

Watt's Happening? #261

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SOLAR *the quiet revolution*



Investment in solar is outstripping every other energy source. It's mostly invisible, it's quiet, it does not pollute, it enjoys high public acceptance, and solar costs less than anything else.

You don't see solar much. Oh, you might drive by a field of solar panels in southern Ontario or Germany, or you might notice that someone has some up on their roof, but mostly it's invisible.

Solar panels certainly don't attract attention. You can't smell them, they make no pollution. You can't hear them, they make no sound. They just sit there. You might think that nothing is happening, since we often think that power comes with a lot of noise, smoke and moving parts. But don't be fooled. It's a revolution.

Revolution? Yep. This year, the world will manufacture and install roughly seven billion solar panels. That's billion with a "B".

Globally, our 10,000 square kilometers of solar panels generate only about 6% of the electricity generated worldwide. But the growth of solar is now exponential, doubling every three years. In 2004 it took the world a whole year to install 1 GW (one billion watts) of solar. Today we are installing twice that amount every day. That's an energy revolution.

BIG BUSINESS

According to the International Energy Agency, an intergovernmental think tank, buying and installing solar panels is now the largest single investment category in electricity generation on the planet: \$500 billion this year alone.

The International Solar Energy Society calculates that solar power will generate more electricity than all the world's nuclear power plants by 2026, that all its wind turbines by 2027, than its hydro electric dams by 2028, its gas-fired generators by 2030, and its coal fired plants by 2032. By the 2040's, solar is on track to become humanity's largest source of primary energy (not just electricity).

WHY?

Cost. When demand increases, we make more solar panels, so the price falls, thus increasing demand, and so on. Early subsidies got this ball rolling about 20 years ago, and now it has taken off on a global scale. Solar is now the cheapest energy source ever, and falling.

Extrapolating exponential growth is always a risky business, but solar has out performed all predictions. In 2009 Greenpeace boldly predicted 921 GW of solar by 2030. We hit 1,419 GW last year.

Somehow, solar is different than all other energy sources. Of course the fuel, sunlight, is supplied free of charge, so that certainly helps.

The actual cost of fossil fuels, in spite of massive increases in use, has stayed pretty constant over the last few decades, while the true cost of solar since the 1960s has dropped by a factor of almost 1000.

SOLAR IS SIMPLE

The raw material for silicon solar panels is sand made of quartz, a crystallized form of oxidized silicon. The sand is melted at high temperature, cooled, dissolved in acid, and then repeatedly distilled to extremely high purity.

Cast into solid ingots, it is then sliced with a diamond saw into wafers about a fifth of a millimeter thick, polished and then "doped" to make it into what is essentially a semiconductor (like the chips in your computer) that are then cut into "cells" about 6 inches square.

Apply a thin network of wires on the front to pick up the electricity, sandwich about 70 cells

between sheets of tempered glass, and voila, a solar panel.

A solar panel (or module) about 3 ft. x 6 ft., will generate some 500 watts of power in direct sunlight – for 30 years plus! And they cost almost nothing to run.

ONE SIZE FITS ALL

Solar cells are a very standardize product. They are all the same, all made in the same way. No matter if you buy one panel to power your travel trailer or 100,000 to power a city, you are buying exactly the same energy-generating tech. You don't need different types for different applications. One size fits all.

SOLAR IS ACCEPTED

Solar also has a high level of public acceptance. Solar tends to disappear up on a roof, while wind turbines get bigger and higher and more massive. Covering arable land with solar panels is of course controversial and should be limited, but overall research finds that solar enjoys more "social license" than any other form of energy: more than wind, hydro, fossil or nuclear.

Add in the new and growing practice of Agrivoltaics (raising shade-loving crops or grazing within the solar farm enclosure) and public acceptance will only increase.

ENERGY STORAGE

Of course, the sun does not always shine, so solar is an intermittent energy source. Thus comes storage.

In the next issue of *Watt's Happening?* we'll explore the equally astounding energy storage revolution that is in full swing right now: batteries. With solar and batteries, we are literally changing the world.

(for more, see "The Sun Machines" in *The Economist*, June 2024.)

