Earth absorbs a huge amount of solar energy - 173 thousand terawatts. This is ten thousand times more energy than the world's population uses.

Is it possible that one day the world will be able to completely switch to solar energy?

To answer this question, we learn how solar panels turn solar energy into electrical energy. Solar panels consist of small cells - photocells.

Usually, solar cells are made of silicon, a semiconductor that occupies the second most common place on Earth. The silicon crystal is located in the photocells of the batteries between two conductive layers. Each silicon atom is connected to the neighboring four strong bonds, they hold the electrons in place, that is, they do not allow the current to flow.

The solution to this problem is to use two different layers of silicon in the photocell.

Silicon of n-type has an excess of electrons, and silicon of p-type has additional places for electrons, which are called holes. At the junction of silicon, electrons can move through the p – n junction, leaving a positive charge on one side and creating a negative charge on the other.

Light is a stream of tiny particles (photons) that the sun emits. When one of these photons hits a silicon cell with sufficient force, it knocks an electron out of its bond, leaving a hole. A negatively charged electron and a positively charged hole can now move freely. But due to the electric field at the p – n junction, they will moveonly in one direction. The electron moves toward the n-type, while the hole moves toward the p-type. Moving electrons are collected by thin metal pins at the top of the cell. From there, they flow through an external circuit, performing electrical work, such as powering an electric lamp, before returning through a conductive aluminum layer on the back.

Each silicon cell produces only half a volt, but you can combine them into a module, to get more power. Twelve photocells are enough to charge a cell phone, but at the same time, many modules are needed to power the house.

Electrons are the only moving parts in photocells, and they all return to where they came from. There is nothing to wear out or waste, so solar panels can last for decades.

What prevents us from completely switching to solar energy?

Political factors are involved here, not to mention businesses lobbying for the preservation of the status quo.

But now let's focus on physical and logistical problems, and the most obvious of them is the uneven distribution of solar energy on the surface of the planet.

Some areas are more sunny than others. On cloudy days or at night, less solar energy is available.

Effective ways are needed to fully rely on solar energy generating electricity for all areas and efficient energy storage.

The efficiency of the photocells themselves is also a problem. If the sunlight is reflected instead of being absorbed, or moving electrons fall back into the holes before passing the chain, the photon energy is lost.

At the moment, the most efficient solar cell converts only 46% of the received solar energy into electricity, and most commercial systems are 15–20% efficient.

Despite these problems, it is possible to supply the whole world with energy at the current level of solar technology. This requires funding for the creation of infrastructure and a lot of space.

Estimates range from tens to hundreds of thousands of square kilometers, which seems like a big number, but only the Sahara desert is almost 8 million square kilometers. Meanwhile, solar panels are getting better, cheaper, and competing with electricity from a conventional grid.

And innovations like floating solar farms can completely change the landscape.

Leaving thought experiments, it is necessary to recognize the fact that more than a billion people do not have access to a reliable electric network, especially in developing countries, in many of which solar energy is abundant. So in these places, solar energy is already much cheaper and safer than available alternatives, such as kerosene.

Although, say, Finland or Seattle for the use of efficient solar energy while something is missing.