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Cost Of Decarbonizing U.S. Power Grid Put At $4.5 Trillion

John Parnell Contributor Energy I cover the international renewable energy sector, especially solar.

Decarbonizing the U.S. power grid rapidly will cost $4.5 trillion, according to a new report from the energy consultancy and research firm Wood Mackenzie.

For context, the 2018 U.S. military budget was $700 billion.

A huge rollout of wind and solar power generation, a reinforced transmission network and the vast deployment of energy storage will be required. Of the $4.5 trillion, the lion's share is for the estimated 900GW of storage capacity required.

Mountains stand beyond solar modules at the Southern California Edison (SCE) solar array in Porterville, California, U.S., on Thursday, Feb. 17, 2011. Photographer: Ken James/Bloomberg

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The report by Wood Mackenzie found that by slowing down this process, to a conclusion in 2050, the cost can be severely curtailed. This is largely due to the benefit of falling costs in energy storage hardware, as well as those of wind and solar. Both of the latter are further along their cost reduction curves than energy storage.

“The mass deployment of wind and solar generation will require substantial investments in utility-scale storage to ensure grid resilience is maintained,” said Dan Shreve, head of global wind energy research at Wood Mackenzie.

In total, more than 1,600GW of new solar and wind power is required. There is currently 130GW installed.

"The challenges of achieving 100% renewable energy go far beyond the capital costs of new generating assets. Most notably, it will need a substantial redesign of electricity markets, migrating away from traditional energy-only constructs and more towards a capacity market."

While the investment figures, which are the equivalent of $35,000 per American household, are astounding in isolation, Wood Mackenzie’s director of Americas power research Wade Schauer suggests the first part of this challenge may be relatively simple. "Over the past six months, Wood Mackenzie analyzed actual hourly wind and solar generation patterns from all major U.S power markets. The data suggest that reaching 50% of supply from intermittent renewables system-wide is relatively straightforward in most of the U.S.

"Above 50%, integration challenges accelerate rapidly. Achieving full decarbonization will require long-duration energy storage, and the electric grid will need to roughly double its capability."

Purists determined to see 100% renewable energy may be persuaded by the dramatic cost reduction impact of switching to a mix of 80% renewables and 20% from existing natural gas assets. When modeled, this combination lowered the cost of renewable energy by 20% and knocked 60% off the bill for energy storage assets.

The cost of doing nothing to reduce emissions also throws out some rather large numbers. An assessment of the cost of climate change to the U.S. under a business as usual scenario totals hundreds of billions. Annually. That covers coastal property losses ($118 billion) and heat-related deaths ($141 billion).

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I am the head of content at Solar Media, a publishing and events company rooted in solar, energy storage and the technologies and business models driving us towards low ...