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News. December, 2016. Issue #56. 98,000 ESB video views. ***Low-Cost*** *100% Renewable by 2035.*

Only when our clever brain and our human heart work together in harmony can we achieve our true potential. - Jane Goodall

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Moving to 100% Renewables

Google: "100% Renewable is Just the Beginning"
Part 1: 100% Renewable in 2017 Worldwide
Google will buy on an annual basis the same amount of … renewable (electricity) as the amount of … electricity that we consume for our operations around the world… Google is the largest corporate renewable energy buyer on the planet, directly purchasing 2.6 gigawatts (GW) of renewable energy. We've signed renewable energy contracts in five countries across three continents…
(Press release and white paper, both G. See part 2 in Open Markets below)
https://environment.google/projects/announcement-100/
https://static.googleusercontent.com/media/www.google.com/en//green/pdf/achieving-100-renewable-energy-purchasing-goal.pdf

Solar Now Cheapest Electricity in Emerging Markets
… unsubsidized solar is beginning to out-compete coal and natural gas on a larger scale, and notably, new solar projects in emerging markets are costing less on average than wind projects, according to fresh data from Bloomberg New Energy Finance… (G)
http://www.japantimes.co.jp/news/2016/12/18/business/world-energy-hits-turning-point-solar-thats-cheaper-wind

"The Cleanest Energy is the Cheapest"
This balanced, readable, and nuanced article looks at recent news' claims that "solar power is now the cheapest energy." *No such fairy dust exists; different sources perform differently in different economies and different electricity systems. What can be said about solar is that it is rapidly increasing the range of circumstances under which it can compete on costs, without subsidies.*

What evidence supports that? First, because of low energy costs, *emerging nations… are now investing more in renewable energy and installing more renewable energy capacity than developed nations.* (see article above on Solar Now Cheapest…)

Second, Lazard's just released 10th edition of their excellent annual report on levelized cost of energy (LCOE) shows that new US utility-scale solar plants have lower LCOE than new gas plants. *Both onshore wind and solar PV have seen insane drops in cost over the past eight years — 66 and 85 percent, respectively.*

And, *in … emerging nations … electricity demand (is) rising quickly. They need new electricity generation, and when one surveys the options for new power plants, renewables look really good.* In emerging nations, renewables are not competing with existing fossil and nuclear plants.

But in the developed world, f*or the most part, we have the electricity we need, which means that new electrical generation capacity often displaces existing capacity.* And this leads to cries by the utility industry for bailouts of existing fossil and nuclear plants.

Bottom line: *the hyped headlines are a little out ahead of the facts. But the hype itself is warranted. Solar is winning.* (Article: G. Lazard Analysis: VG)
http://www.vox.com/science-and-health/2016/12/22/14022114/solar-year-two-remarkable-facts
https://www.lazard.com/perspective/levelized-cost-of-energy-analysis-100/

Open Electricity Markets

"Open" = fair, competitive, deregulated, or choice markets. Avoid "Enrons" by insuring lots of competition. A city or county chooses default suppliers. Individual and businesses can opt-out directly to the market.

Google: "100% Renewable is Just the Beginning"
Part 2: Consumer Choice To Help Google Power Operations on a 24-7 Basis
…we will work to achieve the much more challenging long-term goal of powering our operations on a region-specific, 24-7 basis with clean, zero-carbon energy…

First, …we will focus even more on regional renewable energy purchases in the local markets where we have data centers and operations. Second, we'll broaden the scope of energy sources to include technologies or services that enable 24-7 clean energy. And third, we'll work to promote policies that empower energy consumers to choose their energy supply, which we believe will help accelerate the transition to a 100% clean electricity grid while also driving economic growth. (Emphasis added. Press release and white paper, both G)
https://environment.google/projects/announcement-100/
https://static.googleusercontent.com/media/www.google.com/en//green/pdf/achieving-100-renewable-energy-purchasing-goal.pdf

Energy Storage and Miscellaneous

The State of US Energy Storage - Massive Growth or Bubble?
An excellent analysis and presentation in about 7 pages and 7 charts. A few nuggets:
1) Storage increasingly benefits from many different value streams (see Massachusetts… article below).
2) The Aliso Canyon gas catastrophe dangerously reduced California's ability to respond to summertime peak usage. Storage to alleviate the issue went from problem to online in less time than it takes to just site a gas turbine - never mind build one. The ability to quickly build storage is a major advantage over traditional generation.
3) The Federal Energy Regulatory Commission (FERC) just proposed rules to treat storage fairly in wholesale markets. (G)
https://www.greentechmedia.com/articles/read/The-State-of-US-Energy-Storage-in-7-Slides

Massachusetts Energy Storage Study - Storage Should Save Ratepayers $2.3 Billion
The modeling results show that up to 1,766 MW of new advanced energy storage would maximize Massachusetts ratepayer benefits. The results show that this amount of storage, at appropriate locations with sizes defined by system requirements and dispatched to maximize capability, would result in up to $2.3 billion in benefits. These benefits are cost savings to ratepayers from:
- *Reducing the price paid for electricity*
- *Lowering peak demand by nearly 10%*
- *Deferring transmission and distribution investments*
- *Reducing GHG emissions (reducing the effective cost of compliance)*
- *Reducing the cost to integrate renewable generation*
- *Deferring capital investments in new capacity*
- *Increasing the grid's overall flexibility, reliability and resiliency*

(Study: PG)
http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf

Liquified Air Energy Storage (LAES)
Highview Power Storage has built a 3-hour, 5 MW storage system that liquifies and later re-gassifies air. It is expected that the roundtrip energy efficiency of a standalone plant will be 60% (as compared to 80 to 90% for most battery systems). This particular system is colocated with landfill methane gas generators. This allows the LAES system to use the generators' waste heat to improve the roundtrip efficiency. It is anticipated that in full production this use of waste heat will raise the roundtrip electrical efficiency to 70%. (Article. The 4-minute video on the company's website is worthwhile. Both G)
http://www.bbc.com/news/science-environment-37902773
http://www.highview-power.com