

SOLAR ENERGY



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In the following article, the solar energy will be thoroughly discussed, both in terms of its advantages and disadvantages. Furthermore, a basic comparison will be made with other sources of renewables energy in order to understand the main differences and similarities across the sources.

BENEFITS

One of the first advantages that come easily to mind when relying on solar energy is that the sun is an inexhaustible and renewable source of energy. The sun provides us with solar radiation every single day no matter which part of the world we are located. The presence of the sun all over the globe brings independence which is extremely essential when comparing different types of renewable energy. Also when talking about independence, the solar energy is being produced close to the users meaning there are no costs related to transportation and also no losses over the grid which is the case for wind power energy for example.. Furthermore, solar energy can be implemented for both electricity (if the area lacks access to the energy grid) and heat needs. The solar panels collect the solar radiation from the sun and use the obtained heat to provide for hot water, space heating, cooling. This is especially useful especially in residential, commercial, and industrial applications.

Another advantage related to the plant costs is the maintenance. The solar plants do not require maintenance and repairs which makes them a convenient choice (especially when choosing between wind and solar energy. The wind plants are often located in rural areas where access is not as easy as the one to solar plants which are usually easily accessible. If the solar plants need to be compared with biomass ones, another advantage in favour of solar energy comes out - lack of hazardous organic compounds being emitted in the atmosphere.



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Lastly, solar energy is characterized by being a modular system which is not the case when considering other types of renewable energy. Being modular means that each additional panel installed provides the same marginal conversion efficiency. This is the significant difference with wind energy because in that case the bigger the wind turbine, the higher the efficiency is.

CHALLENGES

One of the most critical points when talking about solar energy is its intermittency or also in other words is that this energy source is subject to periodic stopping because of poor weather conditions (like overcast days or nighttime).

In addition to the above features of solar energy should be mentioned that of space constraints (for residential uses the roofs of the buildings are not spacious enough to cover the energy need of the whole building). The land required for the solar panels installation is particularly large which sometimes could be an obstacle especially in urban areas.

To conclude the solar energy analysis, the issue with conversion efficiency should be mentioned. The efficiency of solar panels is characterized by how much of the sunlight (also known as solar radiation) reflected on the surface of the panels is being transformed into electrical or thermal power. Solar energy is characterized by lower conversion levels when compared to the efficiency of other renewable energy sources (for example wind energy).



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FUTURE IMPROVEMENTS

The potential solution here is to create a storage system at reasonable costs able to store all the energy available in periods of good weather conditions. Concentrating Solar Power (CSP) is a technology converting solar radiation into electricity by double conversion: firstly, the solar radiation is converted into thermal power which is the production of hot fluid (this can be stored very easily and thus represent an effective and relatively cheap solution as a storage system) and secondly, the hot fluid is being converted into electricity.

The latest technology advancements in photovoltaic technology bring for higher efficiency. Until recently, the solar panels were characterized with average efficiency of about 15% while now this number has increased to around 23 % which is a significant increase for the short time span.

Thanks to the technology advancements, more and more panels are being installed which leads to a decrease in costs which allows the construction of bigger plants.



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