The Earth intercepts a lot of solar power: 173 thousand terawatts. That's ten thousand times more power than the planet's population uses. So is it possible that one day the world could be completely reliant on solar energy? To answer that question, we first need to examine how solar panels convert solar energy to electrical energy. Solar panels are made up of smaller units called solar cells. The most common solar cells are made from silicon, a semiconductor that is the second most abundant element on Earth. You can think of light as the flow of tiny particles called photons, shooting out from the Sun. When one of these photons strikes the silicon cell with enough energy, it can knock an electron from its bond, leaving a hole. The negatively charged electron and location of the positively charged hole are now free to move around. From there, they flow through an external circuit, doing electrical work, like powering a lightbulb. Each silicon cell only puts out half a volt, but you can string them together in modules to get more power. Twelve photovoltaic cells are enough to charge a cellphone, while it takes many modules to power an entire house. Electrons are the only moving parts in a solar cell, and they all go back where they came from. There's nothing to get worn out or used up, so solar cells can last for decades. So what's stopping us from being completely reliant on solar power? Is that solar energy is unevenly distributed across the planet. Some areas are sunnier than others. It's also inconsistent. Less solar energy is available on cloudy days or at night. So a total reliance would require efficient ways to get electricity from sunny spots to cloudy ones, and effective storage of energy. The efficiency of the cell itself is a challenge, too. The most efficient solar cell yet still only converts 46% of the available sunlight to electricity, and most commercial systems are currently 15-20% efficient. In spite of these limitations, it actually would be possible to power the entire world with today's solar technology. Meanwhile, solar cells are getting better, cheaper, and are competing with electricity from the grid. And innovations, like floating solar farms, may change the landscape entirely. Thought experiments aside, there's the fact that over a billion people don't have access to a reliable electric grid, especially in developing countries, many of which are sunny. So in places like that, solar energy is already much cheaper and safer than available alternatives, like kerosene.