

Fun and interesting facts (About the types of wind energy)

1. What are the types of wind energy?

Wind energy systems are divided into different types based on the location of the turbine, axis of rotation, and production scale.

Depending on the location, wind energy systems are classified as onshore wind energy systems, offshore wind energy systems, and hybrid wind energy systems.

a) Onshore wind energy

Onshore wind energy involves wind turbines located on land, where kinetic energy is transformed into electric energy. These systems are commonly situated in open areas with sufficient wind speed to rotate turbines. A key advantage is that they need low costs for installation and maintenance, and provide clean energy that does not emit greenhouse gases. Several considerations are needed for installing an onshore wind energy system. There must be sufficient and continuous wind speed for the operation of turbines. The turbines should be situated in areas with minimal disruption. Some examples of onshore wind energy systems include the Muppandal wind farm, which is located in Tamil Nadu, India, and has a production capacity of 1500 MW, the Gansu wind farm in China, and the Mojave wind farm in California, United States.

b) Offshore wind energy

The offshore wind energy system is located at sea with turbine blades above water and their gearboxes at the top of the tower. These systems use large turbine blades, benefiting from greater, more consistent wind speeds at sea compared to onshore systems. Just like onshore wind energy systems, kinetic energy is transformed into electric energy. The more consistent wind flows over the open ocean. These can be installed in large areas of the sea. They can mitigate concerns related to noise and visual impact. Their installation and maintenance are costly. Marine environments can be affected and disrupted by the installation of these systems. Some examples of offshore wind energy systems include Hornsea 2, in the North Sea, with a production capacity of 1,386 MW, which provides power to about 1.4 million houses in the United Kingdom, and Vineyard Wind 1, which has a production capacity of 806 MW, off the coast of Massachusetts, United States.

c) Hybrid wind energy

A hybrid wind energy system is a combination of two different power sources. Among the two, one is wind, and the other is either solar, hydropower, or a diesel generator. In a wind-solar combination, wind turbines are connected with solar PV panels, where solar provides electricity during the day, while wind turbines generate electricity at night. In a wind and hydro combination, wind turbines are connected with pumped hydro storage systems. In diesel generator and wind turbine combination systems, there are generators that provide electricity during power failure or when wind turbines are not generating electricity. The diesel generator acts as a backup. The main advantage of hybrid systems is that they provide a continuous supply of electricity without any interruption. These are some of the cost-effective systems that reduce greenhouse gas emissions. They can be applied for small-, medium-, and large-scale electricity production.

References

- https://en.wikipedia.org/wiki/Wind_power
- <https://www.britannica.com/science/wind-power>