

Watt's Happening?

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The end of energy



Planet Earth is powered by sunlight, about 9 million kilowatt-hours per year per acre. We too can live on

this perpetual energy income, no longer concerned with burning up our planet's expensive energy capital.

Making predictions about the future of energy is a risky business, but here goes: I predict that within fifty years, solar energy will become so invisible and so “everywhere” that it will disappear and be taken for granted like the air we breath. Energy will be everywhere yet nowhere. Like the money in your bank account, it will be virtual.

OLD ENERGY

Historically energy has been clearly tangible to the human senses. Wood can be harvested, cut with saws, and burned to create heat, light, smoke and ash. We understand gasoline as liquid energy that can be

pumped and stored in a tank. We know that a machine using that energy will make noise, emit exhaust, and generate heat, all made possible by a host of complex chemical reactions and interacting mechanical parts subject to wear and tear and needing perpetual maintenance.

The same for gas and oil: pipelines actually have something in them. Refineries and pump jacks are solid and tangible. The smell of the gases they release is even reassuring in a way: something real is happening here. I can smell it.

Energy in the traditional sense, then, is clearly real to our senses: we can see it, hear it, smell it, taste it, pile it, pump it and burn it. It has been that way for

a very, very long time, and we're comfortable with that.

NEW ENERGY

Now let's consider sunlight-generated electricity, or photovoltaic (PV) power. Its rapid adoption around the world is encouraged by its many advantages: it is modular, lending itself to mass production, ease of distribution and installation. With no moving parts it requires no maintenance, and lasts for many decades. It emits no polluting exhaust, and uses only sunlight for fuel, which pours freely from the heavens.

But how can thin sheets of metallic crystal actually do anything? While a solar panel is "working" I can't hear it, I can't see anything moving, there is no exhaust, no real heat and no light. I do not have to keep pouring a prepared fuel into it to keep it working, nor deal with the usual waste products and never-ending maintenance. Our senses say that solar power just can't be real and practical, and our lifetime of experience seems to confirm it.

Trying to make solar power "real" by explaining it isn't easy either. Einstein used quantum theory to explain the photoelectric effect, the first practical application of this new and (at that time) radical way of looking at things. For this he won the 1921 Nobel Prize in physics (not for his theory of relativity).

Essentially he said that we could think of photons as energetic golf clubs that "tee off" electrons from silicon atoms. As their kinetic energy lights lamps and turns fans, the energy is dissipated and the balls dribble back into the tee-off zone, ready for another circuit.

Nothing is used up in the PV process, and everything happens in the invisible realm of sub-atomic quantum mechanics, completely beyond our human senses and at the very edge of our understanding. Yet out pours electricity.

EVERYWHERE ENERGY

Planet Earth is powered by sunlight, including our weather and everything that lives. The amount of solar energy falling upon one acre of the Earth is about 9,400,000 kilowatt-hours per year. Today's PV cells can convert 15 to 20 percent of this energy into electricity, with a theoretical limit of about 50 percent. That's a lot of energy "income" for the harvesting.

About a million conventional solar roofs are being installed around the world every year, but the ball's just getting rolling. Already there are solar roof tiles, solar walls, solar windows, solar patio tiles and flexible solar panels. Soon, solar power will be invisibly integrated into every surface exposed to light: roofs, walls, windows, roads, sidewalks, cars and trucks, airplanes, clothing. Solar energy will be ubiquitous yet invisible, without apparent source. Always there, always available, always plentiful, like the oxygen in the air we breathe.

At that point we will be living on the Earth's income rather than its capital. It will be "the end of energy" as we know it. Energy will be invisible, yet as real and useful as the virtual money in your bank account. (But probably more plentiful, since the sunlight, unlike your bank account, will be automatically renewed every day.)

Watt's Happening? Quick Fact:

SASKATCHEWAN SETS 50 PERCENT RENEWABLES TARGET:

Saskatchewan Premier Brad Wall announced last month that his government has set a goal of sourcing half of its power from renewable sources by 2030. He hinted that the policy package might include solar incentives for homeowners.

