, a 160 amp hour battery might be used to output 8 amps of current for 20 hours.

XI. INVERTER

Batteries and solar cells provide direct current power or DC. This means that the current flows in one direction. However, many electrical devices and system require alternating current power or AC. For example, the electrical outlets in a typical power house provide alternating current. For this reason, a versatile solar panel system will have a power inverter that converts the DC power from the battery or solar panels to AC power suitable for the electrically.

XII. GIRD-TIED SYSTEM

In some circumstances, it may be desirable to tie solar panel system to a nearby power grid. In this case, solar power is fed directly to the power grid and nearby station uses that power. Typically, you are billed for the difference between the power use and the power produce. Therefore, you can potentially make money if you use less power than your system produces. You may wish to have a battery and charge controller in the event of power grid failure. This way, you can still power supply in other sub stations.

XIII. ADVANTAGE

Solar energy is a resource that is not only sustainable for energy consumption; it is indefinitely renewable (at least until the sun out in billions of year). Solar power can be used to generate electricity; it is also used in relatively simple technology to heat water. Solar panels also require little maintenance. After installation and optimization they are very reliable due to the fact that they actively create electricity in just a few millimeters and do not require any type of mechanical parts that can fail. Solar panels are also a silent producer of energy, a necessity if dealing with picky neighbors.

All such projects and roadmaps are, however, only a part of the country-specific long term energy vision, with solar energy aiming to supplement conventional energy technologies. None of these initiatives, at this stage, claim to replace the existing fossil fuel based systems immediately.

- The projects tend to reduce the overall cost of the energy technology as large scale utilization of a particular technology, in general, tends to reduce the cost of that technology. This has also encouraged the entrepreneurs to invest in solar energy technologies.
- The projects are serving as test platforms for large scale solar energy utilization technologies.
- These projects are engaging the long-term solar energy research, development, and pedagogical activities.
- These projects have increased the awareness of green technologies amongst the public

RENEWABLE ENERGY SOURCE:-

Among all the benefits of solar panels, the most important thing is that solar energy is a truly renewable energy source. It can be harnessed in all areas of the words and is available every day. We can't run out of solar energy, unlike some of the other sources of energy. Solar energy will be accessible as long as the sun, therefore sunlight will be available to us for at least 5 billion years when according to scientists the sun is going to die.

BILL REDUCTION:-
The capacity of electricity produced will depends upon the size of solar plant and the cost of plant installation is one time investment. It may be higher in initially but the maintenance cost and other service charge will be approximately zero as comparing the life span of the project. The surplus will be export back to the gird and you will receive bonus payments for the amount.

CLEAN ENVIRONMENT:-
Harmful carbon dioxide and methane emissions from fossil fuels, our traditional energy source, are leading contributors to global warming and decreased air quality. But generating electricity with solar panels produces no greenhouse gasses, no water pollution, no air pollution only provide healthy and safe environment. This is occurs the pollution at the time of manufacturing but always less as compare to other recourses.

LOW MAITENANCE COST:-
Solar energy systems generally don't require a lot of maintenance. You only need to keep them relatively clean, so cleaning them a couple of time per year will do the job. Most reliable solar panel manufacturer give 20 to 25 years warranty. Also, as there are no moving parts, there is no wear and tear.

TECHNOLOGY DEVELOPMENT:-
Technology in the solar power industry is constantly advancing and improvements will intensify in the future. Innovations in quantum physics and nanotechnology can potentially increase the effectiveness of solar panels and double or even triple the electrical input of the solar power systems.

XIV. DISADVANTAGE

WEATHER DEPENDENT:-
Although solar energy can still be collected during cloudy and rainy days, the efficiency of the solar system drops. Solar panels are dependent on sunlight to effectively gather solar energy. Therefore a few cloudy, rainy days can have a noticeable effect on the energy system. You should also take into account that solar energy can't be collected during the night.

SOLAR ENERGY STORAGE IS EXPENSIVE:-
Solar energy has to be used right away or it can be stored in large batteries. These batteries used in off-the-gird solar system, can be charged during the day so that the energy is used at night. This is a good solution for using solar energy all day long but it is also quite expensive. In mostly cases, it is smarter to just use solar energy during the day and take energy from the gird during the night.

LOT OF SPACE CONSUME:-
If you want produce the more electricity, the more solar panels you will need because you want to collect as much sunlight as possible. Therefore solar panels require a lot of space and some roofs are not big enough to fit the number of solar panels that you would like to have. An alternative is to install some of the panels in your yard but they need to have access the sunlight.

ASSOCIATED WITH POLLUTION:-
Although pollution related to solar energy system is far less compared to other sources of energy, solar energy can be associated with pollution. Transportation and installation of solar systems have been associated with the emission of the greenhouse gases. There are also some toxic materials are hazardous products used during the manufacturing process of solar photovoltaic's, which can indirectly affect the environment. Nevertheless, solar energy pollutes far less than the other alternative energy sources.

COST:-
The initial cost of purchasing a solar system is fairly high. Although the UK government has introduced some schemes for encouraging the adoption of renewable energy sources, for example the feed-in tariff, you still have to cover the upfront cost. This includes sources paying for solar panels, inverter, batteries and wiring and for the installation. Nevertheless, solar technology is constantly developing, so it is safe to assume that prices will down in the future.

CONCLUSION

Solar energy technologies could help address energy access to rural and remote communities and also help improve long-term energy security and help greenhouse gas mitigation. Harmful carbon dioxide and methane emissions from fossil fuels, our traditional energy source, are leading contributors to global warming and decreased air quality. But generating electricity with solar panels produces no greenhouse gasses whatsoever. Solar energy is renewable. The sun is the world's most abundant energy source, producing an amazing 173,000 terawatts of solar energy every second. That's more than 10,000 times the world's total combined energy use, and it can be used over and over again. In contrast, fossil fuels are non-renewable and while they may seem in abundance today, there will come a time when the world will run out. Or, the cost of finding and extracting these sources will become too expensive. By that time, the resulting damage to our financial infrastructure and environment may be unrepeatable. Switching to solar today is the best way to hedge against the reality of finite fuel resources. The dependency of foreign oil may also solve though this project. Today country suffering from double crises first is high price of fuels like petrol & diesel and second is environment crises due to use of fossil fuel like petrol & diesel. These panels may be a large investment initially, without a doubt, but the will pay off in the long term, not only financially but environmentally as well.

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