SOLARENERGY – ADVANTAGES AND DISADVANTAGES

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Introduction

Solar energy is energy that is present in sunlight. It has been used for thousands of years in many different was by people all over the world. It is used today to make electricity. Where other power supplies are absent. Such as in remote places and in spaces. It is becoming cheaper to make electricity from solar energy and in many situations it in now competitive with energy from coal or oil.

Energy from the sun:

After passing through the earth's atmosphere most of the sun energy is in the form of visible light and infrared light radiation. Plants convert the energy in sunlight into chemical energy. Through the process of photo synthesis. Human regularly use this store of energy in various ways as when they burn wood or fossil fuels or when simply eating plants. Fishes and animals.

Resource potential

The solar resource is virtually inexhaustible, and it is available and able to be used in all countries and regions of the world. But to plan and design appropriate energy conversion systems, solar energy technologists must know how much irradiation will fall on their collectors.

Iqbal (1984), among others, has described the character of solar irradiance, which is the electromagnetic radiation emitted by the Sun. Outside the Earth's atmosphere, the solar irradiance on a surface perpendicular to the Sun's rays at the mean Earth-Sun distance is practically constant throughout the year. Its value is now accepted to be 1,367 W/m^2 (Bailey etal., 1997). With a clear sky on Earth, this figure becomes roughly 1,000 W/m2 at the Earth's surface. These rays are actually electromagnetic waves—travelling fluctuations in electric and magnetic fields. With the Sun's surface temperature being close to 5800 Kelvin, solar irradiance is spread over wavelengths ranging from 0.25 to 3 μm. About 40% of solar irradiance is visible light, while another 10% is ultraviolet radiation, and

50% is infrared radiation. However, at the Earth's surface, evaluation of the solar irradiance is more difficult because of its interaction with the atmosphere, which contains clouds, aerosols, water vapour and trace gases that vary both geographically and temporally. Atmospheric conditions typically reduce the solar irradiance by roughly 35% on clear, dry days and by about 90% on days with thick clouds, leading to lower average solar irradiance. On average, solar irradiance on the ground is 198 W/m2 (Solomon et al., 2007), based on ground surface area

The solar irradiance reaching the Earth's surface is divided into two primary components beam solar irradiance on a horizontal surface, which comes directly from the Sun's disk, and diffuses irradiance, which comes from the whole of the sky except the Sun's disk. The term 'global solar irradiance' refers to the sum of the beam and the diffuse components. There are several ways to assess the global resource potential of solar energy. The theoretical potential, which indicates the amount of irradiance at the Earth's surface (land and ocean) that is theoretically available for energy purposes, has been estimated at 3.9×106 EJ/yr (Rogneretal., 2000;) Technical potential is the amount of solar irradiance output obtainable by full deployment of demonstrated and likely-to-develop technologies or practices.

Photovoltaic system (METHOD)

A photovoltaic system is composed of the PV module, as well as the balance of system (BOS) components, which include an inverter, storage devices, charge controller, system structure, and the energy network. The system must be reliable, cost effective, and attractive and match with the electric grid in the future (US Photovoltaic Industry Roadmap Steering Committee, 2001;) At the component level, BOS components for grid-connected applications are not yet sufficiently developed to match the lifetime of PV modules. Additionally, BOS component and installation costs need to be reduced. Moreover, devices for storing large amounts of electricity (over 1 MWh or 3,600 MJ) will be adapted to large PV systems in the new energy network. As new module technologies emerge in the future, some of the ideas relating to BOS may need to be revised. Furthermore, the quality of the system needs to be assured and adequately maintained according to defined standards, guidelines and procedures. To ensure system quality, assessing performance is important, including on-line analysis (e.g., early fault detection) and off-line analysis of PV systems. The knowledge gathered can help to validate software for predicting the energy yield of future module and system technology designs. To increasingly penetrate the energy network, PV systems must use technology that is compatible with the electric grid and energy supply and demand. System designs and operation technologies must also be developed in response to demand patterns by developing technology to forecast the power generation volume and to optimize the storage function. Moreover, inverters must improve the quality of grid electricity by controlling reactive power or filtering harmonics with communication in a new energy network that uses a mixture of inexpensive and effective communications systems and technologies, as well as smart meters.

PV offers several advantages including

- Complementarities with other energy sources, both traditional and renewable.
- Flexibility in terms of implementation pv systems can be integrated into consumer goods or into buildings, installed as separate mobile or non – mobile modules or used in central electricity generating stations.
- Environmental advantages pv produces electricity with no green house gas or other emissions and no noise.

Advantages:

1. Solar energy is free although there is a cost in the building of collectors and other equipment required to convert solar energy into electricity or hot water.
2. Solar energy does not cause pollution. However solar collectors and other associated equipment.
3. Solar energy can be used in remote areas where it is too expensive to extend the electricity power grid.
4. It is estimated that the world's oil reserves will last for 30 to 40 years. On the other hand, solar energy is infinite.

Disadvantages:

1. Solar energy can only be harnessed when it is day time and sunny.
2. Solar collectors, panels and cells are relatively expensive to manufacture although prices are falling rapidly.
3. Solar power stations can be built but they do not match the power output of similar sized conventional power stations. They are also very expensive.

4. Solar power is used to charge batteries so that solar powered devices can be used at night. However, the batteries are large and heavy and need storage space. They also need replacing from time to time.

Environmental impacts

No consensus exists on the premium, if any, that society should pay for cleaner energy. However, in recent years, there has been progress in analyzing environmental damage costs, thanks to several major projects to evaluate the externalities of energy in the USA and Europe (Gordon, 2001; Bickel and Friedrich, 2005; NEEDS, 2009; NRC, 2010). Solar energy has been considered desirable because it poses a much smaller environmental burden than non-renewable sources of energy. This argument has almost always been justified by qualitative appeals, although this is changing. Results for damage costs per kilogram of pollutant and per kWh were presented by the International Solar Energy Society in Gordon (2001). The results of studies such as NEEDS (2009) summarized in for PV and in for CSP, confirm that RE is usually comparatively beneficial, though impacts still exist. In comparison to the figures presented for PV and CSP here, the external costs associated with fossil generation options, as summarized in considerably higher, especially for coal-fired generation.Considering passive solar technology, higher insulation levels provide many benefits, in addition to reducing heating loads and associated costs (Harvey, 2006). The small rate of heat loss associated with high levels of insulation, combined with large internal thermal mass, creates a more comfortable dwelling because temperatures are more uniform.

Conclusion

Potential deployment scenarios range widely—from a marginal role of direct solar energy in 2050 to one of the major sources of energy supply. Although direct solar energy provides only a very small fraction of global energy supply in 2011, it has the largest technical potential of all energy sources and, in concert with technical improvements and resulting cost reductions, could see dramatically expanded use in the decades to come.

Achieving continued cost reductions is the central challenge that will influence the future deployment of solar energy. Reducing cost, meanwhile, can only be achieved if the solar technologies decrease their costs along their learning curves, which depends in part on the level of solar energy deployment. In addition, continuous R&D efforts are required to ensure that the slopes of the learning curves do not flatten before solar is widely cost competitive with other energy sources.

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