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SOLAR ENERGY IS CHEAP, SAFE, SUSTAINABLE AND RELIABLE

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"Solar Energy is Cheap, Safe, Sustainable and Reliable" Sustainable development is defined (WCED1987) as development that meets the present needs and goals of the population without compromising the ability of future generations to meet. Sustainable development involves Social, economic and environmental conservation. **Social development** is the improvement in the well being of individuals and society which leads an increase in social capital, institutional capital and organizational capital. **Economic development** is economic progress that leads people to be willing able to pay for goods and services that enhance income and efficient production. It is closely related to economic efficiency. **Environmental development** is the management of ecological services and of the living beings that depend on them. Sustainable development takes all the three fundamental pillars into consideration.

Is there any Environmental development in the world now?

The problems created by humanity to the environment are pollution, ozone layer destruction, depletion of natural resources and deforestation causing global warming and Nuclear power radiation which threatens the life of human beings and animal life. We are getting electricity from fossil fuels like coal, oil and gas which are depleting and non renewable natural resources and are the causes of harmful carbon emissions that cause climate change or pollution with dangerous consequences. Other than fossil fuels nuclear, hydropower, biomass and solar energy are used to generate electricity as cleaner alternatives. Nuclear power which constitutes a bigger share of the alternatives used is associated with great potential hazards.

The issue of sustainability of future energy demand satisfaction is, therefore, beyond conservation of energy resources, change in the life style and efficiency of usage. Future energy supplies should not contribute to environmental problems. Governments need to ensure that energy is generated safely with out any harm to either people or the environment.

Now-a-days we have to use solar energy in our life in order to get electricity. Getting electricity by burning coal, kerosene, petrol, diesel or gas are dangerous to our environment as that process gives rise to pollution and

global warming. So in order to save our environment, to save the earth, and to save our future generations we need to reduce the polluting gases in the atmosphere. This can be done by using solar energy for getting electricity for our life. Our modern solar power plants are the real temples of the sun god which shower electricity for our.

We need solar energy usage in our life for the following reasons**.**

It is clean: Solar energy can be used to light, heat and cool your home and it has no bad effect on global climate. Electricity generated by coal or oil produces Carbon-Di-Oxide emissions which create serious threats to the environment

It is free: Solar energy is enormous and free for us. We need not pay to anybody for using solar energy.

It is renewable and needs low maintenance: While non-renewable energy source like coal, oil and gas are becoming increasingly scarce, the sun's energy is limitless. Whenever sunlight shines, electricity can be generated. Solar systems need low maintenance.

It reduces our utility cost: If we have a system in our home to create solar energy, we use less electricity from electricity department which can reduce our electricity utility cost.

It increases our energy self-reliance: If we have a system in our home which can harness more sunlight, we need less electricity from our electricity department. So we can become self reliant for our power needs.

It can increase our home value: An investment in a solar energy system may improve the value of your home as it lowers the cost of lighting, heating and cooling.

It is extremely reliable: The sun has been around for billions of years and is likely to burn on for billions more to come. So it is extremely reliable and we can get it everyday.

It is easy to install: Solar systems are easily installed in our home even in far off places or remote areas like forest houses, farms, cabins, tourist buses etc.

It is long lasting: Solar cell/panels are long lasting. These can remain working from 25 to 40 years.

Solar energy is in two forms, one is light and the other is heat. We can use light and heat for our needs. By using light we can get electricity with the help of photovoltaic cells which can be utilized for home lighting, street lighting, watering the gardens and farms, cooling, laundry etc. By using heat energy we can get water boil and can use this boiled water for washing, refrigeration, desalination of sea water, cooking, cooling, purification of water etc.

Solar cells are also called photovoltaic cells. These are electrical devices that convert the sunlight directly into electricity by photovoltaic effect. When exposed to light they can generate support an electric current without being attached to any external voltage source. The operation of photovoltaic cell requires 3 basic attributes.

1. The absorption of light generating either electron hole pairs or excitons.
2. The separation of charge carriers of opposite types.
3. The separate extraction of those carriers to an external circuit..

In contrast to the photovoltaic cell, a solar thermal collector collects heat by absorbing sunlight for the purpose of direct heating (as used in Solar water heaters) or indirect electrical power generation.

Materials for efficient solar cells must have characteristics matched to the spectrum of available light. Some solar cells are designed to efficiently convert wavelengths of solar light that reach the Earth surface. However, some solar cells are optimized for light absorption beyond Earth's atmosphere as well. Light absorbing materials can often be used in multiple physical configurations to take advantage of different light absorption and charge separation mechanisms. Materials presently used for photovoltaic solar cells are mono-crystalline silicon, poly-crystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide or sulfide. These materials are cut into wafers between 180 to 240 micrometers thick and then processed like semiconductors. Other materials are made as thin film layers, organic dyes and organic polymers that are deposited on supporting substrates. Some solar cells are made from Nano-crystals. But silicon is the only material that is well researched in both bulk and thin film forms.

Solar cells are often electrically connected and encapsulated as a module. Photovoltaic modules often have a sheet of glass on the front side allowing light to pass while protecting the semiconductor wafers from wind driven debris, rain, hail etc. Solar cells are usually connected in series in

modules, creating an additive voltage. Connecting cells in parallel will yield a higher current. But very significant problems exist with parallel connections. For example, shadow effects can shut down the weaker (less illuminated) parallel string (a number of series connected cells) causing substantial power loss and even damaging the weaker string because of the excessive reverse bias applied to the shadowed cells by their illuminated partners. Strings of series of cells are usually handled independently and not connected in parallel. Special paralleling circuits are the exceptions.

Although modules can be interconnected to create an array with the desired peak DC voltage and loading current capacity, using independent MPPTs (Maximum Power Point Trackers) provides a better solution. In the absence of paralleling circuits, shunt diodes can be used to reduce the power loss due to shadowing in arrays with series or parallel connected cells.

Solar Bicycles and Tricycles

People who want to use clean renewable energy for their rides, have another option now. Unlike solar cars which are costly to use and maintain, the solar bicycles, aptly titled 'Sun Cycles', are cheap and easy to maintain. What is more, the bicycles people are already using can also be transformed into solar bicycles.

Solar Tricycles are going to replace the traditional auto rickshaws in future. Different types of tricycles are available in the market today. We have to choose the best type which meets our requirements. These tricycles provide effective Eco-friendly mechanism to combat climate change and to reduce carbon in the environment. These are transport friendly and are meant for passenger, cargo, garbage and school bus for children. These are useful for the common man which aims at eliminating the daily knee breaking effort with the capability of running 40-100 KMs or more in just a single charge or endless mileage with solar power.

Solar Family Car:

Solar Family Car "Stella" was created by The Solar Team Eindhoven of Eindhoven University of Technology and they have presented the world's first solar powered family car. "Stella" is the first "energy positive car" with room for four people, a trunk, intuitive steering and a range of 600 kilometers. This is the car being entered by the student team in the cruiser class of the World Solar Challenge that starts in Australia in October 2013. "Stella" was created by a team of 22 students from the University of Eindhoven, the Netherlands. It has the combination of aerodynamic design with lightweight materials, such as carbon fiber and aluminum.

Movable Solar Electricity Generator

There are many companies in the world business today who are building solar Electricity generators on wheels. These generators can replace the dirty and expensive diesel generators often used to power the tools and equipment.

Solar Energy for Watering Agriculture Land

Photovoltaic panels are used for pumping water for watering needs. Solar electric power is a reliable and economic choice for powering remote water pumping. Solar water pumping systems are in common use for gardens fountains, livestock watering, and large scale watering needs for agricultural and commercial needs. The solar-powered water pumping system consists of four parts: the actual pump which moves the water, the controller which adjusts the pump speed and output power as the solar panel input varies, the engine, and the solar panels. The specifics of the system design are determined by the following considerations:

Solar Energy (Thermal) for Hostels, Hospitals, Hotels and Milk dairies

Now-a-days **Concentrated Solar Power Technology (CSP)** has been used widely for cooking, heating, cooling and washing. The CSP sector is growing quickly with thousands of Mega Watts under constrction or planning. In many parts of the world including Europe, the US, North Africa, and the Middle East. China, Australia, Mexico, and India have recently started to show interest in CSP.

Clique Solar has installed world's first large solar concentrator system that caters to satisfy the thermal needs in the hotel industry. When not many hotels in the world are not even thinking of the negative impact they have on the environment, Clique solar has successfully installed and operated two **ARUN** solar concentrator dishes for fulfilling the thermal energy needs of ITC, The Maurya hotel at New Delhi. This installation has been operational for over a year now and it saves ITC an equivalent of almost 40,000 to 42,000 liters of fossil fuel (furnace oil) per annum, which amounts to a reduction in Co2 emissions by almost 110 to 130 tons per annum. The ARUN dish is a completely indigenous solar concentrator system developed by Clique solar. ITC Limited is created with being a pioneer in initiating a number of environmental friendly changes and a leader of environment conservation mission.

Solar Energy for Lighting and Lighting Houses:

For lighting and Heating purposes we can use solar powered systems which do not need huge initial investments. Many companies have been manufacturing a wide range of lighting systems which can save costs and also provide sustainable, environmental friendly lighting for our homes, gardens and streets.

Solar Energy for Refrigeration:

Solar powered refrigerator runs on electricity provided by solar panels. These are able to keep perishable goods such as meat and milk cool in hot climates and are also used to keep vaccines at their appropriate temperature to avoid spoilage. There are many environmental concerns regarding our conventional refrigeration technology including contribution to Ozone layer depletion and global warming. Refrigerators contain chlorofluorocarbons (CFCs) which cause much ozone layer depletion and global warming which is now a burning problem in the world.

Solar Sea Water Purifiers

These are designed to support large scale disaster relief efforts and humanitarian assistance ea water in large scale. These systems purify sea water and deliver it in to a tank where the water can be drawn from by a delivery pump. These systems are powered completely by solar power, with options to use generator or AC power. These systems will be activated on/off by a gloat switch in the tank. These are capable of filtering 1,500 gallons of sea water per day. These are programmable, automated, low feed pressure and flush cycle capabilities.

Solar Energy for Environmental development:

As we see earlier, environmental development also comes under the sustainable development. By becoming civilized, man should develop the society and the environment. By spoiling the environment man is making the earth poisonous. Pollution due to thermal projects, fossil fuel using vehicles and industries, deforestation by the poor people for getting firewood, use of animal dung as firewood, ignoring the value of organic farming, using pesticides in the fields more than needed, etc., are all look useful for the time being. But after some time these things will prove as man made blunders. For these blunders we are suffering now. But for the next generation the pollution will become more, resources will deplete and the rate of global warming will increase creating tremendous changes in the environment. In order to make this earth a healthy living place for the next generation, we

have to start using solar energy instead of thermal or nuclear energy. Solar energy only can help in environmental development.

It is the time for every individual in the country to decide weather to install solar power plants in their houses to generate electricity for their own purpose or forcing the government to go for fossil fuels (for thermal power) and nuclear power from the foreign countries. If we do not change our attitude in favour of solar power plats, the government has no other way except thermal power or nuclear power. We have brains in our heads to feel what is good and what is bad. Government can not afford subsidies and loans to each and every individual to install solar panels in their houses and industries as it costs much. So as responsible good citizens of the country we have to come forward to save energy, to save our environment, to save the earth and also to save the future generations from carbon, sulfur, lead and radioactive material emissions into the environment which poisons the earth's atmosphere.

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