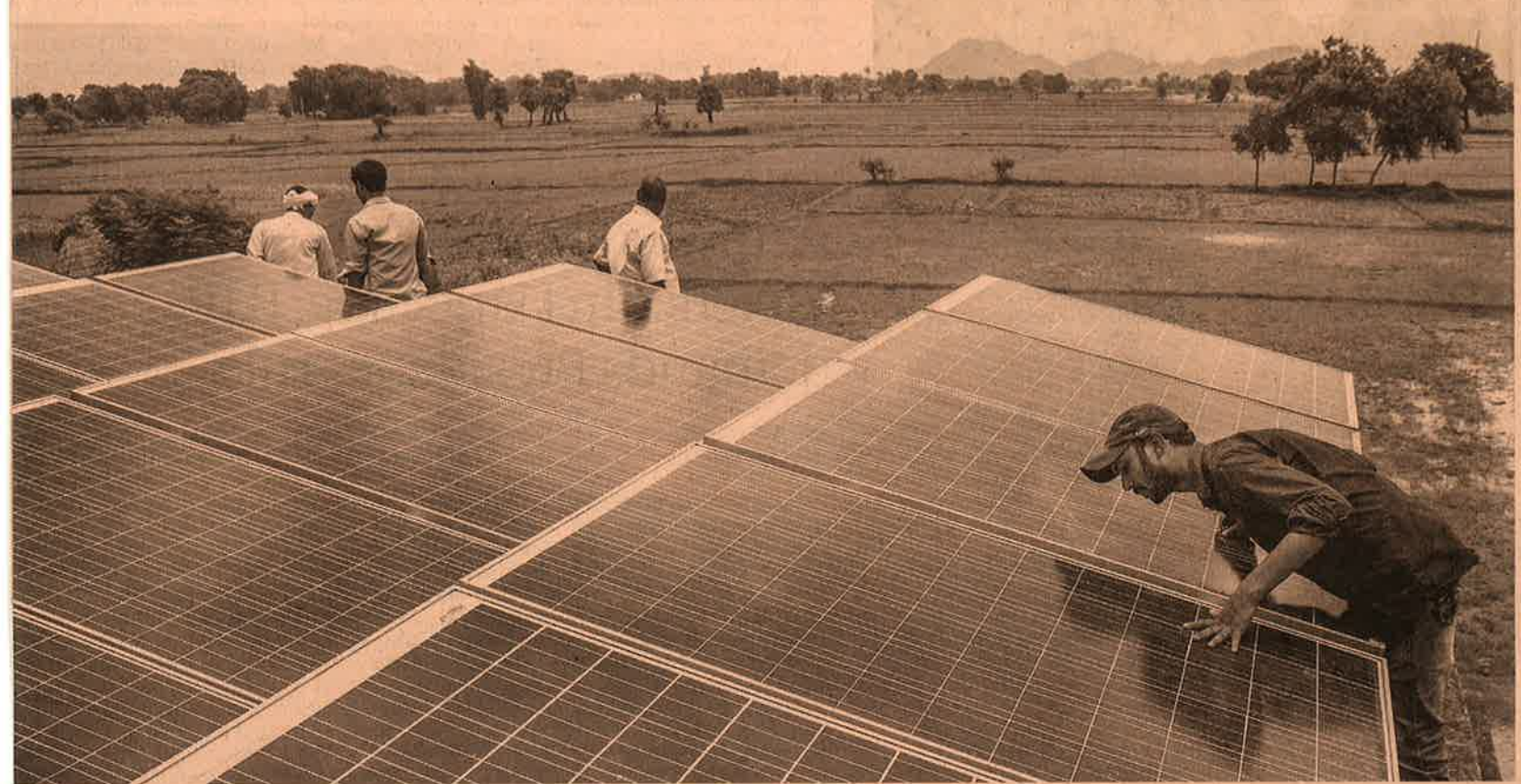


# The case for boosting solar energy

A bigger role for solar power will not only mitigate the country's pollution risks, but also help it develop sustainable energy sources and deliver on its climate change commitments



An employee inspects solar panels, part of a solar power microgrid in a village in Bihar. India has set ambitious targets for its solar energy programme

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Contrary to expert opinions and projections, solar power in India continues to break records and the recent price of ₹2.44/kWh in the Bhadla Solar Park, Rajasthan is an unprecedented low. Grid-parity has arrived earlier than expected. Solar power now is around 18 per cent cheaper than coal-based generation in comparable capacities. This has set alarm bells ringing in the thermal power plant (TPP) sector, where plant load factors (PLFs) have dropped from 76 per cent in 2011 to around 58 per cent currently.

Recently, some observers have argued that the aggressive growth of solar in India will further reduce PLFs of TPPs to less than 50 per cent, leading to defaults on the huge debt that finances these projects. In order to prevent such adverse effects on financial institutions and hence on India's economy, this school of thought recommends curtailment of the growth rate of solar so that TPPs can operate at higher PLFs.

These observers also correctly state that regulations provide implicit and explicit subsidies and give preference to solar when supply exceeds demand. However, the true cost of solar today without any subsidies is around ₹4/kWh thanks to the drastic fall in module prices, accessibility to low-cost international finance and accurate generation forecasts. It is much lower than the ₹6/kWh generally mentioned. Also, such claims fail to reveal the hard truths about coal-based generation. Instead, an unlikely and uncorroborated prediction has been made that solar prices will fall further if India slows down in her pursuit for solar.

Since the inception of the Industrial Revolution in 1760, coal and other fossil fuels have been burnt to fuel "development", causing irrevocable and in most cases irreparable damage to the environment. Studies show that TPPs have contributed heavily to global

warming, air pollution and human health hazards. Mining of coal severely impacts the environment, resulting in irreversible, detrimental changes to local ecological systems. Considering these externalities and factoring them into levelled cost of electricity (LCOE) calculations for coal, research has shown that the unit price is more than double the figure (₹1.77-4/kWh) that has been quoted.

For centuries, the coal industry has reaped the benefits of exploiting natural resources while emitting greenhouse gases incessantly. The world is finally waking up and trying to take corrective measures, with India spearheading a solar revolution. The government

**The coal industry has long provided fuel for the power sector, which has been emitting greenhouse gases. By way of corrective action, India is spearheading a solar revolution**

is making a concerted effort to meet demand using renewable energy (RE) after recognising that the opportunity cost of not pushing solar is higher if coal externalities are factored in. The incentives being offered to solar compensate for this and reflect the true cost of coal.

More than 50 gigawatts (Gw) of the 243 Gw planned coal power plants in India have been shelved and this is a blessing in disguise. Not only will pollution risks be mitigated, but also, the commitments made by India towards sustainable energy security scenarios will no longer be questioned in international forums and discussions regarding climate change commitments.

The real challenges with large-scale solar deployment are not the negative financial impacts on TPPs. At the moment, they are extremely technical in nature. The biggest problems posed by India's aggressive solar plans are reliability and grid integration. Solar radiation varies and disappears completely after sunset. It

is virtually impossible to meet India's electricity needs with solar alone, since most load profiles of states show peak demands occurring after sunset. Also, during the day, when industries with heavy machinery need a stable supply, fluctuations in solar radiation — hence generation — can wreak havoc when deployed on a large scale.

The only way to resolve this issue is to have sophisticated balancing and scheduling mechanisms so that the grid can absorb intermittent generation and compensate with other fast-ramping generation options. Among storage technologies, batteries have still not proven to be worthwhile at Gw levels. Pumped-hydro is a theoretically attractive option but, for all practical purposes, water shortages in India lead to concerns about the viability of this technology.

Until a robust solution with solar and appropriate storage is commercialised, we still need coal to provide stable power. However, we have the opportunity to phase out coal completely with our plans for RE capacity additions. Instead of blaming solar for a potential downfall, existing TPPs under duress need to evolve and innovate. PLFs can be increased by improving operational efficiencies through technological changes. Proactive efforts to support the growth of the manufacturing sector in India under the "Make in India" initiative can be made to formulate new power purchase agreements under the Open Access category.

In the meantime, the solar revolution in India should continue unabatedly. Britain — a champion of coal-based power over the ages — recently had its first coal-free day on April 21, 2017. India, a country blessed with abundant amounts of sunshine and wind, should not be too far behind.

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