STATCOM vs SVC for RE Evacuation in India 2026: Grid Compliance, Costs, Sizing

By Sudarshan Karweer · 30 August 2026 · growthifye.com

A practical 2026 guide to STATCOM vs SVC for RE evacuation in India: sizing, costs, studies, grid-code triggers and lender implications.

India's renewable build-out is pushing many solar, wind and hybrid projects into electrically weak pockets where steady-state capacitor banks are not enough to satisfy grid performance expectations. In 2026, one of the most practical transmission-engineering decisions for project sponsors is whether dynamic reactive support should be delivered through an SVC, a STATCOM, or a mix of plant-level inverter capability plus external compensation.

For developers, this is no longer a narrow electrical-design issue. The choice affects connectivity approvals, plant controller philosophy, compliance testing, outage planning, auxiliary consumption, capex, land use, and ultimately revenue through curtailment and delayed COD risk. For lenders and C&I offtakers, the same decision matters because poorly chosen reactive infrastructure can create persistent non-compliance, repeated retesting, and lower availability during voltage disturbances.

This article focuses on a topic distinct from general reactive power and BESS discussions: how to decide between SVC and STATCOM for renewable-energy evacuation in India in 2026, with a practical lens on ISTS/STU connectivity, grid code triggers, study requirements, cost ranges and contracting strategy.

Why this question matters more in 2026

India's interstate and intrastate systems are absorbing larger shares of inverter-based generation, often through long EHV corridors and pooling arrangements that were originally planned around different demand and generation patterns. As renewable penetration rises, three operational realities are becoming more visible:

- voltage excursions at weak nodes during high RE injection and low local demand
- difficulty in meeting dynamic voltage support expectations during faults and fault recovery
- greater scrutiny by CTU, STU, RLDCs, SLDCs and transmission utilities on plant-level control coordination

In many 220 kV, 400 kV and some 765 kV-connected RE schemes, developers are seeing connection studies call for additional dynamic VAR support even when inverter datasheets suggest adequate reactive capability. The reason is simple: nameplate inverter capability does not automatically translate into stable grid performance at the point of interconnection under all operating conditions.

For large solar parks, wind clusters and hybrids above roughly 250 MW, the issue often emerges during load-flow, short-circuit, transient stability or EMT-style review stages. For smaller projects, especially in congested STU systems, the problem can surface closer to commissioning when voltage flicker, controller interactions or grid-event performance are tested more rigorously than expected.

SVC and STATCOM: what actually differs in practice

At a high level, both SVC and STATCOM provide dynamic reactive power support. But their operational behavior in weak grids is different, and that difference matters for RE evacuation.

An SVC typically uses thyristor-controlled reactors and switched capacitors. It is a mature technology and can be economical for certain applications, especially where the grid is not extremely weak and the dynamic requirement is moderate.

A STATCOM is a voltage-source-converter-based device. It generally offers faster response, stronger performance at depressed voltages, and better support in weak-grid conditions. That is why many renewable-heavy nodes increasingly prefer or require STATCOM-like performance.

In practical Indian project terms, the distinctions are usually these:

- Response speed: STATCOM response is typically faster and more effective for rapid voltage support during faults and post-fault recovery.
- Low-voltage performance: STATCOM can maintain reactive current support better at lower system voltages, which is valuable for LVRT/HVRT-related performance expectations.
- Harmonics and control flexibility: STATCOM solutions often provide more flexible control behavior, though harmonic design must still be handled carefully.
- Footprint and modularity: STATCOM layouts can be more compact depending on rating and vendor architecture.
- Cost: SVC may have lower capex in some medium-strength-grid cases, but the gap narrows once filtering, performance guarantees, redesigns and retesting risks are considered.
- Weak-grid suitability: For low short-circuit-ratio nodes, STATCOM is often technically superior.

For renewable developers, the wrong comparison is “which is cheaper per MVAr.” The right comparison is “which option achieves grid acceptance, stable operation and lower life-cycle project risk at this node.”

Where each technology tends to fit in Indian RE projects

In 2026, there is no one-size-fits-all rule, but a practical segmentation can help.

SVC tends to fit better when:

- the interconnection node has relatively stronger short-circuit levels
- the project is connected into an established EHV network with less severe voltage instability risk
- dynamic performance requirements are real but not extreme
- land is available and harmonic/filter design is manageable
- the evacuation system is less exposed to rapid renewable ramps and fault-induced control stress

STATCOM tends to fit better when:

- the point of interconnection is electrically weak
- the project is part of a large RE cluster or pooling station with high inverter-based penetration
- voltage recovery and reactive current injection performance are closely scrutinised
- controller interaction between plant PPC, inverter controls and network behavior is a known risk
- there is a history of curtailment, voltage instability, or repeated compliance observations in the region
- the evacuation corridor is long and the system is sensitive to dynamic VAR deficits

In western and southern renewable states, developers have increasingly encountered study outcomes where fixed capacitor banks plus inverter capability are not sufficient to secure comfort from utilities. In such situations, developers often try to defer a dynamic device to save capex, only to face longer commissioning cycles and more expensive retrofits later.

A common threshold in market practice is that projects or pooled schemes in the 300 MW to 1 GW range deserve an early dynamic-reactive screening study, especially if the grid node shows low fault levels or prior voltage-control issues. That does not mean all such projects need a STATCOM, but it does mean the decision should be made before main package finalisation.

Sizing logic: how developers should approach MVAr decisions

Sizing is where many projects go wrong. Developers sometimes start with a rough percentage of plant MW capacity, such as 20% to 35% MVAr support, and then force the equipment choice around that estimate. In reality, proper sizing depends on system studies and control philosophy.

A robust sizing exercise should consider:

- base-case and contingency-case load flow at maximum injection and minimum demand
- seasonal voltage profile at the interconnection bus and adjacent substations
- short-circuit strength and effective SCR at the point of interconnection
- expected inverter reactive capability after active-power dispatch priorities and thermal derating
- transformer tap range and OLTC strategy
- line charging, cable charging and filter behavior
- fault ride-through and post-fault voltage recovery expectations
- interaction with capacitor banks, reactors, synchronous condensers or nearby dynamic devices

As a broad market indication in 2026, utility-scale RE projects may see dynamic compensation requirements anywhere from +/-50 MVAr to +/-300 MVAr at plant or pooling level, with larger pooled nodes going beyond that. A 250 MW solar project on a strong 400 kV bus may need no separate STATCOM if inverters and fixed compensation are adequate. The same 250 MW project on a weaker node with long evacuation lines may require a 75-150 MVAr dynamic device depending on system conditions.

For hybrid projects, sizing can be more complex. Wind variability, nighttime voltage behaviour, and BESS operating modes can all alter reactive needs. This is why early-stage [Power system studies](/coreservices/transmissionengineering/powersystemstudies) are not optional for serious sponsors; they are central to capex optimisation and approval certainty.

Cost ranges, schedule impact and lender view

In 2026, exact pricing varies by rating, voltage level, OEM, localisation, filters, civil works and redundancy philosophy. But for planning purposes, developers often evaluate dynamic compensation with these broad ranges:

- medium-sized SVC packages: roughly Rs 0.35 crore to Rs 0.65 crore per MVAr in many utility-scale configurations
- STATCOM packages: roughly Rs 0.55 crore to Rs 1.10 crore per MVAr, with higher values for demanding performance specifications, compact layouts, offshore-like modularity requirements, or extensive harmonic/filter scope

These are indicative planning numbers, not bid benchmarks. Balance-of-plant scope can materially shift totals, including:

- bay extension or interconnection works

- step-down/step-up transformer integration
- harmonic filters
- control room and SCADA integration
- civil foundations and fire systems
- spares and long-term service agreements

Schedule implications are equally important. Dynamic compensation added late in the project can push COD by 4 to 9 months depending on design freeze, vendor approval cycles and site readiness. Imported power-electronics components, protection integration and relay philosophy approvals can still create lead-time risk despite higher domestic manufacturing participation.

Lenders increasingly view dynamic VAR design as part of bankability. They typically ask:

- Was the requirement identified in approved studies or only discovered during testing?
- Is performance guaranteed at the point of interconnection or only at inverter terminals?
- Who bears the cost if the initial sizing proves inadequate?
- Are liquidated damages linked to reactive-performance non-compliance?
- Is there interface clarity between OEM, EPC, and utility expectations?

A cheaper SVC that triggers repeated tuning, retesting or curtailment can be more expensive than a correctly specified STATCOM. Conversely, overspecifying a STATCOM where an SVC or improved inverter-plus-capacitor scheme would suffice can hurt project IRR with little system benefit.

Approval, studies and contracting strategy

The best time to address SVC versus STATCOM is before final connectivity package closure, not after equipment procurement. By 2026, prudent developers are aligning the decision with the full approval chain:

- connectivity application assumptions
- load flow and fault level studies
- transient and dynamic assessment where required
- utility comments and protection philosophy
- plant PPC and inverter-control architecture
- commissioning and compliance test procedures

Contracting strategy matters because this is an interface-heavy scope. One common failure mode is split responsibility: inverter OEM says external reactive support was under-sized; EPC says utility assumptions changed; dynamic VAR vendor says plant controller settings were not coordinated.

To avoid this, developers should define performance at the interconnection point, not just equipment terminals. Contract packages should clearly allocate:

- steady-state reactive range
- dynamic response time
- fault and post-fault behavior
- harmonic limits
- controller interoperability
- retesting obligations

- outage support and spare philosophy

This is where integrated engineering helps. Firms that can combine Power system studies with [Protection, control & SCADA](/coreservices/transmissionengineering/protectioncontrolandscada) and [HV/EHV substation design](/coreservices/transmissionengineering/hvehvsubstationdesign) are better placed to reduce interface risk than teams treating these as separate silos.

For C&I buyers evaluating third-party RE supply, this also matters commercially. If the seller's evacuation scheme depends on unsettled dynamic compensation decisions, COD timelines and delivered CUF assumptions may be less reliable than headline PPA pricing suggests.

A practical decision framework for sponsors in 2026

For developers, utilities and financiers, the most useful approach is a structured decision matrix rather than brand-led procurement.

Ask these questions early:

- What is the minimum and contingency short-circuit strength at the interconnection bus?
- Can inverter-based reactive capability alone satisfy grid-code and utility expectations at full active-power export?
- Under low-voltage conditions, is the required reactive current support still available?
- Are there known voltage-instability or oscillation concerns in the node or corridor?
- Is the project part of a pooled RE cluster where interactions with neighbouring plants matter?
- What is the capex trade-off versus delay risk and curtailment exposure?
- Can the selected device be commissioned and tuned within the project schedule?

A practical rule is this: if studies show a relatively strong node and moderate dynamic need, SVC remains worth evaluating on cost. If the node is weak, the corridor is long, or post-fault performance is critical, STATCOM should usually be the base case unless studies clearly prove otherwise.

Developers should also avoid the temptation to solve every voltage issue with one device. Sometimes the least-cost technical answer is a coordinated package:

- better inverter control settings
- revised PPC philosophy
- switched reactors/capacitors
- transformer tap optimisation
- a smaller STATCOM instead of a larger one
- network-side reinforcement at the pooling or grid substation

That systems view is especially important as more projects combine solar, wind and storage with diverse dispatch patterns.

What Growthifye is seeing in the market

Across Indian RE evacuation projects, the pattern is clear: dynamic reactive decisions are moving earlier in the development cycle and becoming more central to financing and commissioning certainty. Utilities are less willing to accept generic assurances that inverters will "manage" voltage behaviour. They want study-backed, testable performance.

For sponsors, the winning approach in 2026 is to treat SVC-versus-STATCOM selection as a transmission-planning and grid-compliance decision, not a late-stage electrical procurement line item. Early technical diligence can save crores in redesign, protect COD, and improve lender confidence.

If your project is navigating ISTS/STU connectivity, weak-grid evacuation, substation interfaces or dynamic VAR sizing, contact Growthifye’s advisory desk. Our team supports developers, C&I buyers, lenders and utilities with practical transmission engineering, studies and execution guidance from concept to commissioning.

Explore Growthifye's related capabilities

This analysis connects directly to our advisory practice: [Power system studies](/coreservices/transmissionengineering/powersystemstudies) · [HV/EHV substation design](/coreservices/transmissionengineering/hvehvsubstationdesign) · [Transmission line engineering](/coreservices/transmissionengineering/transmissionlineengineering) · [Protection, control & SCADA](/coreservices/transmissionengineering/protectioncontrolandscada).

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