Watt's Happening?

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Storing Energy . . . *and lots of it!*

Wind parks like this one near Dawson Creek, BC supply the grid with clean, emissions-free renewable energy, but suffer from variable output. This problem of intermittency from renewable sources is being solved by a variety of ingenious new energy storage technologies.

Birds do it. Bees do it. Plants and animals do it.

Adapt to energy variations, that is. Because the Earth spins, and spins on a titled axis, we have night, day and seasons. Most of the energy that makes life on this planet possible comes in waves and cycles. It is not constant, but intermittent.

Life has learned to adapt to these on and off cycles of energy in countless ways. Plants and animals store energy on a daily cycle and many animals store energy as fat during high-energy summers for hibernation through low-energy winters, or they migrate from low-energy to high-energy habitats. These adaptations have allowed complex life to thrive here for billions of years.

Humanity is moving towards a world powered entirely by the energies of nature, the endlessly renewable sun and wind. We are encouraged to do so by the threat of catastrophic climate disruption, and our dissatisfaction with a world where threatened wildlife and polluted air, water and land have become the norm.

But can we adapt, as other life has, to the intermittent cycles of renewable energy?

BATTERIES

To smooth out renewables, we have to learn how to store energy. We haven't had to work much on that for the last 100 years, because instead we have been releasing, through burning, the stored energy in fossil fuels. But now, with the global move to renewables, we are seeing huge leaps in energy storage technologies that will forever change the way we generate and use energy.

Edison invented the iron-alkali battery for his electric car some 100 years ago. Like the more common lead-acid battery (you have one to start your car), these were heavy, bulky, with a limited lifespan, modest storage capacity and contained toxic chemicals. We can do better, and we have.

Hybrid and fully electric cars now use lithium-ion batteries. Lithium is a much lighter metal than iron or lead, and has a higher "energy density," making lithium batteries lighter, smaller and safer than lead/acid – much better for mobile applications (your Smart Phone probably has one in it).

Even higher energy densities are possible with lithium-polymer batteries, opening up new applications undreamed of just a few years ago. The new Airbus E-Fan airplane, for instance, is powered entirely by battery-stored electricity. The E-Fan is a trainer plane, powered by two electric motors that drive ducted fans. The two-seater will fly for about 75 minutes, quiet and emissions free, before it has to land and recharge, and the lithium-polymer batteries are good for thousands of flights. Similarly, the all-electric E-volo Volocopter, a two person chopper for in-city commutes, made its maiden flight last year – once again, quiet and emissions-free. These are the FIRST, the Model T's of electric planes.

Just wait.

AND MORE BATTERIES

"Stationary" batteries are designed to sit in one place to store and release large amounts of electricity thousands of times. Lead-acid batteries have been the standard for stationary batteries for . . . well, forever. But not much longer.

The new Aqueous Hybrid Ion (AHI) battery is poised to revolutionize both large and small-scale energy storage. The AHI battery uses salt water-based electrolyte, so it is non-toxic, low-cost, high capacity and has a long life cycle. Plus it can be easily scaled down for home use or scaled up for the grid.

Batteries. I could go on . . .

In fact, I think I will. How about the "organic" battery that is entirely non-toxic and uses the same processes that living cells do to store and release energy? Or the Siemens hydrogen battery that electrolyzes water then re-combines the hydrogen and oxygen to re-release the energy, aimed at large-scale grid storage. Or the chemical-free flywheel battery being used in buses, the compressed air battery being used in cars, or the "super-capacitor" battery that never wears out and charges in just a few seconds. These are not whacky ideas, but highly efficient, practical technologies now entering the new trillion-dollar energy storage market.

Can we wean ourselves off of fossil fuels and adapt, as other life has, to the intermittent cycles of renewable energy? Can we create new, highly efficient ways of storing energy on a global scale?

Of course we can!

Quick Facts:

INDIA PLANS NATIONAL CLEAN ENERGY STRATEGY: India is preparing a German-style national renewable energy policy that should be in force by next February. The policy will feature a national feed-in-tariff that would rapidly accelerate solar adoption in preparation for phasing out its reliance on coal. India's new prime minister has vowed to place a solar panel on every home by 2019.

US/CHINA CLIMATE DEAL BIGGEST IN HISTORY: under this recent agreement, China has committed to investing the equivalent of 800 Site C dams into renewables (mostly solar, wind and biomass), over the next 20 years, while phasing out the equivalent amount of coal power. Now that's a deal!