Solar power satellites

Solar power satellites Introduction The Sun is a very powerful, clean and convenient source of power, particularly for satellites. The only thing needed is a means to convert the energy contained in the Sun’s radiation — mainly light and ultraviolet rays — into electrical power. The most efficient way to achieve this today is by using panels composed of semiconductor photovoltaic cells. ‘ Solar panels’, as they are usually called, are now quite a common sight here on Earth, but they were first used in space in 1958 to power the ‘ Vanguard’ satellite. Principles of solar satellites In photovoltaic cells, such as the Hubble Space Telescope silicon solar cell shown here, the basic materials, the doping and the shape of the junction are chosen in such a way as to increase their capability of transforming the light energy into electrical energy. Each cell is capable of producing a small amount of current at a relatively low voltage, more or less like a common pen-light battery. Many of them have to be combined in series to produce the amount of electric power needed for a satellite to function. A silicon solar cell from the Hubble Space Telescope has an operating efficiency of about 14%. Solar power satellites collect solar energy so that it can be distributed for use all over the earth. With this amazing technology, space-based solar power is the future of power generation. Solar power satellites, otherwise known as powersats, orbit the earth and are designed to capture solar energy and transmit that energy to receiving stations that are situated thousands of miles from each other on the surface of the earth. These satellites are made up of a number of modules outfitted with light weight photovoltaic solar panels. Benefits of solar satellites It is clean, it is green, and it is safe. Collecting solar power in space is also more efficient than collecting solar power on the surface of the earth for many reasons. Space-based solar

power is a method of collection that is not affected by weather on the surface, the seasons, or by the earth’s atmosphere, which can act as a filter, reducing the strength of the solar energy. This means that it is far more reliable than surface solar panels and it is also a renewable source of energy. What else makes space-based solar power a viable energy source for the future? It is fast. The energy can be transmitted from the solar power satellites to the receiving stations and then between receiving stations in just seconds. This is all accomplished via a wireless transfer of the energy, which can then power homes and businesses as effectively as the more traditional forms of power generation. Problems with solar satellites Despite the strength of the Sun, the solar arrays needed by an average-sized satellite are quite large, due to the rather low efficiency of the individual solar cells. You might think the sun would always be available to a solar a solar satellite in space. However, satellites orbiting the Earth pass through a shadow region on the opposite side of the Earth from the Sun. Depending on the type of orbit, this can happen just a few times a year or every few hours. During these so-called ‘ eclipses’, the solar panels cannot produce electrical energy and the satellite would not only be unable to operate, but would also freeze to incredibly low temperatures (eventually around —270°C). This employs the need for electrical energy to be stored on board the satellite. Solar satellites and expensive and each one costs millions of Euros because they have to work and survive in space for periods of up to 15 years. Potential of solar power satellites Space solar power will provide true energy independence for the nations that develop it, eliminating a major source of national competition for limited Earth-based energy resources. Space solar power will not require dependence on unstable foreign oil providers to meet

energy needs, enabling us to expend resources in other ways. Solar power satellites could possibly be the answer to the coming energy crisis. There would be no generation of cost fluctuations in the energy market caused by fuel shortages.