



Curtailment Risk in India RE 2026: Grid Integration, Storage and PPA Strategy

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How Indian RE projects can price, mitigate and contract around curtailment risk in 2026 using storage, forecasting and PPA design.

India's renewable market in 2026 is not constrained by ambition. It is constrained by deliverability. After years of focusing on headline bid tariffs and pipeline growth, the market is now confronting a more operational question: can generation actually be evacuated, scheduled, absorbed and paid for when it is produced?

That question puts curtailment risk at the centre of project economics.

For developers, curtailment directly affects net generation, DSCR, deemed-generation claims and refinancing outcomes. For C&I buyers, it affects whether an open-access renewable strategy can reliably offset expensive grid power. For lenders, it changes P90 assumptions, reserve requirements and covenant headroom. For utilities and policymakers, it has become a test of whether India can convert installed capacity into dependable clean-energy supply.

Curtailment in India is no longer only a force-majeure style risk discussed in lender appendices. In several states and transmission pockets, it is a first-order commercial variable. The right response is not generic caution. It is disciplined quantification, better interconnection strategy, storage-led flexibility and tighter PPA language.

Why curtailment risk is rising in 2026

Three things have changed.

First, renewable penetration is high enough in several time blocks that local grid stress matters. Midday solar concentration is now producing recurring oversupply conditions in some corridors, especially where transmission augmentation lags project commissioning. This is most visible during low-demand periods, high irradiance months and in zones where ISTS or state evacuation infrastructure is saturated.

Second, project development has moved faster than transmission readiness in multiple pockets. India has made material progress through central and state transmission planning, including Green Energy Corridor investments and major ISTS build-outs. But project clustering remains intense. A substation bay that looks available during bid planning can become congested by the time multiple awarded capacities reach COD windows.

Third, scheduling and balancing expectations are stricter. As DISCOMs, intermediaries and system operators seek firmer renewable delivery profiles, projects with poor forecasting discipline, weak pooling design or inflexible contracting are more exposed to backing down and settlement leakage.

In practical terms, curtailment is rising because the system needs not just more megawatts, but more controllable megawatts in the right place, connected to the right node, with the right operating strategy.

The forms of curtailment that matter commercially

Curtailment is often treated as a single line item, but project teams need to separate its causes because the mitigation options differ.



- Economic curtailment: generation is backed down because cheaper or must-run alternatives are prioritised, or because the buyer cannot absorb contracted power in that time block.
- Transmission curtailment: evacuation is restricted due to congestion on intra-state or inter-state lines, substation loading, transformer constraints or bay limitations.
- System-security curtailment: SLDC/RLDC instructions reduce injection to maintain grid stability, frequency control or voltage discipline.
- Commercial curtailment: scheduling errors, drawal mismatch, open-access restrictions, delayed approvals or offtaker-side constraints effectively reduce saleable energy.
- Hybrid-portfolio curtailment: co-located solar-wind projects underperform economically because the evacuation system or contract structure does not reward the combined profile efficiently.

For most Indian projects in 2026, the biggest underwriting mistake is to assume all curtailment is temporary and compensable. It is not. Some of it may qualify for deemed generation under the PPA or applicable regulations. Some of it may not. Some of it can be mitigated by BESS or better dispatch. Some of it is a hard locational penalty that should have been screened out before bid submission.

Where curtailment shows up in project economics

At bid stage, developers often focus on CUF, module and turbine assumptions, annual degradation, tariff escalation and debt pricing. Curtailment deserves equal attention because even a modest loss in net export can materially alter equity returns.

Consider a 250 MW AC solar project at a 26% CUF assumption. Annual gross generation is roughly 569 GWh. If effective curtailment averages 4%, delivered energy falls by about 23 GWh. At a tariff of Rs 2.65/kWh, that is revenue leakage of around Rs 6.1 crore per year before considering change in incentives, penalties or deemed-generation relief.

Now extend the same logic to a 300 MW hybrid or FDRE-linked project with higher contracted performance obligations. Curtailment does not just reduce energy sales. It can trigger:

- under-supply penalties
- balancing power purchases at higher spot rates
- weaker DSCR in low-wind or monsoon transition periods
- lower lender confidence in base-case generation assumptions
- pressure on maintenance reserves and debt-service reserve sizing
- lower terminal valuation for operating assets

For C&I structures, the economics can be even more sensitive. If a consumer has modelled open-access renewable supply to replace grid power priced at Rs 7-10/kWh landed, curtailment can force additional drawal from DISCOM supply or exchange procurement. The result is not merely lower savings, but volatility in monthly power cost.

For lenders, the key issue is whether curtailment is episodic, seasonal, structural or contractual. A project with 1-2% occasional curtailment and robust deemed-generation provisions may still be financeable on conventional terms. A project exposed to 5-8% recurring evacuation risk without strong compensation rights will face more conservative P90 assumptions and tighter debt sizing.

State and market contexts developers should watch



Curtailment risk in India is highly location-specific. Analysts should avoid broad national averages and instead evaluate node-level and state-level realities.

Key filters in 2026 include:

- renewable concentration at the proposed pooling substation and downstream corridor
- status of bay allotment and transformer augmentation
- commissioning queue of awarded projects in the same zone
- historical backing-down instructions at state level
- congestion patterns during solar peak and monsoon wind months
- responsiveness of the SLDC and quality of scheduling systems
- whether the project sells under ISTS-connected central schemes, state PPAs or open access

In states with rapid solar additions, midday curtailment can be a more serious issue than annual resource variability. In wind-heavy corridors, monsoon-season evacuation and grid-security instructions can dominate. In open-access markets, commercial curtailment may arise from procedural frictions, banking restrictions, CSS/AS changes or offtaker-side drawal mismatch.

The implication is simple: land and resource quality are no longer enough. Interconnection diligence must be elevated to the same level as irradiation, wind speed, title and hydrology diligence.

How BESS changes the curtailment equation

Battery energy storage is not a universal cure for curtailment, but in the right use case it can convert a weak project into a bankable one.

In 2026, BESS economics in India are improving when storage is used for multiple purposes rather than a single arbitrage thesis. For curtailment mitigation, the battery can:

- absorb solar energy during congested or low-price periods
- shift delivery into evening blocks with stronger tariff realisation
- support firming obligations under hybrid or RTC-style contracts
- reduce schedule deviations through better dispatch control
- improve effective utilisation of evacuation infrastructure

The key is sizing storage to the actual curtailment profile rather than to generic market templates.

A project losing 3-5% of annual energy in a narrow midday band may need a very different BESS configuration from a project facing broader seasonal congestion. In some cases, a 0.25-0.5 hour battery sized to capture clipped or curtailed energy can improve realised revenue without overcapitalising the balance sheet. In others, particularly hybrid portfolios serving peak-oriented contracts, 1-2 hour storage may be justified because the battery is solving both curtailment and tariff-shifting needs.

Developers should test at least three cases:

- no-storage base case with curtailment and deemed-generation assumptions
- curtailment-capture case with a smaller BESS optimised for lost-energy recovery
- contract-optimised case with a larger BESS aligned to peak delivery, deviations and capacity value

In current Indian conditions, battery capex, augmentation costs, round-trip efficiency, degradation and auxiliary consumption must all be modelled carefully. A simplistic “store all excess solar” assumption often



overstates value. The real question is whether the incremental net revenue and risk reduction justify the higher capex and financing complexity.

PPA and concession design: where risk is really allocated

Too many projects still treat curtailment protection as boilerplate. In 2026, that is a mistake.

The difference between a financeable and a fragile project often lies in five contract points:

- definition of must-run status and exceptions
- deemed-generation payment mechanics
- evidence standards for proving backing down
- compensation treatment for transmission unavailability
- seller obligations on forecasting, scheduling and reactive power compliance

Developers should not assume that every backing-down event will produce timely payment. The enforceability of deemed-generation claims depends on metering data, dispatch records, drafting quality and counterparty discipline.

For utility PPAs, review whether compensation is linked to tariff, fixed charge equivalent or some narrower formula. For hybrid and FDRE-linked structures, clarify how unavailable contracted energy is assessed if the project was capable of generation but prevented from injection. For open-access contracts, curtailment allocation between generator and consumer should be explicit, especially where replacement power costs can be substantial.

For lenders, curtailment-related clauses should feed directly into the financial model. If compensation timelines are uncertain or disputed historically, discount the recovery value rather than carrying it at par in downside cases.

What developers, C&I buyers and lenders should do now

The practical response to curtailment risk is neither panic nor denial. It is better development discipline.

Developers should:

- screen substations and corridors before aggressive land aggregation
- track competing project COD timelines around the same evacuation point
- use seasonal hourly modelling instead of annual-average export assumptions
- test BESS as a curtailment-mitigation and contract-optimisation tool
- negotiate deemed-generation and backing-down clauses early, not after award
- build dispatch, forecasting and SCADA capability from day one

C&I buyers should:

- ask for hourly supply simulations, not just annual savings estimates
- verify whether open-access renewable procurement is exposed to nodal congestion or scheduling limitations
- assess replacement power cost if renewable supply is curtailed in critical production periods
- prefer suppliers with credible grid-integration and scheduling capability, not just low headline tariffs

Lenders should:



- require node-specific evacuation due diligence
- distinguish between compensable and non-compensable curtailment
- stress-test DSCR under seasonal export restrictions
- evaluate whether storage or alternative evacuation design materially improves resilience
- align covenant packages with the actual volatility profile of delivered energy

Utilities and policymakers should also recognise that curtailment is not just a private project issue. If backing down becomes routine in renewable-rich states, bid aggressiveness will fade, risk premiums will rise and India's delivered clean-energy output will underperform installed capacity growth. Transmission acceleration, transparent dispatch protocols, digital visibility of congestion and timely settlement of compensation claims are now central to market efficiency.

The strategic takeaway for India RE in 2026

India's renewable sector has entered the stage where grid integration quality matters as much as generation cost. The winning projects will not necessarily be those with the lowest headline tariff at bid stage. They will be the ones that can consistently deliver saleable energy through constrained networks, variable demand shapes and tighter scheduling regimes.

Curtailment is therefore a strategic filter.

It reveals whether a project is merely permitted and contracted, or actually operable and financeable. It distinguishes superficial capacity growth from dependable energy delivery. And it is pushing the market toward more sophisticated solutions: better node selection, tighter PPA drafting, storage-led flexibility, stronger forecasting systems and more conservative underwriting.

For Indian C&I consumers, developers, lenders and utilities, the message is clear. In 2026, curtailment risk can no longer sit at the margin of project appraisal. It has to be modelled, priced, contracted and mitigated upfront.

If your team is evaluating renewable, hybrid or storage projects exposed to grid-integration and curtailment risk, contact Growthifye's advisory desk for a project-specific assessment of sizing, contracting, bankability and delivery strategy.

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