

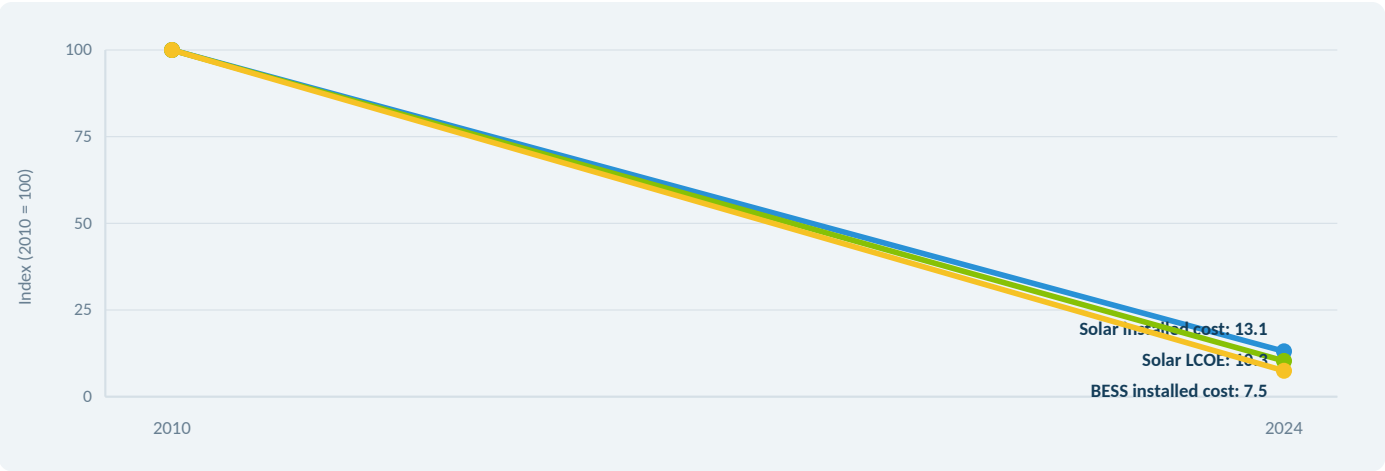
Cheaper Solar. Cheaper Batteries. A Different PPA.

Why the fall in technology cost changes what renewable tenders can procure

Solar and storage costs have fallen dramatically since 2010. The commercial implication is no longer simply cheaper renewable energy - it is the ability to procure time, firmness and flexibility as defined services.



EXHIBIT 01 | The cost revolution changed what renewable contracts can buy



87%

decline in global utility-scale solar installed cost, 2010-2024

93%

decline in global fully installed BESS cost, 2010-2024

INR 461.37 cr

Firstgreen 100 MW / 400 MWh retrofit reference
engineering assumption, not a vendor quote

For PPA design, the key shift is from an energy-only product to a delivery product. Cheap solar creates the MWh; storage changes when that MWh can be supplied. The buyer therefore needs to know whether it is paying for energy, capacity, availability, flexibility or a defined time block.

What changes the story?

IRENA reports a 90% fall in global solar LCOE and a 93% fall in BESS installed cost from 2010 to 2024. Lazard 2026 also cautions that storage costs can rise again when tariffs and supply chains change.

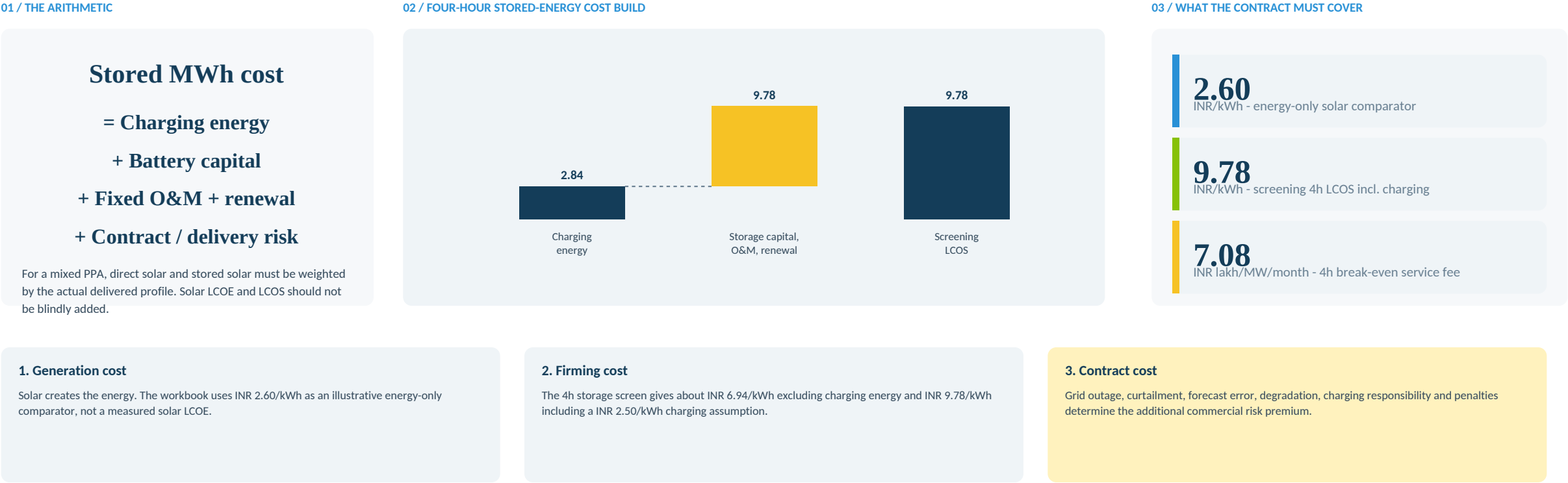
The next auction should procure a service - not simply another renewable MW.

Sources: IRENA Renewable Power Generation Costs in 2024 (2025); Lazard LCOE+ 2026; Firstgreen Theme 3 workbook.

The Firm PPA Has More Than One Cost

Separate generation, storage, losses, firming and contract risk before comparing tariffs

The useful comparison is not "solar tariff versus firm tariff". A firm product contains additional services and additional risk. Every cost component must therefore be traceable.



A firm renewable tariff should be decomposable - otherwise the buyer cannot know what it is paying for.

Model source: Firstgreen Theme 3 workbook. LCOS screen uses 4h capex, fixed O&M, year-8 renewal, 15-year life and 12% discount rate.

The Battery Earns Its Return in 15-Minute Blocks

Daily averages hide charging constraints, peak opportunity and delivery obligations

Observed IEX day: 11 August 2026. Mean MCP = INR 3.917/kWh; maximum = INR 10.00/kWh. Solar, load, curtailment and outage events remain illustrative.

EXHIBIT 04 | One day, 96 commercial decisions

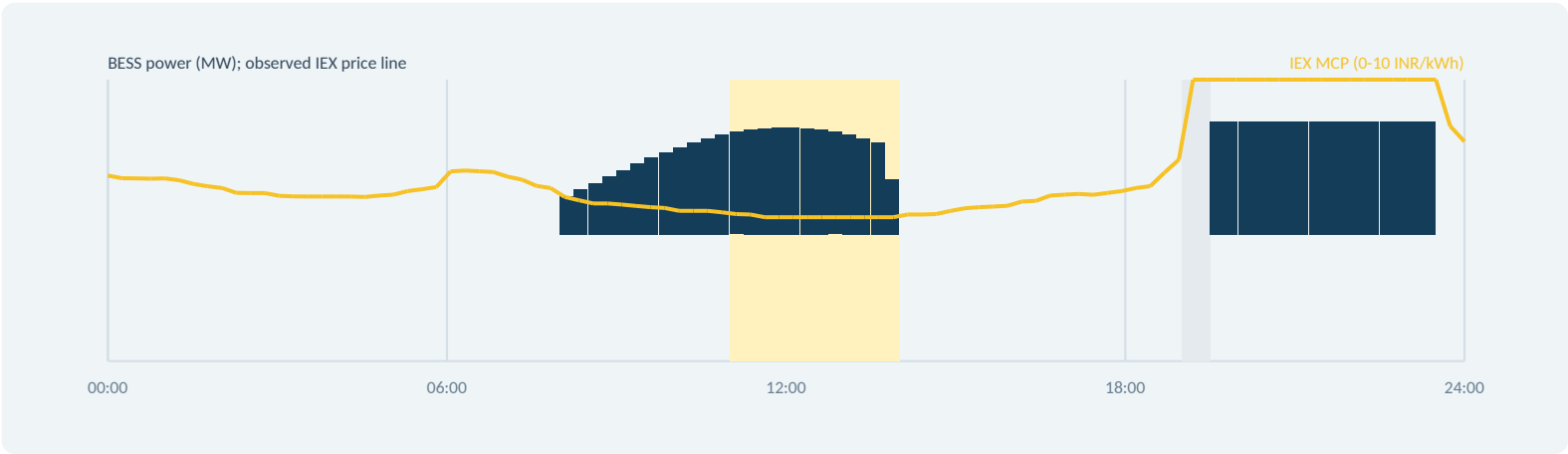
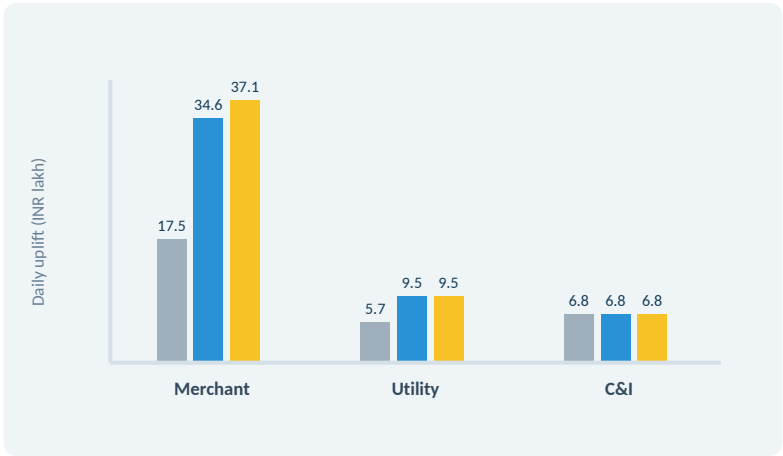


EXHIBIT 05 | Who pays for the extra hours?



6h does not mean six paid hours: 600 MWh installed, 450 MWh dispatched on the replay day.

3.1 Curtailment recovery is not arbitrage

The model captures 104.99 MWh of accessible curtailment; 92.39 MWh returns after conversion loss. That value is distinct from later price-spread value.

3.2 Gross battery sales are not incremental profit

The merchant 4h case earns INR 34.60 lakh/day only after subtracting foregone direct solar sales and variable operation.

3.3 A BESS needs a paying counterparty

Merchant, utility, storage-service and C&I cases use different payment rules. The same physical battery can therefore have very different commercial value.

Storage value comes from the paid service - not from the MWh rating written on the container.

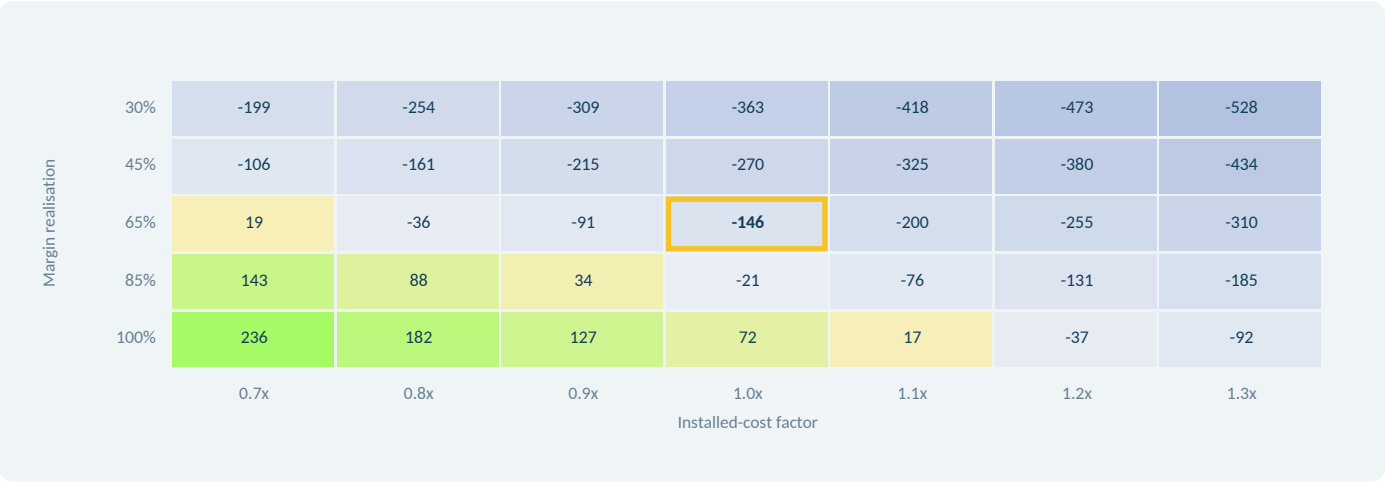
Model source: IEX_15min, Dispatch_15min, Route_Comparison and Curtailment_Value in the Firstgreen Theme 3 workbook.

Firmness Has a Price

The last few percentage points of guaranteed delivery can be the most expensive

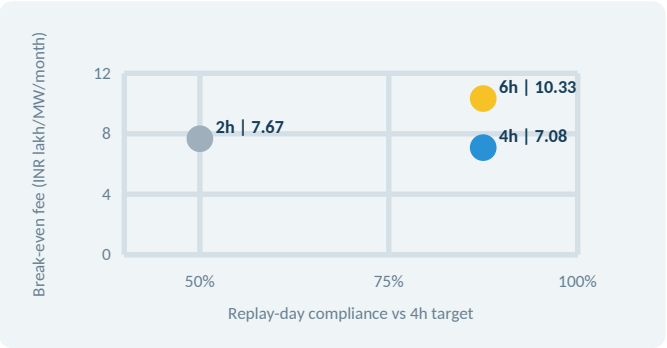
The model does not yet contain a universal 90-95-99% reliability curve. Instead, this page uses the workbook's actual replay-day compliance and storage-service break-even fees, plus the merchant capex/margin sensitivity matrix.

EXHIBIT 06 | Installed cost versus margin realisation



In the model, the 2h battery can cover only 50% of a 4h, 100 MW commitment. The 4h and 6h cases both reach 87.5% on the replay day because a 50 MWh shortfall remains. Extra duration cannot cure the assumed grid outage.

EXHIBIT 07 | Compliance versus break-even capacity fee



4h

lowest break-even fee case in this screen
INR 7.08 lakh/MW/month

- What buyers must specify
- time blocks
 - availability
 - deviation band
 - charging energy
 - curtailment
 - degradation
 - grid outages
 - penalties

The break-even storage-service fee is INR 7.67 lakh/MW/month for the 2h screen, INR 7.08 lakh/MW/month for 4h and INR 10.33 lakh/MW/month for 6h. More duration is therefore not automatically more economical when payment and utilisation do not rise with it.

MW defines power. MWh defines duration. The contract defines value.

Model source: Sensitivity, Utility_Service and Route_Comparison. Compliance values are replay-day screening outputs, not reliability forecasts.

The Next PPA Should Buy a Service

Energy, firmness, flexibility and availability should not be hidden inside one number

Theme 3 asks how competitive bidding and PPA design should evolve as storage moves from an optional add-on to a delivery tool. The answer is to define the service, the risk allocation and the payment basis explicitly.

EXHIBIT 08 | Renewable commercial-product matrix

Product	Buyer receives	Seller bears	Payment basis
Solar-only PPA	variable energy	generation / availability risk	INR/kWh
Utility peak energy	specified peak blocks	charging + delivery risk	INR/kWh delivered
Storage service	MW + duration + availability	storage-performance risk	INR/MW-month
C&I firm renewable	matched delivered supply	OA + profile + residual grid	INR/kWh landed

EXHIBIT 09 | Risk allocation should be priced, not hidden

● Grid outage	shared / contract specific
● Curtailment	buyer or shared
● Battery degradation	seller
● Charging cost	depends on model
● Forecast error	seller / shared
● Change in law	shared
● Market price	seller in merchant
● Availability penalties	seller

5.1 Policy evolution | access, accounting and duration are separate steps



Two numbers should replace one:

1) Cost of renewable generation + 2) Cost of making it available when required

The policy path now separates access, metering, storage capability and MWh enhancement. The commercial contract should do the same: define delivery windows, charging responsibility, curtailment treatment, degradation, settlement interval and penalties.

The future of renewable procurement is not cheapest energy. It is least-cost reliable clean energy.

Sources: Theme 3 workbook PPA_Evolution, PPA_Architecture and Policy_Evolution; CTUIL MWh advisory; CERC GNA context; SECI procurement examples.