

Stakeholder Consultation on Hybrid PV–BESS Architectures: Coupling Choices

Date: 31 August 2026

Time: 10:30 a.m. to 3:35 p.m.

Venue: Le Méridien New Delhi

Concept Note

A subnational least-cost resource planning study by the Center for Study of Science, Technology and Policy (CSTEP) shows that pairing solar with battery energy storage systems (BESS) with 2-hour and 4-hour durations can be a cost-effective pathway to meet rising electricity demand through FY 2031–32 across several states.

As battery storage is increasingly co-located with solar generation, an important design consideration is how the two systems should be electrically connected. This is where the choice between AC coupling and DC coupling becomes important. While AC coupling is the more widely adopted configuration, DC coupling offers a more integrated approach, with potential benefits such as reduced balance-of-system (BoS) components and wiring, as well as improved utilisation of solar generation that might otherwise be curtailed. The differences between these configurations can also translate into cost advantages compared with standalone configurations, particularly through differences in BoS requirements.

The choice of coupling architecture, however, extends well beyond plant-level cost. It can influence converter utilisation, energy efficiency, curtailment, operational flexibility, voltage and reactive power support, dynamic performance, and the overall value that hybrid plants can provide to the power system. As India moves towards higher shares of inverter-based resources and increasingly complex grid requirements, developing a common understanding of these trade-offs is important for future planning, procurement, and regulatory frameworks.

To further explore this topic, CSTEP in collaboration with the Centre for Mission on Energy Transition, Maulana Azad National Institute of Technology (MANIT) Bhopal, is conducting a **Stakeholder Consultation on Hybrid PV–BESS Architectures: Coupling Choices** on **31 August 2026** at **Le Méridien New Delhi**. This roundtable discussion will bring together utilities, grid experts, renewable energy developers, OEMs, industry experts, policymakers, think tanks, and academia to deliberate on the technical, economic, and regulatory considerations shaping the choice between AC and DC coupling in India's power system.

Key questions

1. **Planning and decision drivers:** What should drive the choice, and should planning, grid codes, and procurement frameworks distinguish between the two architectures?
2. **Technical and grid integration:** How do the two architectures compare in technical challenges; clipping and curtailment; and grid-support functions, such as ramp support, reserves, and voltage/reactive power support?
3. **Economic and commercial:** How do the economic and commercial implications of AC- and DC-coupled architectures differ, and how should tendering and procurement frameworks evolve to adequately recognise and differentiate between these architectures?
4. **Policy and utility perspective:** Should the choice be market-driven, and what role should utilities and policymakers play?
5. **Future outlook:** Will the two architectures coexist, or will one become the preferred option?

The outcomes of the consultation are expected to contribute to the techno-economic assessment of AC and DC coupling choices and support the development of evidence-based policy recommendations for large-scale hybrid renewable energy integration in India.