Good ENOUGH
The Better Way

2026 Industry Report

— Integrated EV Charging in India —

Discover how EV infra integrated with Solar + BESS can be a big hit.

Executive Summary

India stands at a critical juncture in its electric mobility transformation. While electric vehicle adoption accelerates and solar capacity surges, these systems are being built largely in isolation creating a fundamental mismatch that threatens to undermine both initiatives.

The paradox: India has 29,277 public EV charging stations serving a rapidly growing EV fleet, yet charging infrastructure struggles to keep pace. Solar capacity has crossed 135.8 GW, making India the world's third-largest solar market. Yet India curtailed an estimated 2.3 terawatt-hours of renewable energy (primarily solar, along with wind) in 2025 alone enough to power 400,000 households annually due to grid absorption constraints.[1][2]

The timing mismatch is real: A fleet operator generates solar power through the afternoon when vehicles are out on routes but charging begins only after they return in the evening, when solar is no longer available and grid tariffs are highest.[3]

The solution emerging: Battery Energy Storage Systems (BESS) integrated with EV charging infrastructure can capture surplus solar during the day and release it during peak charging hours. These theoretical projects in Surat, Bengaluru, and Delhi are already demonstrating the technical and economic viability of this integrated approach [4][5].

Why this report exists: To document India's current EV charging landscape, quantify the solar-EV timing problem with real data, examine proven solutions already deployed, and provide a factual roadmap for scaling integrated EV + Solar + BESS systems across India's charging infrastructure over the next three years.

Key findings:

- India's EV-to-charger ratio of 235:1(means that for every 235 EVs there is 1 charger) is far below the global standard of 20:1
- 2.3 TWh of solar was curtailed in 2025, costing ₹5,750 - 6,900 crore in compensation payments
- Real-world deployments show 40-60% reduction in demand charges and 23% lower charging costs
- 17 GW/48 GWh of BESS capacity was tendered in 2025, signaling mainstream adoption

This report provides decision-makers in fleet operations, charging infrastructure, energy utilities, and policy with factual analysis of what works, what doesn't, and what's coming next in India's integrated energy-mobility transition.

TABLE OF CONTENTS

1.
EV charging infrastructure in India today

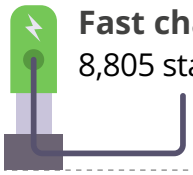
The growth story

India's public EV charging network has expanded dramatically over the past three years, reflecting the accelerating adoption of electric vehicles across the country.
Network Growth Statistics:

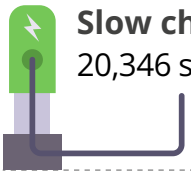
- 29,277 public charging stations operational as of August 2025[6]
- Nearly six-fold growth from 5,151 stations in December 2022[7]
- 2024 saw record expansion: 25,202 stations by year-end, with 19 lakh EVs sold (19% year-on-year increase) [8]

Some projections suggest an even larger requirement - 2.9 million+ charging points across public, residential, and fleet segments by 2030.

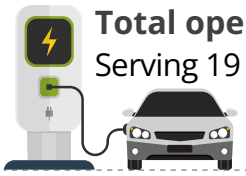
Charger type distribution



Fast chargers (DC)
8,805 stations



Slow chargers (AC)
20,346 stations



Total operational capacity
Serving 19 lakh EVs sold in 2024

Geographic distribution

Charging infrastructure remains heavily concentrated in a few leading states, with significant geographic imbalances, top 5 states by charging:

State	No of Charging Station
Karnataka	6,096 stations (23% of national total)
Maharashtra	4,166 stations (16%)
Uttar Pradesh	2,316 stations (9%)
Delhi	1,957 stations (7%)
Tamil Nadu	1,780 stations (7%)

These five states account for 62% of India's public charging infrastructure, while many states lag far behind[9][10].

The infrastructure gap

Despite impressive growth, charging infrastructure is falling behind EV adoption:

Current EV-to-charger ratio
235:1 far below the global standard of 20:1[11]

To support 50 million EVs by 2030
India needs approximately 1.32 million public chargers[12]

Annual installation rate required
~400,000 chargers per year from 2026-2030

Quality of power supply varies
significantly by location and time of day

Peak Power Demand Context

India's electricity demand is hitting record highs, adding pressure to the grid:

- Peak power demand reached 250.1 GW in May 2024 an all-time high[11]
- Peak demand in 2025: 241 GW (June 2025)[12]
- Annual growth rate: ~5% since 2019[13]
- Projected demand for 2025-26: 266-277 GW[14][15]

EV charging is adding concentrated load to already stressed urban grids during peak hours (6-11 PM), exactly when solar generation is unavailable.(highlight by negativ clr its showing impact

2.
EV charging challenges in India

Problem 1: Grid dependency drives cost & reliability risks

Most charging stations rely heavily on grid power, creating operational strain.

Key Issues
- Peak load stress during 6–11 PM
- Power shortages when demand is highest
- Peak tariffs 20–40% higher than off-peak
- Uneven charger distribution across states

DC Fast Charging Impact
- Demand charges form 70–90% of bills (low utilization periods)
- One high-power session sets monthly peak cost
- No peak shaving :- punitive electricity expenses

EXAMPLE

Charging 10 E-buses (~500 kW peak) for 1 hour can trigger ₹1.5–2.5 lakh monthly demand charges, even if the spike occurs once.

Problem 2: Fleet economics & timing mismatch

Charging demand and solar supply don't align.

Charging windows
- Fleet depots: 6–10 PM return
- Public fast charging: Commute peaks
- Residential: Evening/night

Reality
Solar is abundant in the day but unavailable when EVs actually charge.

Core gap
Cheap daytime solar ≠ evening charging demand.
Without storage, energy is either wasted or unavailable when needed.

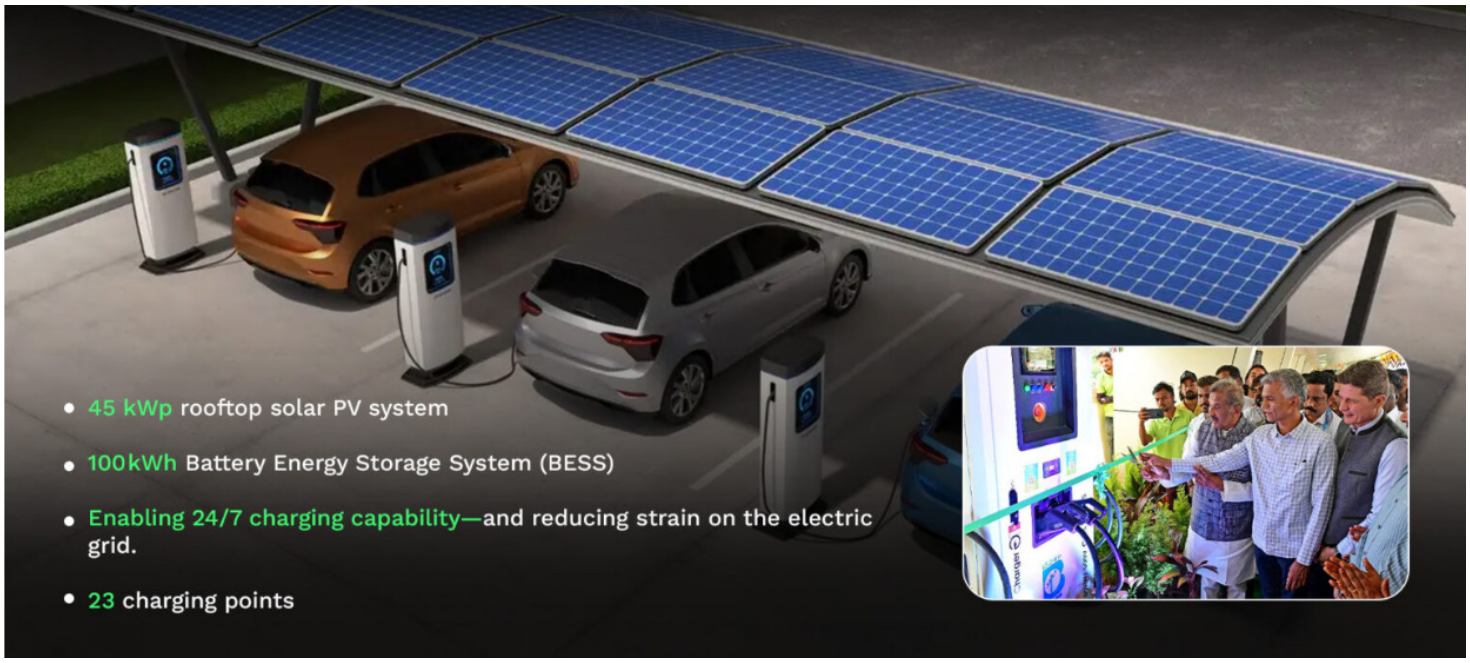
The question remains: If India is generating surplus solar energy, Why do power disruptions persist across states?

3.

Let’s take a closer look at real EV infrastructure case studies

The integration of EV charging with solar and battery storage isn't theoretical; several pioneering projects across India are already demonstrating technical and commercial viability.

Case Study 1: RE2EV solar-powered EV charging hub, Bengaluru



Location: Near Kempegowda International Airport, Bengaluru
Type: Commercial fast-charging hub for taxis and fleet vehicles

System Configuration:
- 45 kWp rooftop solar
- 100 kWh BESS second-life EV batteries
- Charging capacity: Up to 23 vehicles simultaneously
- Charger mix: 30 kW and 50 kW DC fast chargers

Unique Features:
- India's first solar-powered EV charging station using repurposed batteries
- Serves airport taxis, ride-hailing fleets, and commercial vehicles
- 24/7 operation with reduced grid dependence

Operational Impact:
The 100 kWh BESS provides:
- **Peak load reduction:** Solar stored during day supplements fast-charging events
- **Backup power:** Ensures uninterrupted 24/7 charging during grid outages, critical for commercial fleet operations
- **Demand charge management:** Battery supplies peak power during simultaneous charging events, preventing expensive demand charge triggers

Case Study 2: Tesla supercharger + megapack storage hub, California (USA)

Location: Kettleman City, California
Type: Highway Supercharging hub for long-distance EV travel

System Configuration:
- Solar canopy installation (onsite generation)
- Tesla Megapack Battery Energy Storage System (~3 MWh)
- Charging capacity: 40+ vehicles simultaneously
- Charger mix: Tesla V3 Superchargers (up to 250 kW)

Unique Features:
- One of Tesla's flagship solar-powered Supercharger stations
- Integrated energy ecosystem: Solar + Storage + Fast Charging
- Designed to operate with reduced grid dependence
- Supports high intercity EV traffic on major travel corridors

Operational Impact:
- **Peak load reduction:** Megapack storage buffers high simultaneous Supercharging demand.
- **Demand charge management:** Reduces grid peak draw, lowering operating costs.
- **Renewable energy utilization:** Stores surplus solar energy for later vehicle charging.
- **Charging reliability:** Provides backup support during grid instability or outages.

IMPACT

Enables scalable, high-power EV charging while improving energy cost efficiency and renewable usage.

Source link you can cite:
https://www.tesla.com/megapack

4.

So, how do we solve this?

Solution: Solar integration is scaling EV charging - but critical gaps remain

Solar energy is emerging as one of the most effective enablers of sustainable EV charging infrastructure. With falling tariffs, rising rooftop adoption, and policy support, solar-powered charging stations are helping operators reduce electricity costs and lower carbon intensity. Across depots, commercial hubs, and charging corridors, solar integration is already improving the economics and environmental footprint of EV operations.

Solar energy is emerging as one of the most effective enablers of sustainable EV charging infrastructure. With falling tariffs, rising rooftop adoption, and policy support, solar-powered charging stations are helping operators reduce electricity costs and lower carbon intensity. Across depots, commercial hubs, and charging corridors, solar integration is already improving the economics and environmental footprint of EV operations.

However, while solar addresses part of the energy challenge, it does not fully resolve the structural gaps within EV charging infrastructure. Its intermittency, timing mismatch with charging demand, and grid integration limitations create operational and commercial constraints that solar alone cannot bridge.

Where solar adds clear value

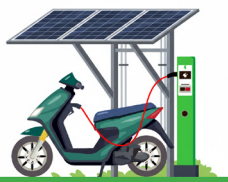
- Reduces grid electricity procurement
- Lowers charging cost per kWh
- Supports ESG and decarbonization goals
- Enables daytime fleet charging
- Utilizes rooftop and depot infrastructure
- Provides predictable long-term energy pricing

Solar has become the **first step** toward sustainable charging.

But key limitations remain

- **Generation–demand mismatch**
  Daytime solar vs evening charging demand.
- **Limited night support**
  No solar after sunset → grid reliance.
- **Grid dependency**
  Peak load & demand charges persist.
- **Underutilized solar**
  Excess generation goes unused.

Solar has become a foundational layer in sustainable EV charging - but its value remains constrained by intermittency, timing mismatch, and utilization gaps. Bridging these structural limitations requires complementary infrastructure that can store, shift, and optimize renewable energy in alignment with charging demand.



Closing the gap: Making Solar efficient for EV charging

Battery Energy Storage Systems (BESS) bridge the gap between when solar power is generated and when EV charging demand peaks.

What BESS actually does (In Simple Terms):
Think of BESS as a **time-shifting tool,** not complex technology:

1. Store cheap solar power during the day
- Solar generation peaks 10 AM - 3 PM, when wholesale electricity prices can drop to near-zero
- BESS captures this surplus energy for later use

2. Use stored energy during peak charging hours
- Release stored solar power during 6-11 PM when EV demand peaks and grid electricity is most expensive
- Avoid demand charges by drawing from battery instead of grid during high-power charging events

3. Reduce dependence on expensive grid power
- Real example: Surat's solar bus depot (100 kW solar + 224 kWh BESS) expects ₹**6.65 lakh annual savings** from avoiding peak-hour grid purchases[16]

4. Improve charger uptime during outages
- BESS provides backup power during grid disturbances, keeping stations operational
- Critical for fleet operators who cannot afford downtime

How batteries affect operating economics:

1. Without BESS:
- Charging stations pay volatile time-of-use rates
- Peak-hour costs can be 30-50% higher than off-peak
- Demand charges can comprise 70-90% of monthly bill at DC fast charging stations[17]

2. With BESS:
- 40-60% reduction in demand-charge components (documented in US NREL studies)[18]
- 23% reduction in per-session charging cost (California demonstration project)
- Predictable energy cost based on solar generation + modest grid backup

3 use cases BESS enables

Use case 1: Peak load reduction

- Surat depot: BESS stores solar during the day, discharges during evening/night bus charging, avoiding expensive peak-hour grid power

Use case 2: Backup power

- Bengaluru hub: 100 kWh BESS provides resilience during grid outages, ensuring uninterrupted 24/7 charging for commercial fleets

Use case 3: Grid services (emerging)

- NTPC BESS tender (2,500 MW / 10 GWh): Systems designed for daily 2-cycle operation to support morning and evening grid peaks, in addition to charging support

Battery technology & cost dynamics

StorEDGE BESS - By GoodEnough Energy

- **Storage duration**
  Typically **2–4 hours**, optimized for EV fast-charging and peak load management use cases.

- **Battery chemistry**
  Powered by **Lithium Iron Phosphate (LFP)** - chosen for higher safety, longer cycle life, thermal stability, and cost efficiency.
  Built on **in-house R&D and Made-in-India cell engineering.**

- **System configuration**
  Modular, containerized architecture ranging from **100 kWh to 1 MWh+** per unit.

Designed for scalable deployment across charging hubs, fleets, and commercial sites.

Key takeaway

StorEDGE doesn't replace the grid - it optimizes it. By storing energy when it's affordable and abundantly available, and dispatching it during peak demand or high-tariff hours, the system reduces cost pressure, stabilizes load, and enables more reliable EV charging operations.

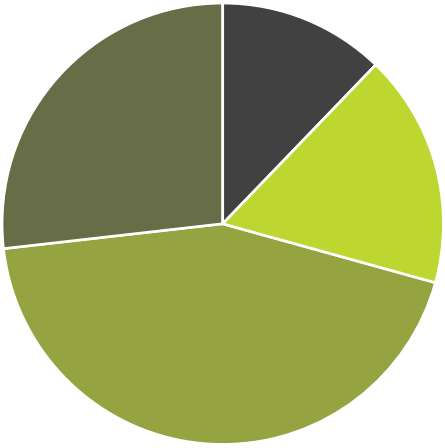
5.
Meeting India's EV and energy targets through integrated Solar + storage

The economic case

The business case for integrated solar + BESS + EV charging is strengthening rapidly as battery costs fall and electricity tariff differentials widen.

Approximate cost split for integrated EV charging hub:

For a typical **1 MW solar + 2 MWh BESS + 500 kW fast charging** setup (approximate Indian costs, 2025)



Component	Approximate share of Capex
Solar PV (rooftop/ground-mount)	25-30%
Battery Energy Storage System	40-50%
EV Chargers (hardware + installation)	15-20%
Balance of System (inverters, transformers, grid connection, civil works, controls)	10-15%

Key insight:
BESS represents the largest single capital cost but also delivers the most economic value through peak shaving, demand charge avoidance, and grid upgrade deferral.

How the business case improves

Battery prices influence project returns more than charger hardware costs. As BESS capex falls 10-15% annually, the payback period for integrated solar+BESS+charging systems is shrinking from 7-8 years to 4-6 years.

The environmental case

Solar curtailment represents massive waste:

India curtailed 2.3 TWh of solar in 2025, representing:
- **2.11 million tonnes of CO_2 emissions** that could have been avoided[19]
- Enough clean energy to power 400,000 households for a year[20]
- ₹5,750-6,900 crore paid to producers for power that was never used[21]

If this Solar energy had been stored:

Assuming 2.3 TWh of curtailed solar could have been captured by distributed BESS at EV charging stations:

- **2.11 million tonnes of CO_2 avoided** annually
  (equivalent to removing ~450,000 cars from roads)
- Zero compensation payments to solar producers for curtailment
- Massive reduction in coal-fired generation during evening peak hours

Real-world example:

The Surat depot's 224 kWh BESS generates 100,000 kWh annually from stored solar, avoiding approximately:

80 tonnes of CO_2 annually (assuming grid displacement of coal power)
This scales: 10,000 similar depots = **800,000 tonnes CO_2 avoided** annually

6.
Government policies supporting EV + Solar + BESS

India's policy push is lowering costs and accelerating integrated EV + solar + storage deployment.

PM E-DRIVE (2024–28)
₹10,900 Cr outlay | ₹2,000 Cr charging
72K–88K chargers | Up to 100% subsidy
Reduced Infra capex

EV Charging Guidelines
License-free | RE allowed | ToD tariffs
Reduced Opex, easier rollout

PLI – ACC Batteries
₹18,100 Cr | 50 GWh domestic capacity
Reduced Battery costs

National BESS Tenders
17 GW / 48 GWh storage
Reduced Storage prices, scale

RE + Storage Targets
500 GW by 2030 | Transmission waivers
Increased Solar + BESS viability

Net impact

- Lower charging capex
- Cheaper batteries
- Renewable integration enabled
- Faster EV infra ROI

Even with aggressive electrification push, EV charging infrastructure remains heavily reliant on diesel backup-creating a costly and carbon-intensive contradiction to clean mobility ambitions.

Final takeaway

The future of EV charging in India is not grid vs. Solar it is grid + Solar + storage working together.

By 2030:

- 10-15 GWh of BESS will be integrated with EV charging infrastructure (50× growth from 2025)
- Solar+BESS+charging will be the default configuration for new highway stations and fleet depots

The transition is underway. The question is no longer if, but how fast India can scale the integrated model to match the pace of EV adoption.

7.
Closing remarks

India's electric vehicle future and renewable energy future are inextricably linked. The evidence is clear: building these systems in isolation creates inefficiencies, wasted clean energy, and higher operating costs. Integration is not optional, it's essential.

Looking ahead

By 2030, integrated solar + BESS + EV charging will transition from pioneering projects to mainstream infrastructure. Policy frameworks will mature, reducing approval barriers and enabling revenue stacking. And India's EV fleet will grow to millions of vehicles requiring reliable, cost-effective, clean charging infrastructure.

The opportunity is clear: Build India's charging network with integrated solar and storage from the beginning, rather than retrofitting later at higher cost. The technology works. The economics work. Policy support is emerging. What remains is execution at scale.

The choice facing stakeholders is not whether to integrate solar and storage with EV charging, it's how quickly they can deploy integrated systems to capture the economic, environmental, and grid stability benefits before the competition does.

India's electric mobility future will be powered by sunshine stored in batteries. The infrastructure being built today will determine whether that future arrives on time or is delayed by avoidable inefficiencies. The path forward is integration.

References

[1] Ember Energy. "Beyond Capacity: Why India's Power System Must Get Flexible." January 2026.

[2] PV Magazine India. "India Curtailed 2.3 TWh of Solar Between May and December 2025." January 2026.

[3] Swastik Power Supply. "Industrial Power Tariff 2025 Revised Rates & Slab Rules." June 2025.

[4] Saurenergy. "SMC Charges Electric Fleet with Solar Powered Bus Depot." July 2025.

[5] Auto Economic Times. "India's First Solar-Powered, Second-Life Battery Integrated EV Charging Station is in Bengaluru." June 2025.

[6] Government of India, Ministry of Power. "Electric Vehicle Charging Stations Status." PIB Release, August 2025.

[7] Government of India, Ministry of Power. "EV Charging Infrastructure Growth Data 2022-2025." November 2025.

[8] ICCT. "India Synchronizes EV Sales and Charging Infrastructure Growth in 2024." Press Release, January 2025.

[9] Tesla Volts. "The State of India's Electric Vehicle Charging Infrastructure: A Comprehensive Analysis." September 2025.

[10] Government of India, Ministry of Power. "State-Wise EV Charging Station Data." PIB Release, November 2025.

[11] India Data Map. "EV Charging Stations in India: State-Wise Breakdown 2025." November 2025.

[12] All India EV. "EV Charging Stations in India 2025: Trends, Drivers & Key Challenges." November 2025.

[13] Mobec. "Charging the Future: India & Global Outlook on EV Charging (2026)." February 2026.

[14] Energy Central. "India's Electricity Demand to Reach 273 GW by 2025: Can Grid Handle Surge?" March 2025.

[15] Avaada Energy. "India's Grid Crisis: Why Renewables Matter." January 2026.

[16] CREA (Centre for Research on Energy and Clean Air). "India Power Sector Overview FY 2024-25." April 2025.

[17] Powerline. "Maintaining Balance: Power Sector Confronts Demand Surges and Decarbonisation Goals." July 2025.

[18] IEEFA. "Meeting India's Peak Power Demand with Clean Energy." February 2026.

[19] Neufin. "Commercial Electricity Tariff: 3 Components Explained." February 2025.

[20] NASEO (National Association of State Energy Officials). "Demand Charges & Electric Vehicle Fast-Charging." 2019.

Disclaimer: This report provides indicative financial and operational insights for EV charging infrastructure integrated with solar power and Battery Energy Storage Systems (BESS), based on 2024–2025 market data and industry analysis.

Actual project performance, savings, and ROI may vary depending on site conditions, engineering design, regulatory approvals, tariff structures, and technology costs. India's EV and energy storage ecosystem is evolving rapidly; therefore, stakeholders should conduct independent technical, financial, and legal assessments before making investment decisions.

Version: 1.0
Date Prepared: February 18, 2026
Prepared by: Goodenough Energy Analytics Team
Review & Approval: Strategy & Growth Team
Contact: connect@goodenough.energy

Scan to Book your energy consultation