Watt's Happening? #221

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Busting more
ENERGY MYTHS

If you think battery-electric transportation is not reliable or powerful, think again. CN has just announced the purchase of its first battery-electric freight locomotive from Wabtec, part of the rail company's efforts to reduce freight transportation emissions.

Solar and wind power have become dramatically cheaper over the last few years, and their share of overall electricity generation has grown accordingly.

Along with that energy growth has come the growth of myths about renewables, mostly around their dependability compared to conventional energy sources. Let's take a moment and bust the heck out of some energy myths!

MYTH 1:
More renewables means less reliability.

Germany, which now supplies almost half of it's electricity from renewables, boasts a grid that is one of the most reliable in Europe and the world,

Grid reliability is measured in the tongue-twisting name of "System Average Interruption Duration Index" (SAIDI), which measures the average power outage duration experienced over a given year.

In 2020, SAIDI was just 15 minutes in Germany. Since 2006, Germany's renewable energy generation has nearly quadrupled, while its power outage rate was nearly halved.

Similarly, the Texas grid became more stable as its wind capacity sextupled from 2007 to 2020. Today, Texas generates about one fifth of its total electricity from wind, more than any other U.S. state.

MYTH 2:
Because solar and wind are variable energy sources, they cannot form the basis of a grid that needs power 24/7

No source of electricity runs 24/7, 365 days a year. Running a grid means taking into account the variability of ALL energy sources.

Nuclear plants (often thought of as very reliable) are typically out of action for seven to 12 percent of the time. In France, which is heavily dependent on nuclear, the average down time was 96 days per year in 2019 and continues to rise. In 2020 French reactors provided only 65% of their rated capacity overall.

Then there was the Fukushima disaster in Japan where some 40 reactors were suddenly shut down either permanently or indefinitely.

Large amounts of solar and wind tend to increase reliability since they tend to work dependably at different times of the day and year, making short falls LESS likely.

Remember, wind and solar facilities are composed of many, many small, identical generators. If a few wind turbines in a wind farm or a few solar panels in a solar farm have to be shut down for repair or replacement, the rest of the generators just keep on working.

Modern grid operators prefer diversity and flexibility of energy sources rather than the older reliance on less flexible "base load" sources like hydro, nuclear or coal. Good to have some, but don't rely on it if you want a truly stable and reliable grid.

MYTH 3:
With a grid relying heavily on renewables, vast amounts of energy storage will be needed.

What is called "smart charging" of electric vehicles (charging them when clean energy is most abundant and affordable) can almost eliminate the need for other sources of storage. Just EV batteries!

Recent studies have shown that smart charging from a grid heavily populated with electric vehicles could enable Texas in 2050 to use 100 per cent renewable electricity without needing any giant batteries at all.

Similarly, the dark cold winters of Europe would need only one or two weeks of renewable derived back-up fuel to provide the six percent of their winter shortfall – not a big deal.

> The "smart charging" of millions of electric vehicles could come close to eliminating the need for any other form of energy storage!

EFFICIENCY:
Doing more with less

Even more important than storage is energy efficiency, and we have a along way to go there for sure.

Efficiency reduces demand, especially during periods of peak use. Buildings that are more efficient need less heating or cooling and change their temperature more slowly so they can coast longer on their own thermal capacity.

Think of the Passive House concept, where almost no heating or cooling is needed even in the heat of summer or the cold of a northern winter. A little energy efficient heat pump for a touch of heating and a touch of cooling, running off a small solar array on the roof, and you have building that is very easy on the grid indeed.

In short, electrical grids can easily deal with a much larger fraction of renewables. Some European countries with little or no hydro already get half or more of their power for renewables, with grid reliability better than most anywhere in Canada or the U.S.

It's time to put the myths aside and get to where we are going as quickly as possible: a fully electrified world powered by cheap, reliable, renewable energy.