Powering the Future

▲ A helicopter lowers a worker to do repairs on a wind farm in Denmark. In Denmark, wind generates about 20 percent of all electricity. Globally, wind supplies less than one percent of electric power, but it's the fastest growing energy source.

Despite modern society's heavy dependence on fossil fuels for energy, most people are aware that the supply of these fuels is finite. As oil, in particular, becomes more costly and difficult to find, researchers are looking at alternative energy sources, including solar, wind, and even nuclear power. But which substitute—if any—is the right one?

Solar

Solar panels catch energy directly from the sun and convert it into electricity. One of the world's largest solar power stations is located near Leipzig, Germany, where more than 33,000 solar panels generate enough energy to power about 1,800 homes. But unlike the burning of fossil fuels, the process used to create all that solar energy produces no emissions.

Today, however, solar provides less than one percent of the world's energy, primarily because the cost of the panels is still very high. And price is only one issue. Clouds and darkness also cause solar panels to produce less energy, which requires one to have additional power sources (such as batteries) available.

Some scientists think the solution to this problem can be found in space—which they say is the ideal place to gather energy from the sun. With no clouds and no nighttime, a space-based solar power station could operate constantly. These stations would send the power back to Earth, which could then be turned into electricity for consumption.

Advocates of solar space stations say this technology would require a lot of money initially, but eventually it could provide continuous, clean energy that would be cheaper than other fuels. Also, unlike other energy sources, solar power from space will last as long as the sun shines and will be able to guarantee everyone on Earth all the energy they need.

A solar park near Leipzig, ▶ Germany, with more than 33,000 panels, is one of the world's largest.

Wind

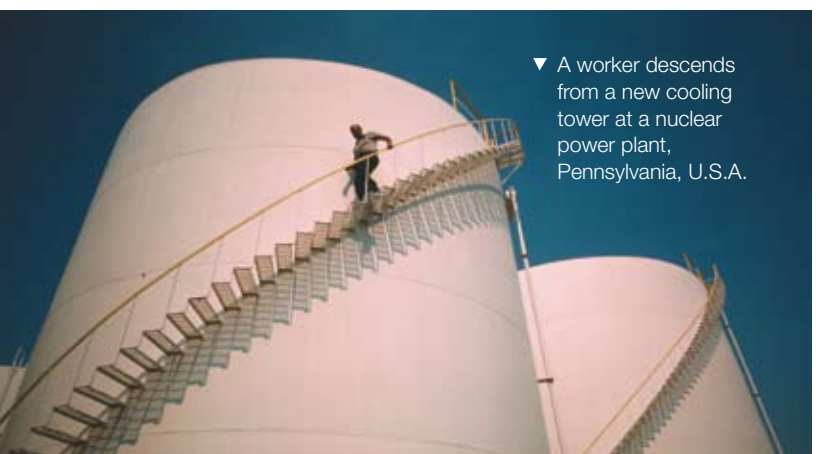
Wind—the fastest growing alternative energy source—is another way of collecting energy from the sun. Unlike solar power, however, it works well on cloudy days.

All over Europe, incentives designed to decrease the dependence on oil and coal have led to a steep increase in wind-powered energy. Today Europe leads the world in wind power, with almost 35,000 megawatts,[1] the equivalent of 35 large coal-powered plants. North America remains a distant second, with just over 7,000 megawatts.

Despite its successes, some oppose wind-power development, saying the turbines are both noisy and ugly. Just outside England's Lake District, a protected national park, 27 wind towers are planned, each about 40 meters (130 feet) tall. Many locals are protesting. "This is a high-quality landscape," says one local home owner. "They shouldn't be putting those things in here."

There are other challenges too. If the wind doesn't blow, the turbines don't have the capacity to produce sufficient energy. As a result, other power sources are needed. In contrast, a strong wind can create too much power. In cases like this, the energy company must sell the extra power at a much-reduced rate, which is not good for business.

What's needed for both wind and solar is a way to store a large energy surplus[2] so that it can later be turned into electricity. However, most systems are still decades away from making this a reality. On the plus side, both wind and solar enable people to generate their own energy where they live: people can have their own windmills or solar panels, with batteries for calm days.



▼ A worker descends from a new cooling tower at a nuclear power plant, Pennsylvania, U.S.A.

Nuclear

In the 1970s, nuclear was the energy alternative. Nuclear power produces vast amounts of electricity more cheaply than gas or coal, with no carbon emissions. For a number of years in the 1980s and '90s, however, use of nuclear power declined due to accidents, concerns about nuclear waste storage and disposal, and high construction costs.

Today, though, times are changing. Worldwide about 440 plants now generate 16 percent of the planet's electric power, and some countries have invested heavily in nuclear energy. France, for instance, gets 78 percent of its electricity from nuclear power. China has started to build one or two new plants a year, and Japan and India have also begun to utilize nuclear energy on a large scale. Though there are still concerns about the safety of nuclear power, many now believe it may be one of the future's greenest energy alternatives.

In the end, are any of these sources alone the answer to our current energy problems? The short answer is no, but used in some combination—along with other power sources—we may find ways to reduce and eventually eliminate our dependence on fossil fuels.

[1] A **megawatt** is a unit of power.
[2] If you have a **surplus** of something, you have more of it than you need; you have extra.