

ENERGY & ENVIRONMENTAL POLICY TRENDS

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CHEAP RENEWABLES HAVE ARRIVED

The recently released International Energy Agency's *World Energy Outlook 2020* turned some heads in declaring: "Solar is the new king of electricity." In this Policy Trends, we highlight how we got here and what it means for future electricity systems.

As more and more countries around the world announce net-zero emissions ambitions, it is clear electrification of more parts of the economy — from transportation, to buildings, to industry — will require ever greater supply of low- or zero-emissions electricity. The decline in renewable energy costs offers some optimism for their role in such future electricity supply.

Lazard's (2020) recently released levelized cost-of-energy analysis highlights the dramatic decline in solar and wind costs over the past 10 years: wind costs falling by 70 per cent and solar by 90 per cent!

Perhaps more significantly, the levelized cost of wind and solar — a measure which includes cost to construct and operate power plants — has now reached parity with the marginal cost of efficient natural gas plants (Figure 1). This suggests building new renewables is now cheaper than operating existing fossil power plants.

The main drivers of cost reductions in solar energy projects are improvements in PV module prices, advancements in solar technology and an increase in global average capacity factor (actual energy production relative to potential) (IRENA 2019). Similarly, cost improvements of wind projects are driven by lower turbine prices, more efficient operations and maintenance, and a better global average capacity factor. Additionally, low costs of financing have helped these capital-intensive projects become cheaper (IRENA 2019).

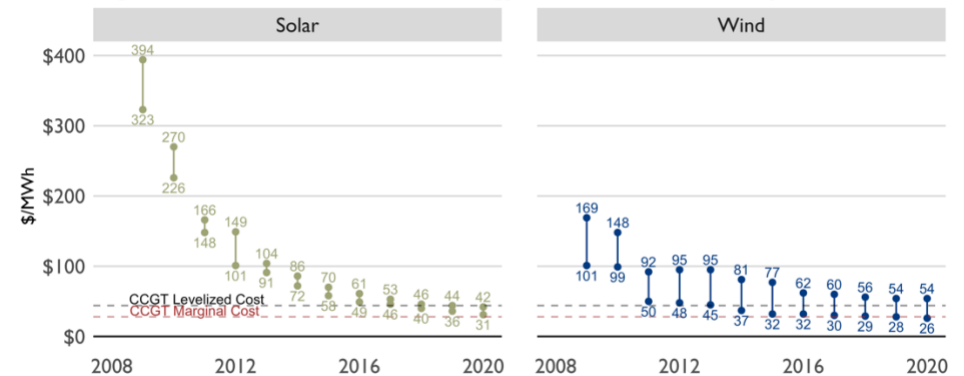
Despite their low costs, wind and solar still have a long way to go before they are the dominant sources of energy. In 2018, renewables accounted for only 8.5 per cent of total global energy supply (BP 2019). Despite their small share of supply, renewable energy investment growth — 97 per cent of which is in wind and solar — is outpacing any other energy source at 7.6 per cent per year (UN Environment 2019).

But low cost is only half the battle. For renewables to take centre-stage in electricity, markets will require grids that can turn this increasingly cheap and clean source of raw energy into the on-demand power consumers require.

To that end, there are several options.

First, storage technology, in the form of batteries, compressed air, pumped hydro and even concrete blocks lifted by a crane (yes, it's true!), offers the potential to directly transfer power when the wind is blowing and the sun is shining to times when it is needed. Here too we see

Figure 1: Levelized cost of energy for solar and wind power



Source: Lazard Levelized Cost of Energy Analysis (LCOE 14.0)

promising signs of dramatic cost declines, riding the wave of investment into battery technology for electric vehicles.

Second, enabling more demand response is another way to benefit from cheap renewables. Rather than dispatching supply to meet demand, future electricity systems will benefit from dispatching flexible demand to meet intermittent supply.

Third, the ability to transmit power from areas of abundance to those without can greatly improve the reliability of an increasingly renewable-based grid.

And last, firm low-emissions supply will be an essential component of reliable energy systems. Whether it comes from biomass, new nuclear reactors or hydrogen-peaking plants will be an interesting area to watch.

Renewables are about to have their moment. Low costs and more urgency to decarbonize offer a bright future for this source of electricity. While the past 10 years have focused on making renewables cheap, the next decade will be squarely focused on integrating them into reliable electricity systems.

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