Original Article: Solar Energy, Is it necessary?

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ABSTRACT

Central receiver solar systems are capable of generating electricity at high capacities and are more efficient than other similar systems due to their high operating temperature. These types of power plants can be used to supply steam to thermal power plants and also to produce hydrogen. Because, like other solar systems, only energy from solar radiation is used, there are no problems with greenhouse gas emissions or environmental pollution. These systems are one of the few solar electrical systems that can properly store solar energy and inject the stored energy into the grid when necessary, such as at night or in cloudy weather. The above advantage can be used to store energy and deliver electricity during peak network times. A 100-megawatt power plant with a capacity of 12 hours of energy storage requires only 4,000 square meters of barren land and can well supply the energy needed by 50,000 households. There are millions of square meters of barren land in the central deserts and in the southern, southwestern and northwestern regions of Iran, which can be used as a source for solar energy production compared to hydropower.

Introduction

There are currently two successful examples of high-capacity solar power plants that are a good example of the potential of this type of power plant.

California's 10-megawatt Solar One power plant, which generated 38 million kilowatt hours of electricity during operation from 1982 to 1988, practically proved the potential of using these power plants. By optimizing the Solar One system, the Solar Two power plant used molten salt instead of water vapor as the operating fluid. Molten salt was also used in the energy storage system, and with the desired results, it was shown that solar energy could be collected efficiently and even delivered electricity at night and during cloudy hours.

The success of Solar Two sparked global attention for the use of solar power plants as the central receiver type.

After the end of the Solar Two's term, a consortium of US-led international companies, including Boeing and Bechtel (also technically supported by Cindy national laboratories)

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A central receiving power plant was set up to follow up. Especially in Spain (where good sunlight makes technology economical) as well as in Egypt, Morocco and Italy.

The first commercial power plant was designed with a capacity of about 4 times that of the Solar Two power plant (about 40 MW and with a backup source that stores the energy needed to power 15 MW turbine 24 hours a day). US industry is now looking for an opportunity to build a 30- to 50-megawatt plant in the southwestern deserts of the country, taking advantage of the advances and experiences of Spanish projects and meeting the peak US network needs. The first plant of its kind will cost $ 100 million and supply electricity at a rate of 15 cents per kilowatt hour.

Although the rate of electricity generation is still slightly higher than the rates of traditional methods of production, but with financial support from environmental organizations and the government, this rate is reduced, also with the improvement of engineering methods and advances in technology electricity supply rate in This type of power plant will reach 7 cents per kilowatt hour. If there is a determination and interest in using clean energy, it is possible to economize this technology so that it can compete with traditional power plants.

Linear parabolic solar power plant

Description

Rising costs and the uncertain future of fossil fuels, as well as the international community's attention to environmental issues and their effects, have led to the use of non-polluting environmental systems in industrial and commercial applications. One of the common and suitable methods for industrial and power plant uses is the use of linear parabolic collector system.

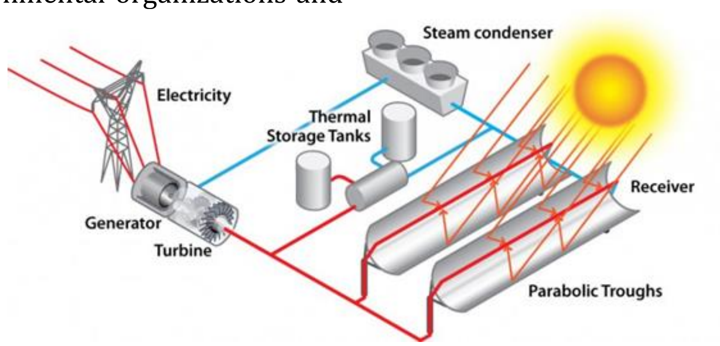

Figure 1: Linear concentrator solar power plant illustration

In this method, the solar radiation energy is concentrated and collected after reflection from the surface of the parabolic mirrors installed on the structures on the receiving tube located in the parabolic focus.

The tube converts the radiant energy into heat and transfers it to the heat transfer fluid (oil). The hot oil is steam generated in a heat exchanger and the steam is generated to generate electrical energy. This method is able to heat the outlet fluid from the collectors to about 400 degrees Celsius.

Usage

1- Power generation at power plant capacity and above.

2- Increasing the efficiency of non-thermal power plants in combination with fossil thermal cycles.

3- Production of steam for non-power plant systems (oil, power and heavy industries).

4- Production of fresh water.

Solar water heaters are installed in cities and villages without gas in the country.

The operation of the first project of a solar water heater for a public bath began in the village of "Derakhsh" in the border section between Birjand.

"Bad Nilo", the executor of this project, said: 50,000 Euros have been spent by the government for the installation and operation of this water heater.

He added: "The solar water heater, which uses advanced European technology, has been installed and commissioned for the first time in Khorasan province in this region with the cooperation of Austrian experts."

"This water heater has 40 cells and 100 people can use its hot water," he said.

He added: the solar water heater system will be installed in the villages for free and in the cities with a 40% subsidy.

Bad Nilo said that during a five-year plan, solar water heaters will be installed in all cities and villages without gas pipelines, adding that the amount of fuel savings using these water heaters will reach 90%.

Siavash Yousefi, Deputy Director of the Energy Office of the Management and Planning Organization, during his visit to Gonabad, announced the installation of 7,000 solar water heaters in different cities of the country.

The deputy director of the Energy Office of the Management and Planning Organization mentioned the installation location of these water heaters in the eastern and southern provinces of the country and added: "According to the schedule, 3,000 more water heaters and other solar baths will be installed in the country by the end of this year."

He said: "Due to the success of the initial plan and planning, in the second plan of the energy office of the management organization and the fuel optimization organization of the country, 215 thousand water heaters and 1000 solar baths will be installed and commissioned in the country."

He added: "According to the decision of the economic council, about 50 million dollars have been exchanged to provide credit and operation of this number of water heaters and solar baths, and its agreement has also been exchanged."

He said: "The spread of the culture of using new energy, especially solar energy in Khorasan province among the people is more than other parts of the country, so the acceptance of water heaters and solar baths in this region has been met with widespread success by the people."

He added: the government pays a subsidy of more than three million RIALS for each solar water heater.

He said: "Using each solar water heater every year, not consuming 700 liters of kerosene and avoiding more than 100 million RIALS will help the country's economy."

Benefits of solar energy from a general point of view

1- Compared to fossil fuels, solar energy is an inexhaustible resource that can be used in the distant future to solve the energy crisis and reduce the need for non-renewable fuels, especially gas and oil, now and in the near future. As a result, such fuels can be used more efficiently and for longer periods of time.

2- The use of solar energy in the distant future will make countries no longer need foreign technology and technology dependent on those resources, which as a result will reduce the influence of foreign policies in countries and this will lead to some world peace.

3- Unlike many technologies dependent on modern methods of energy production (nuclear energy), the basic technologies required for many solar energy applications are simple. These technologies only need to be developed and advanced in order to be economically justified.

4- Solar energy-related technologies in the country, create new permanent industries that prevent unemployment caused by the reduction of fossil fuels.

5- Solar energy does not pollute the environment.

In this passage, photovoltaics is one of the sources of solar energy extraction, which is very important because:

1- The possibility of installing a photovoltaic power plant is very simple and easy to access.

2- Unlike other forms of solar power plants, photovoltaics converts energy from radiation directly into electrical energy.

3- It is possible to use this type of solar energy on small and large scales. (From 10 watts to several megawatts)

4- Can be used in urban and rural areas.

5- It can be installed wherever it is possible to use this system.

6- Execution time of photovoltaic projects due to other forms of clean energy such as wind, geothermal, linear parabolic, central receiver, etc. is very short, which in itself makes the flexibility of the system more evident.

7- It helps the society in the discussion of job creation.

8- The costs of transferring the line to places far from the reach of the national network, as well as the peak and prevent the drop in the transmission network.

Water force - The force of moving water

Renewable energy sources often use hydropower. This type accounts for 6% of total US and 42% of US renewable energy production in 2001. Hydropower is one of the oldest sources of energy and was used thousands of years ago to turn the mills of mills.

The first time the United States used this power to generate electricity dates back to 1880, when 16 arc lamps were powered by a Wolverine Chaire water turbine at the grand rapids in Michigan, up to 30 In September 1882, when America's first hydropower plant was commissioned, coal was the only source of electricity. Because the source of hydropower is water, hydraulic power devices must be located close to water. Therefore, hydropower can only be widely used if power transmission technology is advanced over long distances.

Figure 2: Water force

Mechanical energy is obtained from the conduction of four moving canals. The amount of energy available in the moving water above and below the ground is determined. Dam running water??? In a large river like the Columbia River, which borders Washington and Uruguay, it has a lot of energy flowing through it. This is also true for fast-moving waters such as Niaga Falls in New York. In this connection, water flows in a pipe and then, by its own pressure, turns the blades of an electric turbine to turn a generator and generate electricity. In the run-of-the-river system, the running water force creates the required pressure, while in the storage system, water collects in the tanks created by the heads and then when the demand for electricity increases will be released.

Meanwhile, reservoirs or lakes are used for boating and fishing, and even the rivers behind provide opportunities for kayaking and boating.

More than half of all US hydroelectric capacity is concentrated in Washington, California and Oregon.

It is noteworthy that only a small percentage of US dams generate electricity. Most dams are built exclusively for flood control and irrigation.

Some people consider hydropower to be an ideal fuel for electricity generation because, unlike non-renewable fuels, it is almost free and ubiquitous, has no waste products, and does not cause environmental pollution. However, this force is also criticized because it changes the environment by affecting the natural inhabitants of different areas.

In the Columbia River, for example, salmon have to swim upstream to lay their eggs and produce offspring, but there are dams on all three. Judgmental solutions to this problem have been used, such as the construction of "fish ladders" to jump fish from the dam and reach upstream lands.

Definition of electricity and hydropower

Running water can generate energy. That is, it can generate electricity by controlling it. Which is called hydropower.

The most common and common method for a hydroelectric power plant unit is to use a dam that closes on the river and stores water in its reservoir. Water is released from the tank and flows into the turbine. It then spins it, in which a generator is used to generate electricity. But hydropower does not necessarily require large dams. In some hydropower plants, a small canal or channel has been used to transfer river water into the turbine.

Hydroelectric power plants are environmentally friendly power plants and can be used for multiple purposes for flood control and water supply in the region. Existence of cheaper and more affordable fossil fuels in the country has been one of the main reasons for not paying attention to hydropower.

However, issues related to environmental pollution and the limited lifespan of fossil fuels along with the benefits of hydropower plants and having positive side effects, renewability and the existence of high potentials of hydropower in the country have led to more attention to this energy.

Application of electricity and hydropower

The use of these small hydropower plants in the country can be a factor in the development of rural areas and on the other hand an obstacle to the migration of villagers to cities. And due to the versatility of these facilities for irrigation of agricultural lands can also be used.

Storage behind the dam

These types of technologies are commonly available in large systems that use a dam to store river water in a reservoir. Stored water may be released from behind the dam for power demand variables or to achieve a desired level of water.

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Figure 3: Dam

Storage with water diversion

Deviation - sometimes called off-roading - is a technology in which a section of a river is channeled in the desired direction. In this method, there is no need to use a dam.

Storage by pump

When electricity demand is low, a pump pumps water from a low-rise tank to a higher-level tank. When needed, water is released back into the bottom tank to generate electricity.

Size of power and hydropower plants

• *Large power plants*

Despite different definitions, large power plants are defined as power plants with a capacity of more than 30 MW.

• *Small power plants*

A small power plant is a power plant with a capacity of 0.1 to 30 MW.

Conclusion

Power plants with a capacity of less than 100 KW are called very small power plants.

The use of hydropower needs today and tomorrow. World thinkers are concerned about the planet's climate. Every day we hear disturbing news of climate change on the planet. Greenhouse gas emissions and severe pollution caused by the indiscriminate and unscientific use of fossil fuels have seriously affected the human condition. Statistics show that countless people die every year due to severe air pollution. In other words, the use of fossil fuels for comfort and service to human beings has become a monster that, while serving, also shows its strange power. The issue does not end with the loss of human lives, but the main and worrying issue is the devastating environmental effects of this type of fuel on the present and future of the place where humans live, and if no serious solution is considered, we have to wait for the new situation that the author calls the "Black Age" and the uncertain future that man has figured out with his own hands.

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