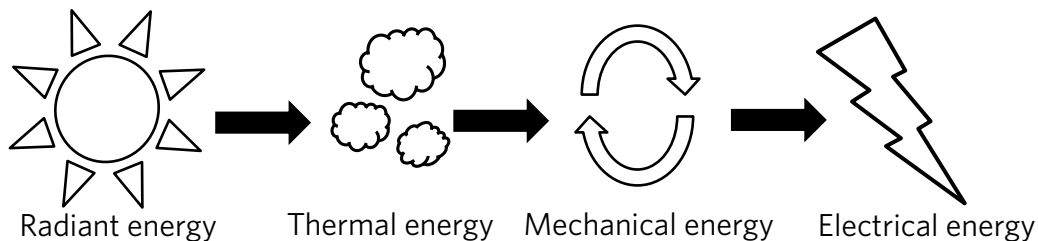




### Solar Energy

Solar energy is a way to harness sunlight for heating or electricity. There are different ways to convert sunlight into usable energy. Concentrated solar power uses mirrors to focus the energy from the sun onto a smaller area. This concentrated thermal energy heats water into steam, which turns a turbine connected to a generator. The generator converts the mechanical energy of the spinning turbine into electrical energy. Concentrated solar power plants need between 500 to over 1,000 acres of land—more than 400 football fields!—to have enough mirrors to generate electricity efficiently. Often they are found in unpopulated desert regions—like the Ivanpah Solar Electric Generating System in the Mojave desert—which means the electricity generated has to be transmitted a long distance to where it will be used. It also means that large regions of desert ecosystems can be impacted<sup>1</sup>.



Another technology that can convert the energy of sunlight into electricity is solar photovoltaics (PV). When sunlight strikes a solar photovoltaic cell, it is absorbed by a semiconductor—a material like silicon that can conduct electricity under the right conditions. This excites electrons in the semiconductor, which then flow, generating an electrical current. A bunch of solar photovoltaic cells can be grouped together to create a solar panel. Solar panels can be installed on the roofs of homes and buildings in solar arrays, so they are better options for cities. Solar panels are relatively easy to take care of and aren't noisy.

Solar photovoltaic technology produces no direct carbon dioxide or other greenhouse gases that can warm the climate. Sunlight is free, abundant, and renewable, since it won't run out for billions of years. The Earth's surface continuously receives 10,000 times more energy from the sun than the world currently uses<sup>2</sup>!

Unfortunately, solar energy isn't a great option everywhere or all of the time. Regions that don't get a lot of constant or direct sunlight aren't ideal places to use solar energy. Solar panels don't work at night and don't work as well when it is cloudy. Solar technology is becoming cheaper, but there is a cost to build a large concentrated solar power plant or install solar panels.

<sup>1</sup> [The New York Times: BrightSource Alters Solar Plant Plan to Address Concerns Over Desert Tortoise \(Feb. 2010\)](#)

<sup>2</sup> [U.S. Department of Energy](#)



# Weighing the Benefits and Drawbacks of Solar Energy



For a complex problem, we need to evaluate how a solution fares across multiple dimensions:

**Benefits**

**Drawbacks**

**Environmental  
Factors**

**Social & Cultural  
Factors**

**Economic  
Factors**



# Exploring Energy



## Weighing the Benefits and Drawbacks of Solar Energy

For a complex problem, we need to evaluate how a solution fares across multiple dimensions:	Benefits	Drawbacks
<b>Environmental Factors</b>	<ul style="list-style-type: none"><li>• Solar PV does not directly produce greenhouse gases like carbon dioxide that contribute to global warming and climate change.</li></ul>	<ul style="list-style-type: none"><li>• Large concentrated solar power plants can impact ecosystems because of their large land footprint.</li></ul>
<b>Social &amp; Cultural Factors</b>	<ul style="list-style-type: none"><li>• There is more than enough solar energy to go around.</li></ul>	
<b>Economic Factors</b>	<ul style="list-style-type: none"><li>• Sunlight is free!</li></ul>	<ul style="list-style-type: none"><li>• There is a cost to installing solar panels.</li><li>• Building large concentrated solar power plants can be expensive.</li><li>• Solar power isn't a feasible option for energy generation everywhere, since not every region has a lot of direct or constant sunlight.</li></ul>

### Additional resources

[GRID Alternatives](#): Making solar technology accessible to underserved communities  
[Solar Energy Basics](#) from the National Renewable Energy Laboratory

