

Use of Solar Energy in Optimization of Renewable Generation Sources

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Abstract: Today, man is facing with two great crises: environmental pollution and increasing velocity of energy consumption. Reduction in energy consumption and making use of new energies such as nuclear power and hydropower, wind, geothermal and solar energies and so can reduce a large part of the problem and the crisis of the present time, but in between the solar energy, due to purity, safety, endlessness and more accessibility is a priority. In this study, we tried to examine the use and advantages of solar energy as a renewable resource.

Keywords: solar energy, renewable, energy, alternative fuels

Introduction

First, it is important to note that natural resources are generally divided into two groups: renewable resources and exhaustible resources (Irreplaceable). Renewable resources refer to those natural resources that can be considered as permanent consumption resource by doing protective measures, while the exhaustible resources will be finished as soon as they are consumed. For renewable resources, the process of renewal or replacement of them is a prolonged natural process and replacement doesn't occur quickly in nature. These sources will be finished as a result of exploitation finally and are generally considered as non-renewable. Very good examples of these resources are oil and coal, but resources such as forests, marine resources and arable lands are renewable resources. (Behling et al. 2000)

A significant part of the conceptual difference between the incomes from the sale of assets and income from economic activities within the

framework of national accounts and more generally in terms of economic theory is related to the relationship between flow variables and cumulative variables. In a broader context, we can say that accounting systems that rely solely on flow variables, a strong analysis obtains from the functional relations of 3 economies. While in a computational system based on cumulative variables, a valuable analysis of the structural relationship of 4 economies is achieved. The relationship of cumulative and current variables is like the relationship between motion and speed or velocity and acceleration in physics. Flow variables show the change (continuous or intermittent) of cumulative variables over time.

Some of the natural resources that are called "renewables" are so that if apply the good management and principle productivity can always take advantage from them without the shortcomings of these sources, like forests, grasslands, water, soil and animals. The sun is the agent and origin of various energy sources in

the nature such as fossil fuels, stored in the earth, and wind, and waterfalls energy, plants growth that animals and humans use them for their own growth, all organic material can be converted into heat and mechanical energy, the waves, the tides obtained by the gravity and the motion of the Earth around the Sun and Moon, they are all symbols of solar energy. Industrial societies high dependence on energy resources, especially petroleum fuels and the use and overuse of them discharges immense resources that were formed during centuries in layers of the earth, given that subterranean energy resources are consumed with a tremendous speed and nothing will not remain from them in the not too distant future, the current generation has a duty to use those energy sources that have long lifestyle and capacity and to expand their knowledge to exploit them.(Ewing,2006)

Solar parameters status in the world and Iran

Solar energy is one of the resources of free, clean energy and free of environmental impact that have long been used in various ways by humans. The energy crisis in recent years, made countries in the world to have a different approach to energy issues, among which the replacement of fossil energy with renewable energies and such as solar energy to reduce energy consumption, energy supply and demand control and reducing emissions of pollutant gases has been met with great interest. On average, sun emits $10^{20} * 1/1$ kilo watt hours of energy per second. Only about 47% of the total energy emitted by the Sun reaches the surface of the earth i.e. the energy from three days of emitting to the earth is equal to the energy from the combustion of fossil fuels in the ground, so it can be concluded that as a result of solar radiation for forty days the energy required for a century can be stored.(Kryza ,2003)

Therefore, using solar collectors, we can partly use this endless, clean, and free of charge source of energy, and save in the fossil fuel consumption to a wide extent.

The status of Iran solar energy intake in kWh per square meter compared to other countries

Based on information obtained by Energy Consumption Optimization Company, Iran is located between the 25 to 40 degrees north latitude orbits and in an area that is in the highest ranks in terms of solar energy intake in the world. The average amount of solar radiation in Iran is estimated between 1800 to 2200 kWh per year, which is higher than the global average (in Iran on average, more than 280 sunny days is annually reported that is very noticeable.) The amount on average in Europe is 1700 kWh and in Africa 2100 kWh per square meter per year.(Perlin,2002)

Specifications of urban lighting systems using solar energy

The use of solar energy has a long history and is running in many countries for many years and the basic reason for the widespread use of solar energy as previously stated is its safety, healthy, and purity and lack of pollution (environmentally friendly energy), free and availability etc., using this energy with all these advantages, however, due to lack of Public Enlightenment by authorities and lack of cultural background for using clean energies, presence of cheap fossil resources and need for relatively high initial investment to create solar systems in developing countries, including Iran is not sufficiently popularized.

Solar lighting system components and their longevity

The main components of a unit of solar lighting system other than the metal base and other components existing in other non-solar systems

includes 100 amp battery and its box to save energy, solar panels 120 watts to intake energy, micro-sensor controller charge 12V to charge the battery, LED lamps 130-watt (two LED lamps 65 watt) for two-way streets and miniature fuse 15 amp. Useful lifetime of a solar system for lighting the city is an average of 10 years but the batteries have at least the age of 7 years, the solar panels at least 20 years, charge controllers at least 5 years and LED lamps 130 watts 30 years.(Laird,2001)

Replacement of solar energy with oil and gas

In Iran, energy - including oil, gas and electricity – is available for people with a very low price and relatively free of charge. This has resulted in wasteful use of energy in the country; while profusion in food, natural resources etc. is prohibited by Islam. Burning oil and gas, the God's very valuable and limited blessing to produce hot water (at a temperature of about 45°C), producing hot air or water for heating buildings(at 50 to 90°C) and cooking food (at temperatures around 100°C) is extremely wasteful. Burning fossil fuels for these applications is profusion (thus committing sin)as much as burning the wheat to meet these demands. Oil, this blessing can be used to produce pharmaceuticals, plastics, fertilizers etc. by formulating standards for energy consumption in buildings and, household appliances, lighting lamps, industrial exchangers, vehicles etc. in these parts, energy consumption can be dramatically reduced; for example, with proper design of buildings, and the use of heat insulation and preventing cold air leaking from seams of window, the energy required to heat and cool the building can be a least halved, and by using electric motors, household appliances and lighting lamps with high efficiency, residential and commercial electric power consumption can be reduced by at least half the current rate and finally by

regulating engines of vehicles, their fuel consumption can be reduced at least 65% of its current level. In industry and agriculture, we can significantly save energy consumption by developing and applying standards.(Sklar,2002)

Solar energy is the cleanest non-fossil energies and its use creates the minimum pollution in the environment (1) - (the squanderers are brothers of Satan, and Satan is unthankful to his Lord. Alasra' verse 27). Iran is one of the world sunniest countries and solar energy intake in the country, on average is equivalent to 6570 MJ per square meter per year for a horizontal plane, for a plane installed with a slope of approximately 30 degrees to the south is equal to 8395 and for a plane constantly kept perpendicular to the sun's rays is estimated 10,220 MJ per square meters per year. Total solar energy intake (with an area of 1.648 million square kilometers) is about 10,827 EJ a year. This energy intake is more than a thousand times of the total energy consumption and energy exports in 1990. In short, Iran is very rich in terms of solar energy intake and it is necessary that the Islamic Republic of Iran to consider this eternal energy source in future whether to save oil and gas resources (for industrial applications) or to reduce environmental pollution.(Scheer ,2002)

Other advantages of solar energy

Using solar energy, the energy needs of the country can be supplied; environmental pollution can be reduced and the hydrogen can be produced for export. Other reasons for using solar energy in large-scale is discussed in the following:

1. The application of solar energy technology is not so complex that we need to use foreign experts. In many applications, the technology is already available in the country. In some applications (such as making photocells)

with a brief attempt, the related technology can be developed.

2. Iran was an importer of technology to solve its problems in the past decade. Almost all modern life facilities (such as electricity and all electrical appliances, telephone, transportation, automobile, computers, etc.) are obtained by importing technologies. Due to the limited oil resources and possibility to finish this valuable natural resource, we can wait for industrialized countries to solve their energy issues and to import technologies as in the past or to take steps prior to others and to think of solar energy, and instead of importing, to be considered as an exporter of solar energy technology.
3. Rising the levels of carbon dioxide (CO₂) in the atmosphere and, subsequently, global temperature rise is an issue that is raised at a global level and concerned many people around the world. Compared with other industrialized countries that have a very high fossil fuels use, Iran has not a major role in raising CO₂ at global level and warming of the atmosphere but due to the fact that (the industrialized countries have already thought about it) it can create an excellent reputation for the Islamic Republic of Iran in the scientific and political circles in the world.
4. Currently, Iran is the political leadership in some Third World Countries. It is good that the country to be also in charge of spiritual leadership of the world, and scientific and technical leadership in the third world. Due to the role of energy in developing countries and that the third world countries also

have a significant amount of solar energy, Iran can be the exporter of this technology to the third world in practice by investing in the development of sciences and technology of solar energy in the country, and to play the role of scientific and technical leadership in the third world properly. Solar energy can also be used to produce electricity, which is a more flexible and useful form of heat. Some kind of metal sandwiches are regulated with a detailed composition that until they are exposed to sunlight, they produce a small amount of electric current. Such "solar batteries" are used to produce power in synthetic satellites with great success. (Behling et al 2002)

Conclusion

The results of investigations in official authorities such as the optimization of fuel consumption and SANACO. showed that Iran, due to locating in orbits of 25 and 40 degrees northern latitude and that is located in a region which is in the highest ranks in terms of solar energy intake in the world, and the average amount of solar radiation is higher than the global average (in Iran, on average, more than 280 days are reported as sunny which is remarkable), so due to many sunny days and low cloudy weather, it has a good potential to use solar energy, but for example in Europe due to the high cloudy weather and the absence of many sunny days during the year, many energy-intensive activities, particularly urban lighting are done by enhancing the level and efficiency of solar panels.

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