Concentrated solar power vs pv

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Many people are familiar with solar photovoltaic (PV) or solar hot water systems. But in sunny spaces across the world, another lesser-known technology exists as a different way to take advantage of the sun"s energy: concentrated solar power (CSP). In this article, we"ll describe how concentrated solar power technology works, the types of concentrated solar systems, and how the technology compares to the solar photovoltaic panels you might install on your property.

Have you ever tried using a mirror or magnifying glass to fry an egg on the pavement during a hot, sunny day? Concentrated solar power (also known as concentrating solar power or concentrating solar-thermal power) works in a similar way conceptually. CSP technology produces electricity by concentrating and harnessing solar thermal energy using mirrors. At a CSP installation, mirrors reflect the sun to a receiver that collects and stores the heat energy. That heat is used to power an engine or turbine that is connected to an electricity generator.

CSP is used in utility-scale applications to help provide power to an electricity grid. They can be paired with energy storage technologies to store thermal energy to use when solar irradiance is low, like during the night or on a cloudy day. Today, roughly 1,815 megawatts (MW) of CSP plants operate in the United States.

Generally, concentrated solar power is not installed at a residential scale and instead will almost always be installed over a large area as a utility-scale generating facility. For residential and commercial property owners, solar photovoltaic panels are the best way to harness the sun"s energy for use.

With parabolic dish concentrated solar power systems, mirrors are set up in a satellite-dish shape with a receiver mounted in the middle, away from the mirrors. Sunlight reflects off the mirrors and hits the receiver focal point, which typically has a heat engine mounted directly on it.

Two of the biggest advantages of parabolic dishes over other types of CSP systems are that they require very

little land space and don"t need to be installed on a flat surface.

Solar power towers have a host of mirror reflectors at the ground level, also known as heliostats. These heliostats run on a tracker system and concentrate sunlight throughout the day, reflecting it to a single point at the top of a tower that hosts the receiver.

Within the receiver is a heat transfer fluid that will warm up, generate steam, and then power a turbine in the generator, creating electricity. Oftentimes this heat transfer fluid is a molten salt, which can retain heat more effectively than many other fluids, given its high heating capacity.

Parabolic troughs are the most common type of CSP system used throughout the world. Long, u-shaped mirrors reflect sunlight towards a tube that runs along their center, parallel to the mirrors. Inside the tube is a heat transfer fluid that gets heated as sunlight is reflected toward the tube. Once hot, this liquid runs to a central power generator that will use the heat to produce electricity.