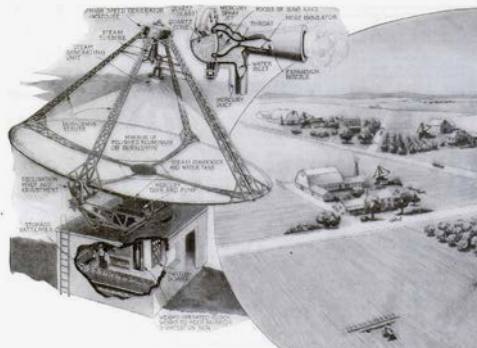


CENTENARIAN

Updating the science of the PopSci archives

BY BILL GOURGEY



harnessing the sun

• Robert Hutchings Goddard always had rockets on the brain. Of the early-20th-century inventor's 214 patents, the vast majority focused on catapulting us into space; those that didn't still had astronomical inclinations.

One such invention, published in *Popular Science* in November 1929, was for a solar generator to "supply abundant and cheap power" that could prove useful on Earth but that Goddard admitted he mainly intended for "interplanetary navigation." Unlike photovoltaics, which generate energy when the sun's rays liberate electrons from light-sensitive materials, Goddard's scheme concentrates the light to boil water in a turbine.

While Goddard did not invent the concept—known either as solar-thermal power or concentrating solar power (CSP)—he set in motion improvements that have helped make it a contender in our growing renewables arsenal.

The first CSP installation, opened in in Egypt in 1913, was wildly inefficient; only 4 percent of the sun's heat became electricity. (Burning coal hits 30–40 percent.) Goddard's design proposed improvements to reach 50 percent. But it would take more than five decades for his ideas to surface in the world's first commercial plants in California. The holdup: "Coal was just cheap and proven," says Cliff Ho, a senior scientist at Sandia National Laboratories who specializes in CSP. The tech has since come to compete economically with fossil fuels, Ho points out.

In the last two decades, more than 100 CSP

plants have been installed worldwide, employing variations on concepts traceable to Goddard: A field of reflectors concentrates sunlight onto an absorbent collector to warm a synthetic fluid or engineered salts to more than 1100 degrees Fahrenheit, the liquid pipes into tanks, and steam turbines convert the heat into electricity. The method reaches 30–40 percent efficiency. Ho's looking at compounds, including a novel sandlike ceramic, that cook even hotter to hit 50 percent.

Today, solar-thermal power represents only about 3 percent of sun-derived energy in the US. And if battery storage costs drop, Ho thinks solar will trend exclusively photovoltaic. But that doesn't mean CSP will become obsolete. Industrial processes, like those used to make cement and steel, require furnaces as hot as 1,800 degrees. "They're extremely expensive to electrically heat," Ho says. "That's an untapped market, and that's where I think CSP's future is."

November 1929

When a propeller plane graced our cover at the end of the 1920s, the idea of manually cranking the aircraft's motor to get it moving was on its way out. The issue showcased a new technology that used an explosive cartridge to spin the motor into action. The starter added only two pounds to the craft.

