

Watt's Happening?

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More than a gadget

Just another portable radio? No, it's much more. It is a portable power supply for other electronic devices, and can charge its lithium battery with DC power, AC power, mechanical crank power or with sunlight from its large built-in solar panel. Efficient, inexpensive energy storage makes this possible.



All right. I admit it. I'm bit of a gadget guy. My most recent one, a portable emergency radio, amazed me more than usual. Here's why.

Our old portable kitchen radio was well past its useful life: broken antenna, power cord held in place with duct tape, scratchy reception. What with all the fire threats around, I happily had an excellent excuse to buy a new portable radio. What I got was quite a surprise.

Being a solar guy, I was pleased to see a large solar array covering the entire back of the radio. Put it in the sun for a few hours and it charges itself with sunlight.

It will also charge from a car cigarette lighter outlet, a normal wall socket, a rugged hand-crank, or a set of regular penlight dry-cell batteries (if you choose to be so primitive as to use disposable batteries).

But the real surprise was this little radio's ability to charge other devices: cell phones, tablets, laptops. Huh?

What made all this magic possible? It has quite a large built-in rechargeable lithium battery, that's what. It can supply energy storage for itself as well as other portable devices.

A small improvement, you might say. I disagree. Advanced battery technology will revolutionize the way we use and even think about energy, and this little hi-tech radio is a hint of what's to come.

ENERGY STORAGE THE KEY

If you've been reading *Watt's Happening*, you know that solar and wind power are coming on strong, much more quickly than anyone thought possible. Everyone from the U.S. Department of Energy to Greenpeace has consistently underestimated the growth of both wind and solar.

Global investments in renewables outstripped investment in new fossil energies for the first time in history two years ago, and is expected to capture two-

thirds of new investment dollars by 2030. Installed capacity of solar is doubling roughly every 2.5 years (now at 220,000 megawatts) and will quickly catch up to and exceed installed wind capacity (currently at about 440,000 megawatts).

With all this solar and wind coming on-line, our 1960's-era electrical grids are going to need help. Eventually we'll all have "smart grids" that are up to the challenge of the on and off nature of renewables, but for now, the big answer will be utility-scale energy storage that will smooth out energy supply and keep our old-fashioned grids happy.

South of the border, Democrats and Republicans don't agree on much, but they do agree on energy issues. Their new Energy Policy Modernization Act of 2016 provides \$500 million a year for 10 years to research and develop grid storage technology. Good move.

But the energy storage revolution has already begun, and the winners will share this brand new multi-trillion dollar market.

All electric vehicles (EVs) contain large lithium batteries, which account for about one third of their cost. As lithium battery production ramps up (which it is), prices will fall (which they are).

By 2020, battery costs will drop EV prices to be competitive with internal combustion engine cars.

At that point, EV sales will jump from their present 60% increase per year, to right off the scale.

NEW STORAGE TECH

Every month or so, it seems, a new energy storage technology is announced, each to fit a special need.

Solar or wind power is used to break down water into hydrogen and oxygen. When the sun goes down or the wind decreases, the gases are recombined in a fuel cell to produce more electricity. This is already available in home size and grid-scale.

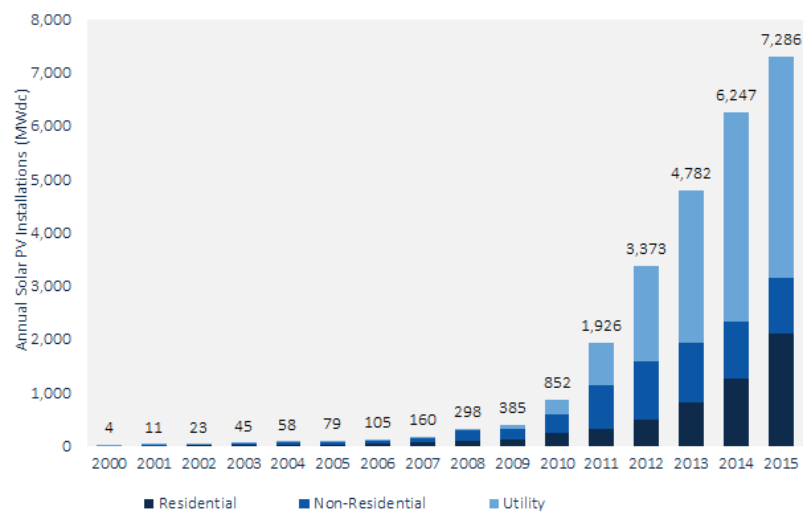
Flywheels are storing energy in commercial vehicles, compressed air is being pumped underground then released through compressed air generators, water is pumped high then run back down through generators, carbon nano-tube capacitor batteries can be recharged essentially instantly, millions of EVs when plugged in can be used to store grid power while earning their owners some cash . . .

Cheap battery storage will take many forms, it will change everything and it's advancing at breathtaking speed. It will be the final link in the chain that will create a strong, stable economy based on clean energy.

And I may never have to plug in my portable radio again.

Quick Fact: massive potential for roof-top solar

The U.S. National Renewable Energy Laboratory has recently assessed the potential for roof-top solar in America. If installers covered all suitable roofs with solar panels, they would generate 1,100,000 megawatts of power, roughly 40 percent of the electricity Americans consume. At the rate they're going, they could do it in 10 years.



Actual solar installed in the US.