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This Issue :

Google Energy Facts

- Google uses enough energy to continuously power 200,000 homes
- Google accounts for roughly 0.013 percent of the world's energy use
- One Google search is equal to turning on a 60W light bulb for 17 seconds
- YouTube can stream for three days on the energy it takes to make a DVD
- Google's carbon footprint is zero (after offsets)

Source : www.techland.time.com

Quantum Dots:

A New Nanohighway to Renewable Fuels

Using just CO_2, sunlight and water (and some math right off Einstein's blackboard) researchers come up with a potential game-changing technology for making renewable fuels. The hunt is on for technologies that use carbon dioxide and non-potable water since they are available in such tantalizing abundance. The National Science Foundation's division of Emerging Frontiers in Research and Innovation, widely known as EFRI, made a $2 million grant to a group of researchers led by Lehigh chemical and bioengineering professors Steve McIntosh and Bryan Berger, in a project that aims to make methanol using only carbon dioxide, sunlight and water. The project utilizes a new low cost technology that McIntosh and Berger developed to produce low-cost quantum dots from bacteria. A quantum dot is a really tiny crystal, so small (in the 5 to 50 nanometer range, at the low end roughly equivalent to the smallest transistor ever made) that the crystal begins to exhibit properties associated with quantum mechanics. Specific to fuels, when a photon, arriving on planet Earth after an eight minute journey from the Sun, happens to strike a quantum dot (instead of say, a plant's light harvesting mechanism) — it produces an excited electron (which is to say, an electron in a higher energy state than the garden variety electrons that power your computer). Two things make this effect important for the production of fuels. First, there's no limitation imposed by photovoltaic or photosynthetic efficiency — you get one electron for every photon. Second, the Lehigh team has theorized that these excited electrons catalyze the removal of hydrogen from water and carbon from CO2, and produce methanol in a

Supercapacitors as an Alternative to Batteries

Imagine charging your cell phone in just a few seconds. Or consider how transportation would be transformed if it took only a few minutes to fuel up an electric car.

The technology for rapid-fire power-ups has been around for decades—in supercapacitors. Supercapacitors not only charge faster than batteries, they last longer because they don't suffer the physical toll in charging and discharging that wears down batteries. They also have a number of safety advantages. However, supercapacitors' super size—they have to be much larger to hold the same energy as batteries—and their super-high cost have held them back.

But a number of scientists believe that recent breakthroughs put the fast, reliable, and potentially safer power storage in supercapacitors, sometimes known as ultracapacitors, well within reach of competing better with batteries.

Batteries take a long time to charge, are relatively heavy—a big problem for the electric car market—and their safety often arises as an issue. Fires involving batteries earlier this year also helped temporarily ground Boeing's new Dreamliner. In one of the worst tragedies traced to battery failure, two crew members died in the 2010 crash of a UPS airplane in Dubai that investigators tied to flames rising from a cargo of batteries. The dangerous pitfalls of battery use are part of what's helping boost renewed interest in supercapacitors.

Instead of the chemicals that make batteries difficult to manage, supercapacitors use a sort of static electricity for storing power. That means their performance is more predictable, their materials are more reliable and less vulnerable to temperature changes, and they can be fully discharged for safer shipping .

New materials might help supercapacitors compete better on energy density. Many scientists are focusing on graphene, carbon that is only one

Gaspar Makale : The Solar Trainer

Gaspar Makale was one of the pioneers of solar electrification in East Africa.. During the 1990s he was the Chief Solar Technician at the KARADEA Solar Training Facility (KSTF) .

During the following decade KSTF gave regular three-week long training courses which were attended by people from all over East Africa (Tanzania, Kenya, Uganda, Somalia) as well as from further afield. Gaspar Makale managed the practical sessions as well as arranging for the field trips during which course participants installed solar electric domestic systems in the Karagwe district.

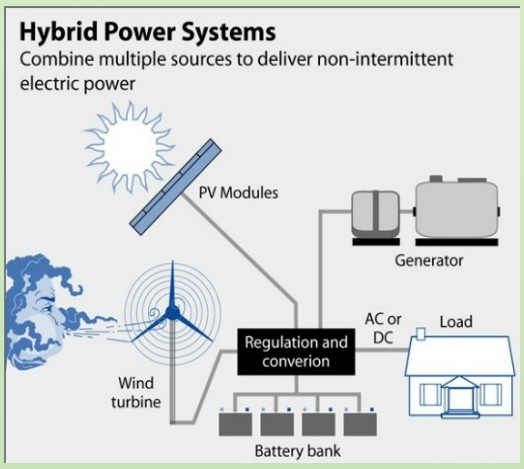
Gaspar Makale was also involved in other solar training courses in Tanzania, such as the one held at Wasso Hospital, Maasailand, Tanzania. Course participants, many of whom later went on to set up solar businesses and work in the growing East African solar industry, got their first hands-on experience of installing solar electric systems under Gaspar Makale's experienced and expert guidance. He installed an Ampair Hawk 100 wind turbine at KSTF for charging batteries, the first wind turbine installed in that part of Tanzania.

While working with KSTF, Gaspar Makale installed numerous solar systems in local schools, hospitals, clinic refrigeration systems, two-way radio systems, domestic lighting systems. He also installed systems in the refugee camps that sprung up in Karagwe after the Rwanda genocide in 1994. He also ran a solar-powered disco in his own village.

Gaspar Makale also worked closely with Harold Burris of Solar Shamba, one of the very first people to see the potential of solar electricity in East Africa .

Hybrid Wind and Solar Electric Systems

According to many renewable energy experts, a small "hybrid" electric system that combines home wind electric and home solar electric (photovoltaic or PV) technologies offers several advantages over either single system. In much of the United States, wind speeds are low in the summer when the sun shines brightest and longest. The wind is strong in the winter when less sunlight is available. Because the peak operating times for wind and solar systems occur at different times of the day and year, hybrid systems are more likely to produce power when you need it.



Many hybrid systems are stand-alone systems, which operate "off-grid" i.e. not connected to an electricity distribution system. For the times when neither the wind nor the solar system are producing, most hybrid systems provide power through batteries and/or an engine generator powered by conventional fuels, such as diesel. If the batteries run low, the engine generator can provide power and recharge the batteries.

Adding an engine generator makes the system more complex, but modern electronic controllers can operate these systems automatically. An engine generator can also reduce the size of the other components needed for the system. Keep in mind that the storage capacity must be large enough to supply electrical needs during non-charging periods. Battery banks are typically sized to supply the electric load for one to three days.

A new study by the Reiner Lemoine Institute and Solarpraxis AG study examined the surface area where solar photovoltaic systems and wind turbines were installed together. In that same surface area, twice the amount of electricity was being

India to build world's largest solar power plant in Rajasthan

India will build the world's largest solar plant to generate 4,000 MW from sunlight near the Sambhar lake in Rajasthan that will sell electricity at an estimated rate of □ 5.50 per unit.

The proposed solar project's capacity is about three times India's total solar power capacity and comparable with coal-fired ultra mega power projects of Tata Power and Reliance Power. According to a Government statement, being the first project of this scale anywhere in the world this project is expected to set a trend for large scale solar power development in the world.

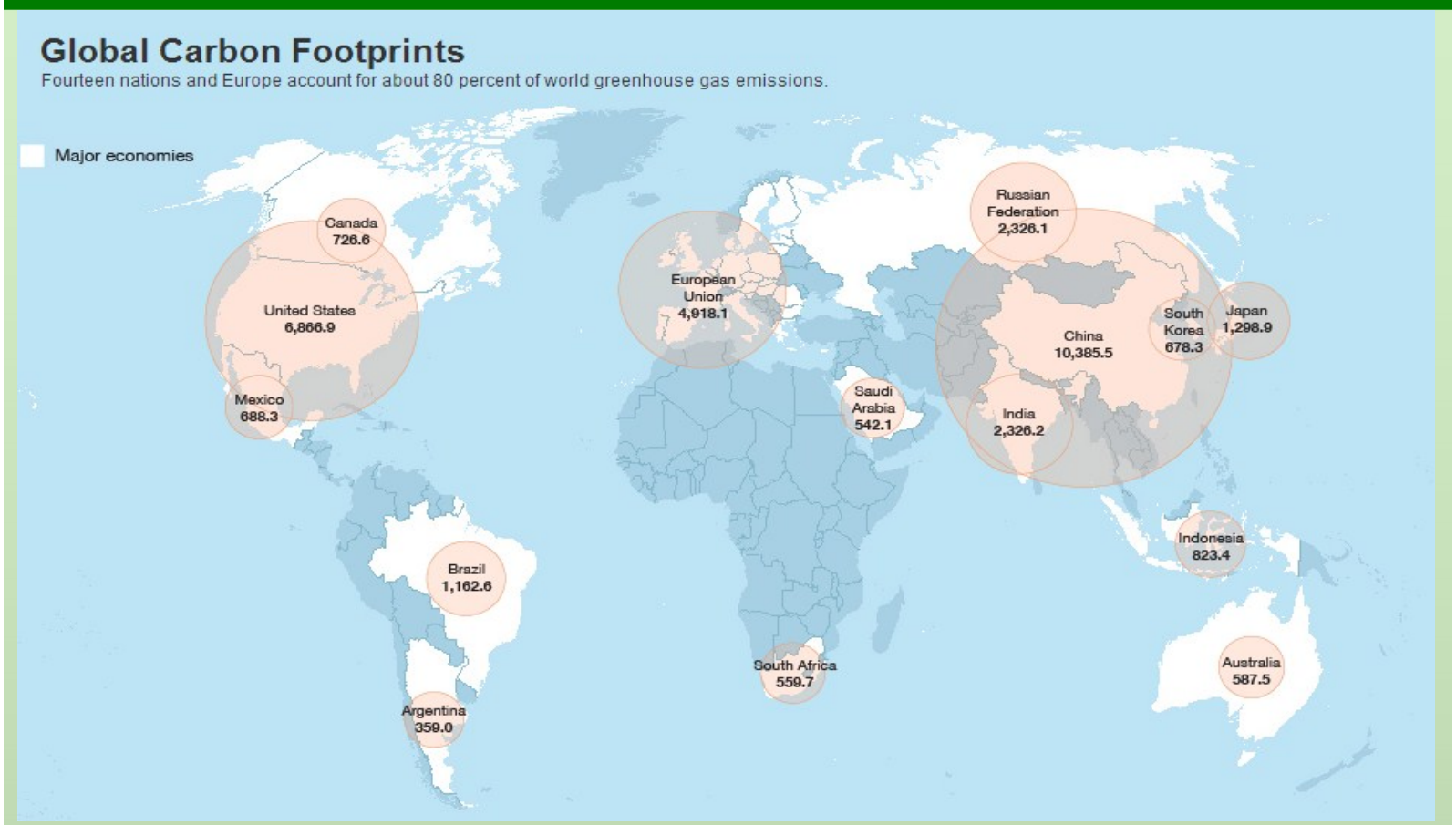
It would be set up and run by a joint venture of five public sector utilities Bhel, Powergrid Corporation of India,Solar Energy Corporation of India, Hindustan Salts limited and Rajasthan Electronics & Instruments Limited.

The first phase of the project, which would be 1,000 MW is expected to be commissioned in 2016. The project would 23,000 acre of land out of which 18,000 acre would be provided by Hindustan Salts limited. The tariff is expected to be competitive.

Government is considering a tariff of □ 5.50 per unit of solar power generated for this project. Notably, □ 5.50 per unit would be the lowest ever tariff for solar power in the country, which is expected to be the benchmark reference tariff for the upcoming phase of the national solar mission as well.

The current cost of solar power in the country is around □ 7 per unit. With the project setting the benchmark cost □ 5.50 per unit, it is expected to bring down the cost of solar power further.

Solar Energy Corporation is also trying to get a part of viability gap funding from national clean energy



COMIC SENSE

CONFERENCE ALERT

- **Wind power Monthly 4th Annual Offshore Cables Forum 2014**

  Date: 12–14 February 2014

  Location: London, United Kingdom

- **10th South-East European Congress & Exhibition on Energy Efficiency and Renewable Energy (EE & RE)**

  Date: 5–7 March 2014

  Location: Sofia, Bulgaria

QUIZ

1. What does UNFCCC stand for ?
2. When and Where was the first Earth Summit held ?
3. Which country is the largest producer of Wind energy ?
4. When is Ozone Day celebrated ?

Send your entries to *mnit.energyheadlines@gmail.com*

We received an overwhelming response this time , so we had to decide the winners by a lucky draw. The winners are : Aakash Bhatia (B.Tech ,III Year, Chemical Engg.)

Dinesh Mutha (B.Tech ,III Year, Civil Engg.)

CREDITS

- **Amit Kumar Aman** (II Year, Civil Engg.)
- **Bhupendra Pratap Singh** (II Year, Mechanical Engg.)
- **Kundan Kumar Gupta** (II Year, ECE)
- **Mayank Singhvi** (II Year, ECE)
- **Rupesh Kumar** (II Year, Metallurgical & Materials Engg.)
- **Dr. –Ing Jyotirmay Mathur**

(HOD , Centre for Energy and Environment)

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