Hybrid Open Access PPAs in India 2026: Solar-Wind Design, Charges and Landed Cost

By Sudarshan Karweer · 14 September 2026 · growthifye.com

How hybrid open access PPAs cut shaping cost in India 2026: CUF, banking, charges, scheduling and landed-cost design for C&I buyers.

India's corporate renewable market in 2026 is moving beyond the simple solar-versus-group-captive debate. A more practical commercial question is now taking centre stage: when does a hybrid open access PPA, typically combining solar and wind from one or more projects, produce a lower delivered power cost than a single-resource as-generated contract?

For commercial and industrial consumers, the attraction is clear. Solar-only open access often delivers the cheapest ex-bus tariff, but it also leaves the buyer heavily exposed to evening grid draw, demand charges, and time-of-day price risk. Wind-only contracts improve evening and monsoon alignment in some states, but output volatility and seasonal concentration can create different mismatches. Hybrid structures sit between plain as-generated PPAs and firm or RTC products. They do not make supply flat, but they can materially reduce shaping cost and improve renewable utilisation.

This article examines hybrid open access PPAs in India in 2026 from a practitioner lens: how solar-wind resource mix changes landed cost, what state and central rules matter, where scheduling and banking assumptions go wrong, and how buyers, developers and lenders should evaluate hybrid designs.

Why hybrid PPAs are gaining traction in 2026

Several market shifts are pushing buyers toward hybrid structures.

First, solar tariffs have remained competitive, with many plain-vanilla open access solar offers in stronger states still clustering around roughly Rs 2.65-3.35 per kWh at the generator busbar depending on tenure, location, evacuation readiness, and developer return assumptions. But the landed cost to the C&I buyer can move far above this once wheeling, transmission, CSS where applicable, additional surcharge where applicable, losses, scheduling charges and residual grid draw are included.

Second, many industrial loads now care less about annual renewable percentage and more about hourly cost suppression. Automotive, data processing, chemicals, textiles, food processing and commercial campuses increasingly track day-evening load shape, not just aggregate units. A solar-heavy profile often leaves 25-45% of monthly consumption to be purchased from DISCOM or exchange during non-solar hours.

Third, RTC and FDRE-style products remain significantly costlier than plain as-generated PPAs because they require storage, oversizing, or merchant balancing. In many cases in 2026, an RTC renewable product may imply a delivered premium of Rs 1.50-3.00 per kWh over a plain solar OA structure. Hybrid solar-wind can narrow that gap without fully stepping into 24x7 obligations.

Fourth, the policy ecosystem now better recognises hybridisation. The National Wind-Solar Hybrid Policy remains relevant as a directional framework, while central transmission connectivity, forecasting and scheduling arrangements, and ISTS-linked utility-scale development have improved execution confidence for larger portfolios. State-level open access rules, however, still determine much of the real economics.

What a hybrid open access PPA actually changes

A hybrid PPA changes three economic drivers simultaneously.

- It alters hourly generation shape.
- It changes annual CUF and seasonal output pattern.
- It can reduce the buyer's residual purchase from grid or market.

A standalone solar OA asset in India may operate at an annual CUF around 19-24% depending on irradiation, DC oversizing and curtailment. Standalone wind projects may be anywhere from 28-40% CUF depending on site quality and machine configuration, but generation is concentrated by season and can be highly variable by hour.

A solar-wind hybrid portfolio can deliver an aggregate annual CUF around 30-45% depending on the chosen mix and project locations. More important than annual CUF is coincidence with buyer load.

For example, consider a manufacturing consumer with a monthly load of 10 million kWh and the following average pattern:

- Base daytime load: 12 MW
- Evening peak load: 18 MW from 6 pm to 11 pm
- Night load: 8 MW

If this buyer signs a solar-only OA PPA sized to cover 45% of annual consumption, the actual hourly renewable share may exceed 80% in some daytime blocks and fall close to zero after sunset. Unless banking is highly permissive and economically attractive, a large part of the value leaks out through unused injection, lower settlement value for surplus, or expensive evening draw from the grid.

Now consider a hybrid structure where solar supplies daytime blocks and wind contributes more evening, night and monsoon energy. The total annual renewable procurement may remain 45%, but the effective direct consumption of renewable energy can rise meaningfully. In practical models, we often see direct-settlement utilisation improve by 8-18 percentage points compared with solar-only structures, depending on state banking rules and load shape.

That is the real hybrid advantage: not just more renewable units, but more usable renewable units.

The landed cost framework buyers should use

A common procurement mistake is comparing ex-bus tariffs instead of delivered economics. In 2026, hybrid PPAs should be evaluated through a full landed cost stack.

At minimum, the model should include:

- PPA tariff for solar component and wind component, or blended hybrid tariff
- Transmission charges and losses, whether interstate or intrastate
- Wheeling charges and wheeling losses
- Cross-subsidy surcharge if applicable to third-party supply
- Additional surcharge if applicable and not exempt
- SLDC charges, scheduling charges and metering costs
- Banking charges, banking loss or unit deduction, and settlement mechanism
- Curtailment assumptions and deemed generation treatment if any
- Standby or residual grid draw tariff for uncovered demand

- Time-of-day impact on residual purchases
- Demand charge effects where renewable supply changes maximum demand pattern

In many states, the difference between a visually cheap and an actually cheap PPA is Rs 0.80-2.20 per kWh after all layers are considered.

A practical 2026 illustration:

Solar-only third-party OA structure:

- Ex-bus tariff: Rs 2.85 per kWh
- OA transmission/wheeling/loss-adjusted impact: Rs 0.85 per kWh
- CSS and other statutory costs: Rs 1.10 per kWh
- Banking and scheduling impact: Rs 0.20 per kWh
- Residual evening grid power weighted impact on blended supply: Rs 1.35 per kWh equivalent
- Effective blended landed cost on total consumption basis: around Rs 6.10-6.60 per kWh depending on state and load shape

Hybrid third-party OA structure:

- Blended ex-bus tariff: Rs 3.20 per kWh
- OA transmission/wheeling/loss-adjusted impact: Rs 0.88 per kWh
- CSS and other statutory costs: Rs 1.10 per kWh
- Banking and scheduling impact: Rs 0.18 per kWh
- Reduced residual evening grid power impact: Rs 0.90 per kWh equivalent
- Effective blended landed cost on total consumption basis: around Rs 5.85-6.30 per kWh

The hybrid tariff looks higher at contract level, but the delivered portfolio cost can be lower because expensive uncovered demand is reduced.

This is exactly where [Demand & ToD analysis](/coreservices/greenenergyppa/demandandtodanalysis) and Landed-cost management become critical. The right question is not whether hybrid is cheaper per renewable unit. It is whether hybrid lowers total electricity spend while meeting risk and compliance thresholds.

Design choices that materially change hybrid economics

Not all hybrid PPAs are equal. Three design choices typically decide success.

1) Resource ratio

A 70:30 solar-wind contract behaves very differently from a 40:60 structure. Solar-heavy hybrids often suit buyers with strong daytime operations and expensive daytime DISCOM tariffs. Wind-heavier structures make more sense where evening and night exposure is the main pain point, or where banking for solar spill is weak.

The ratio should be driven by:

- Hourly load curve by season
- Weekly shutdown pattern
- Contract demand and demand-charge exposure
- State banking windows and settlement rules

- Curtailment risk by project location

2) Single-state versus portfolio sourcing

Some buyers prefer both resources in one state to simplify OA approvals and settlement. Others combine assets across states or use ISTS-connected projects to improve generation diversity. While diversification can reduce resource risk, it may also add complexity in connectivity, scheduling and charge treatment.

In 2026, state-level charge volatility remains material. A hybrid design that works on paper in one state can fail once revised wheeling charges, banking restrictions or peak-hour settlement rules are notified.

3) As-generated versus shaped delivery commitment

Many developers market “hybrid” in a loose sense, but the contract structure matters.

- Pure as-generated hybrid: buyer takes actual output from combined resources
- Minimum supply band: developer targets delivery within agreed hourly or monthly range
- Peak-hour shaping clause: seller commits stronger supply in specified periods, often at premium tariff
- Sleeved market-backed structure: renewable generation plus external balancing for selected hours

The more shaping the developer commits, the more careful the buyer must be about premium justification, liquidated damages, and availability definitions.

Regulatory and commercial issues to watch in India 2026

Hybrid PPAs do not escape the basic open access regulatory matrix. Buyers still need state-specific diligence.

Banking remains decisive

Even in hybrid contracts, banking assumptions can make or break savings. Some buyers assume hybrid automatically solves mismatch. It does not. It only reduces mismatch. If a state allows limited monthly banking but disallows carry-forward beyond billing cycle, then monsoon wind surplus and weekend solar spill may still lose value. If banking is permitted only in solar hours or excludes peak periods, the economics change further.

Third-party versus group captive still matters

Hybrid can be done under either structure. For consumers with sufficient appetite for equity participation and ongoing captive-rule compliance, group captive can remove CSS exposure in many cases and materially improve landed cost. But hybrid generation portfolios introduce another layer of compliance tracking if SPV structures, offtaker mix and annual consumption shares change over time.

Forecasting and scheduling complexity increases

A hybrid schedule is more manageable than standalone wind in some cases, but more complex than plain solar. Error bands, revision capability, aggregation logic and DSM exposure require close review. Where the buyer or trader takes scheduling responsibility, weak forecasting discipline can erase part of the hybrid value.

Curtailment and evacuation risk are not identical for solar and wind

Developers may present a blended CUF, but lenders and buyers should separately assess evacuation readiness, substation loading, seasonal backing down risk and machine availability assumptions. Wind-season concentration means one weak quarter can significantly affect annual economics.

RPO and environmental claims should be documented carefully

Where buyers use hybrid procurement as part of broader sustainability reporting, contract language on energy accounting, attribute treatment and delivery proof should be aligned with actual state settlement mechanisms.

When hybrid PPAs usually work best

Based on current 2026 market practice, hybrid open access PPAs are usually most compelling in the following situations:

- The buyer has meaningful evening or night load and wants lower residual grid dependence without paying full RTC premium.
- Daytime solar spill is high under a standalone OA design because banking is capped or expensive.
- DISCOM ToD tariffs make uncovered peak-hour procurement expensive.
- A group captive route can reduce statutory charge burden and improve hybrid landed economics.
- The buyer values annual renewable share improvement but cannot operationally absorb pure daytime generation.
- Lenders require more diversified generation profile than a single-resource project can provide.

They are often less attractive where:

- Load is almost entirely daytime and steady
- Solar-only captive already offsets the cheapest and largest consumption blocks efficiently
- State OA charges are so high that resource shaping cannot overcome statutory cost burden
- Banking is highly favourable for solar-only and the consumer has minimal evening demand

A practical evaluation template for buyers and lenders

Before signing a hybrid PPA, the evaluation process should cover at least these questions:

- What is the 12-month hourly load profile, including planned expansion and shutdown periods?
- How much direct renewable utilisation occurs under solar-only, wind-only and hybrid cases?
- What is the residual grid purchase by time block under each scenario?
- Which charges are avoidable, fixed, pass-through or at risk of revision?
- How are banking charges and settlement valued month by month?
- What is the expected curtailment and forecasting penalty exposure?
- Is the contract third-party or group captive, and how does that affect five-year savings certainty?
- What is the downside case if banking rules tighten or CSS changes?
- How much merchant or unutilised surplus risk remains in monsoon and low-load months?

This is where [Sourcing strategy](/coreservices/greenenergyppa/sourcingstrategy) and [PPA structuring & negotiation](/coreservices/greenenergyppa/ppastructuringandnegotiation) can materially improve outcomes. A buyer that runs a proper hourly portfolio model often reaches a different conclusion from one that relies on annual average tariffs.

Conclusion: hybrid is a portfolio decision, not a technology slogan

In India’s 2026 open access market, hybrid PPAs are not automatically superior to standalone solar or wind contracts. Their value comes from improving load match and reducing the cost of uncovered demand. For

many C&I consumers, that can translate into a better blended electricity cost than either a cheap solar-only PPA or a costly RTC product.

But the economics are highly state-specific and contract-specific. Banking treatment, CSS and surcharge exposure, scheduling responsibility, resource ratio, and hourly load shape matter more than the label “hybrid”. Developers should avoid selling hybrid as a generic premium product. Buyers and lenders should insist on hourly landed-cost modelling before committing tenure and capacity.

If your team is evaluating hybrid open access options, contact Growthifye’s advisory desk for a state-by-state commercial assessment, contract review and execution strategy.

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