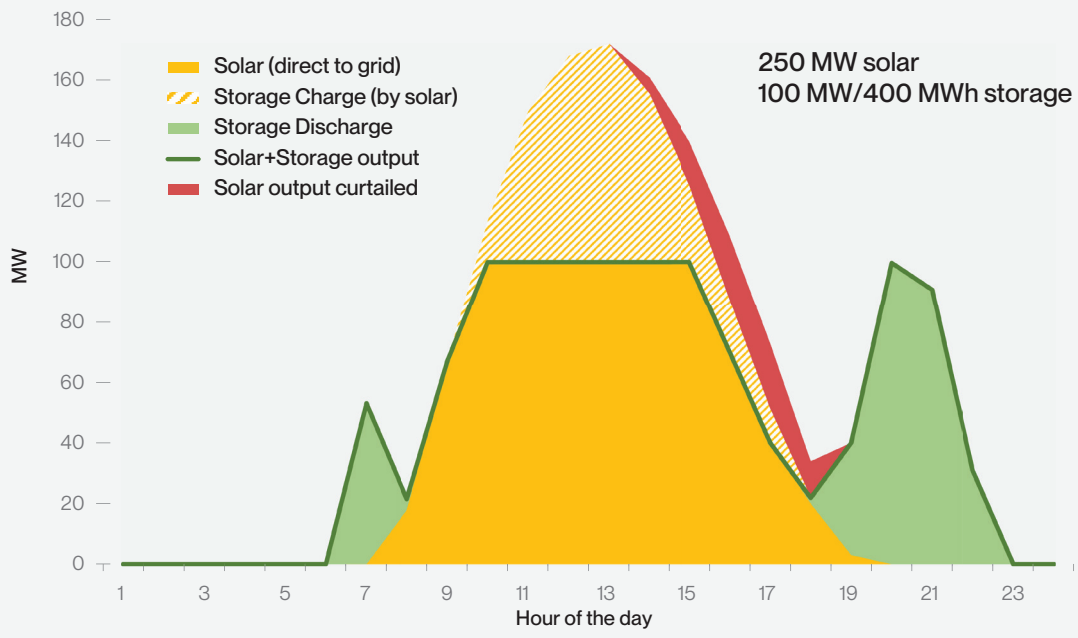
How Solar ⊕ Storage systems can meet India's fast growing load?



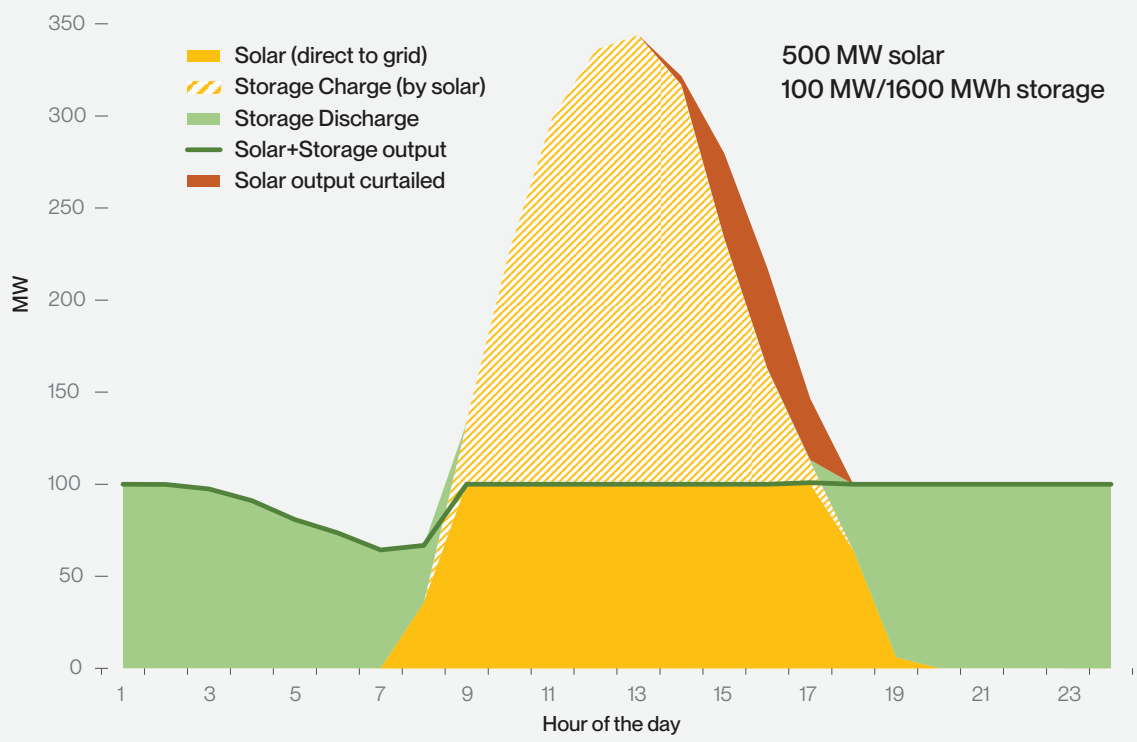
A Peaking Solar ⊕ Storage system is already cheaper than power procured from the exchange.

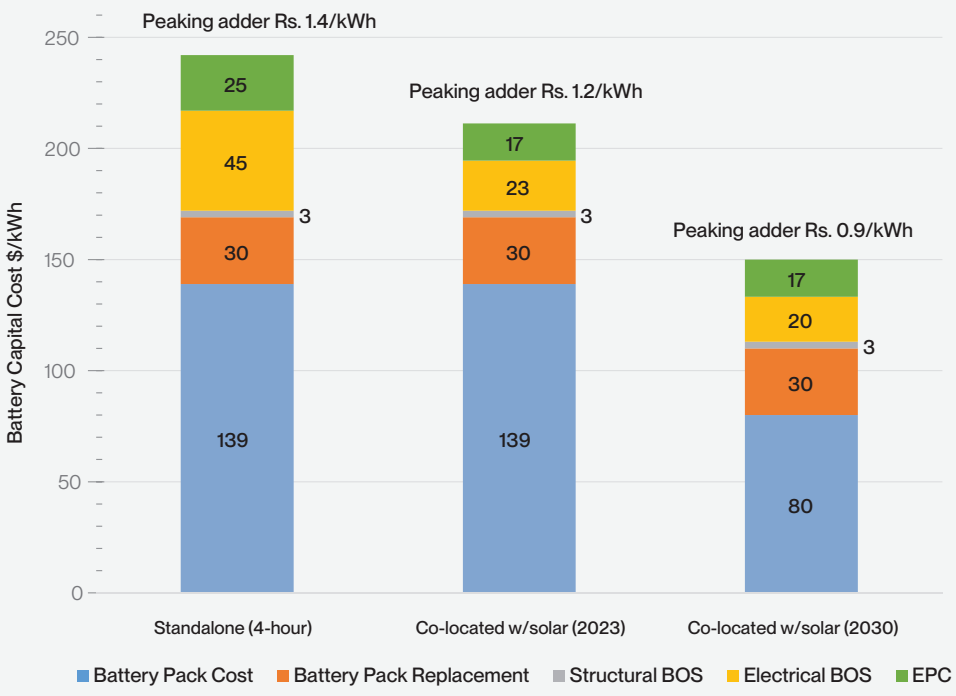
A 100-MW system that provides power during daytime plus ~4 hours during morning and evening peak- would need 250 MW of solar co-located with 100 MW/400 MWh of battery storage (by storing 30% of solar output, with 6% curtailed). It would cost ~Rs. 4.7/kWh at current prices*, potentially decreasing to Rs. 3.5/kWh by 2030. Latest GUVNL auction has revealed capital cost for Li-ion storage in line with international prices (~$250/kWh).

*assuming global benchmark battery pack prices as per Bloomberg, and author estimates of other costs

A Round-The--Clock (RTC) Solar ⊕ Storage system could soon be cheaper than building new coal

A 100-MW system that can provide round the clock power at 95% capacity factor- would need 500 MW of solar panels co-located with 100 MW/1600 MWh of battery storage (by storing 60% of solar output with 6% curtailed). The cost of this system would be ~Rs. 6/kWh at current prices, potentially dropping to Rs. 4 to 4.5/kWh by 2030. Thus, price of baseload power from solar+storage systems would be competitive with new coal plants within this decade.





Storage cost can be lowered by co-locating batteries with solar plant

Co-locating battery storage with solar plants reduces the capex by sharing balance-of-system (BOS) costs. Co-locating a 4-hour battery with solar would add Rs. 1.2/kWh to solar tariff at current prices (termed as peaking/storage adder*), potentially dropping to Rs. 0.9/kWh by 2030, as battery pack prices reduce further.

*Storage adder is the cost of adding storage to a solar plant, expressed as per kWh cost on top of solar levelized cost of energy (LCOE)