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COVER STORY

Power To The People

How Distributed Solar Is Shaping India's Urban And Rural Energy Future



“

In Conversation with

Jay Kumar Waghela

CEO - Distributed Solar at
Fourth Partner Energy

*Highlights the need for uniform
definitions and single-window approvals
to boost distributed solar adoption.*

Dharmendra Jain

Director -
HFM Solar Power

*Expresses that distributed solar boosts
urban energy resilience through
decentralized power generation.*

MUST READ

Policy vs. Practice:

Are India's Distributed
Solar Goals on Track?

read more....

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IN CONVERSATION



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BUSINESS NEWS



Think Tank >

India's Solar Cell Manufacturing Set To Surge To 55 GW By 2027

India's solar cell manufacturing capacity is projected to reach 50-55 GW by FY 2027, up from 10 GW in 2024, driven by government policies to reduce import dependence. A Crisil Ratings report estimates that this expansion will require ₹28,000-30,000 crore in investment, structured in a 70:30 debt-equity ratio. Government initiatives like the Production-Linked Incentive (PLI) scheme and domestic content requirements are boosting local production, with around 45-50 GW of new projects announced. However, imported solar cells still account for 80% of total consumption, primarily from China. Despite higher domestic costs, policy support such as the Approved List of Cell Manufacturers (ALCM) is expected to enhance self-sufficiency, increase local integration, and reduce reliance on global supply.

Union Budget 2025: A Transformative Leap For India's Renewable Energy And Manufacturing Sectors

The Union Budget 2025-26 strengthens India's clean energy transition by prioritizing solar PV manufacturing, battery storage, and green hydrogen. Focused on Make in India, tax incentives, and financial support, it aims to reduce import dependence while boosting domestic innovation. Investments in grid modernization and nuclear energy enhance long-term energy security. Industry leaders see this as a vital step for infrastructure growth, job creation, and investment flow. The budget simplifies taxation, fostering economic expansion. While optimism surrounds its policies, efficient fund allocation and execution remain key. If implemented effectively, it will drive India's renewable energy leadership and accelerate a sustainable, self-reliant economy.

India's Renewable Surge: Powering Towards A Greener Future With Record Additions And Investments In 2024

India added 9,307 MW of power capacity in Q4 2024, with renewables contributing 85.8%. Total capacity reached 462 GW, with 209.4 GW from renewables. Solar dominated, comprising 76.3% of new installations. Rajasthan and Gujarat led renewable additions, with major projects from ReNew Power and NTPC. Investment surged to \$3.73 billion in Q4, though full-year funding declined 23.7% from 2023. Tata Power, Avaada, and JSW Neo Energy announced major deals. Despite investment challenges, India's renewable sector continues strong growth, aiming for 500 GW non-fossil fuel capacity by 2030, supported by policy stability and corporate clean energy adoption.

India's Renewable Energy Milestones: 217 GW Capacity And 182% Growth In 2024

India's renewable energy sector saw record growth in 2024, with 24.5 GW of solar and 3.4 GW of wind capacity added. Solar led the expansion, contributing 47% of total renewable capacity, with Rajasthan, Gujarat, and Tamil Nadu as top contributors. Rooftop solar grew 53%, aided by the PM Surya Ghar: Muft Bijli Yojana. Wind capacity surged, with Gujarat, Karnataka, and Tamil Nadu accounting for 98% of additions. Policy support, green hydrogen initiatives, and domestic manufacturing boosted progress. With 217.62 GW of renewable capacity, India is on track toward its 500 GW non-fossil fuel target by 2030.





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BUSINESS NEWS

Think Tank >

Exploring The Potential Of Sodium-Ion Batteries In India's Renewable Energy Future - Report

Sodium-ion batteries (SIBs) are emerging as a sustainable alternative to lithium-ion batteries (LIBs), addressing supply chain risks and cost concerns. The ASPIRE program, supported by the UK's FCDO, highlights SIBs' potential in India's energy landscape. With abundant sodium reserves and existing manufacturing capabilities, India can leverage SIBs for grid-scale storage and renewable integration. While SIBs have lower energy density, they offer safety, cost-effectiveness, and long cycle life. Global leaders like China and the US are advancing SIB research, and Indian firms are exploring adoption. Policy support and innovation could accelerate SIB deployment, complementing LIBs in energy storage.

Enhancing AMI Systems: Standardization And Interoperability For A Smarter Power Sector - CEA Report

The report focuses on standardizing Advanced Metering Infrastructure (AMI) for seamless communication between smart meters, head-end systems (HES), and Meter Data Management Systems (MDMS). It addresses interoperability challenges caused by proprietary communication technologies like RF Mesh and cellular networks. The Ministry of Power proposes two integration models to unify HES operations while ensuring security and scalability. A phased approach includes standardized protocols, modular communication, and secure key management. Future efforts will enhance industry adoption through REST APIs and JSON schemas, ensuring a scalable, vendor-neutral AMI system aligned with global standards.

Odisha's Ambitious Path To 7 GW Solar Power: Leading The Renewable Revolution - Report

Odisha aims for 7.5 GW of solar capacity by 2030, requiring an additional 6,500 MW beyond its current 608 MW solar capacity. With 300+ sunny days annually and 5.3 kWh/m² solar radiation, the state promotes ground-mounted, rooftop, floating, and agri-PV models. The Odisha Renewable Energy Policy 2022 offers investment incentives, tax benefits, and exemptions to attract solar development. Green hydrogen projects and rising industrial demand further boost clean energy adoption. Odisha's proactive policies and strategic investments position it as a renewable energy leader, driving sustainable growth and industrial decarbonization.

India's Solar Surge: Milestones Of 2024 And The Road Ahead For 2025

In 2024, India's solar industry reached a major milestone, adding over 24.5 GW of capacity, reinforcing its leadership in global renewable energy. Key policy updates, like the Approved List of Models and Manufacturers (ALMM) and continued anti-dumping duties on solar glass, bolstered domestic manufacturing and self-reliance. The government's support has attracted increased investor interest, with several IPOs reflecting the sector's growth potential. Experts like Mr. Udit Garg and Jaspal Singh foresee continued momentum, with 2025 marking a defining year for India's climate action strategy and solar capacity expansion.

Crisil Projects ₹31 Lakh Crore Green Investments In India By 2030 To Achieve Net-Zero Targets

India is set to see a five-fold increase in green investments, reaching ₹31 lakh crore by 2030, as part of efforts to meet net-zero targets by 2070. The investments will focus on renewable energy, transport, and oil & gas sectors. Crisil's Managing Director, Amish Mehta, highlighted the need for blended finance and flexible policy support. The Crisil Infrastructure Conclave 2025 emphasized decarbonization, financing, and greening infrastructure. The private sector, multilateral organizations, and government support are vital in overcoming financing gaps, with international collaboration playing a key role in scaling emerging technologies like green hydrogen and CCUS.

Refining Capacity Credit And Peak Demand Methodologies For India's Renewable Energy Future - CEA

India is transitioning from a fossil fuel-based energy system to renewable sources, requiring accurate capacity credit assessments for reliable power supply. Unlike stable thermal plants, solar and wind power vary with weather, necessitating scientific evaluation. The methodology analyzes recent demand trends while excluding COVID-affected years. Battery energy storage and pumped storage plants support peak demand management. Stakeholders recommend calculating capacity credit in million units (MUs) instead of megawatts (MW) for better accuracy. Advanced analytics, including k-means clustering, help optimize planning, ensuring India meets its renewable energy targets efficiently.



BUSINESS NEWS

Think Tank >

India's Renewable Energy Journey: 485 GW By 2030 - Growth, Challenges & Opportunities - Report

India's renewable energy sector is expanding rapidly, aiming for 485 GW capacity by 2030. As of FY2024, renewables account for 43.5% of total power capacity, with solar leading at 57%. Government support, including ₹191.1 billion in the 2024-25 budget, boosts initiatives like solar parks and the PLI scheme. Wind, hydro, and bio-power also contribute, alongside advancements in energy storage and green hydrogen. Foreign investments are rising, but challenges remain in grid integration, supply chains, and land availability. Despite obstacles, strong policies and investments position India's renewable sector for sustained growth and long-term energy security.

India Achieves 100 GW Solar Milestone, Solar Makes Up 60.73% Of Renewable Energy Capacity

India is steadily transitioning to renewable energy, with renewables accounting for 35.43% of total installed capacity by January 2025. Solar energy leads this shift, surpassing 100 GW, contributing 21.52% of total capacity. While renewables grow, coal still dominates at 45.87%, posing challenges for balancing reliability and sustainability. Government policies, such as quality standards for solar manufacturing, support this expansion. Renewable energy growth boosts job creation and energy security by reducing fossil fuel dependence. Continued investment, policy support, and technological advancements are essential to ensure a smooth transition towards a cleaner and more sustainable energy future for India.

Union Budget 2025: Strengthening India's Clean Energy Future With Renewable Expansion And Nuclear Growth

India's Union Budget 2025 focuses on energy security, domestic manufacturing, and achieving net-zero emissions by 2070. The government targets 500 GW of non-fossil fuel capacity by 2030, with solar and wind expansion, energy storage, and nuclear growth. Key measures include the National Manufacturing Mission, nuclear expansion to 100 GW by 2047, and incentives for recycling critical minerals. The budget builds on past initiatives like the PLI scheme and green hydrogen funding. While it strengthens renewable energy goals, gaps remain in wind energy, transmission, and storage support. Overall, it reinforces India's clean energy transition and long-term sustainability efforts.

Policy & Regulatory >

- MNRE Issues Guidelines For Solar Cold Storage With Thermal Energy Storage Backup
- MNRE Proposes Lower Efficiency Thresholds For Off-Grid Solar Projects: Seeks Stakeholder Feedback
- MNRE Invites Comments On Draft Application For ALMM Enlistment Of Solar PV Cells
- Ministry Of Power Issues Competitive Bidding Guidelines For Pumped Storage Plants To Boost Renewable Energy Integration
- Ministry Of Power Issues Draft Guidelines For Designating Renewable Energy Implementing Agencies For Solar And Other Projects
- Ministry Of Power Advisory On Co-Locating Energy Storage Systems With Solar Power Projects To Enhance Grid Stability And Cost Efficiency
- Ministry Of Power Issues Competitive Bidding Guidelines For Pumped Storage Plants To Boost Renewable Energy Integration
- Ministry Of Power Revises Bidding Guidelines For Wind-Solar Hybrid Projects To Boost Transparency And Efficiency
- Ministry of Power Amend Guidelines for Tariff-Based Bidding in Firm and Dispatchable Power from Grid-Connected RE Projects with ESS
- Ministry Of Power Amends Solar Bidding Guidelines To Enhance Transparency And Efficiency
- MERC Invites Public Feedback On 2025 Amendment To Transaction of Business And Fees And Charges Regulations
- MERC Enforces RPO Compliance For Captive Power Plants In Maharashtra
- Madhya Pradesh Electricity Supply Code 2021 Fifth Amendment Key Updates and Changes
- MPERC Introduces Amendments To Electricity Regulations Enhancing Recovery Charges And Consumer Provisions
- Assam Cabinet Approves Clean Energy Policy, Boosts Solar, Wind, Hydro, And Green Hydrogen Initiatives
- CEA Introduces New Verification Procedure For Captive Power Plants Across Multiple States
- RERC Introduces Rajasthan Electricity Grid Code 2024 Regulations To Strengthen Power Infrastructure
- APERC Approves Cost Data For Power Distribution Materials In Andhra Pradesh For FY 2025-26
- CERC Approves Tariff For 1200 MW Wind-Solar Hybrid Power Project At ₹4.64-₹4.73/kWh
- CERC Approves Tariff For 1530 MW Renewable Energy Procurement By NTPC
- CERC Approves Tariff For 1200 MW Wind-Solar Hybrid Projects Under SECI's Competitive Bidding

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Policy & Regulatory >

- MNRE Extends Compliance Deadline For Solar Inverters Above 100 kW To December 2025
- CERC Grants Compensation For GST Hike Impact On 350 MW Solar Project In Madhya Pradesh
- Central Electricity Regulatory Commission Amends Tariff Regulations For 2025
- CERC Grants Transmission License To PBTL For Renewable Energy Evacuation In Rajasthan
- CERC Issues Draft Cross Border Trade of Electricity Second Amendment Regulations, 2024
- CERC Clarifies Recovery Mechanism For DSM Pool Account Deficits And Legacy Dues
- CERC Grants Transmission License For Khavda IV C Power Transmission Project To Support Gujarat's Renewable Energy Expansion
- CERC Grants Flexibility To GETCO For Phased GNA Applications In FY 2025-26
- CERC Grants POWERGRID Transmission License For Bhadla-Bikaner Inter-State System
- Enhancing Power Distribution: CEA's Benchmarking Guidelines For Efficient O&M Practices
- Appellate Tribunal Overturns JSERC's RPO Exemption, Reinforces Strict Compliance With Renewable Energy Regulations
- APERC Introduces Draft Third Amendment To Security Deposit Regulation For Smart Prepaid Meters In Andhra Pradesh
- KERC Introduces New Regulations For Rooftop Aero Turbines With Solar Power Integration 2025
- Resolving Power Disputes: CERC Rules On Grid Constraints And Force Majeure In Energy Agreements
- KERC Proposes Amendment To Enhance Consumer Grievance Redressal Mechanism In Karnataka
- MSETCL's Revised Grid Connectivity Codes Reshaping Maharashtra's Renewable Energy Sector
- RERC Dismisses Petition Over Disputed Grid Connectivity Charges And Substation Bay Construction Costs
- GERD Approves 9 MW Hybrid Renewable Energy Procurement Agreement At ₹4.13 Per kWh
- CERC Grants Approval For Security Interest In KPS1 Transmission Limited's ₹887.20 Crore Transmission Project
- KERC Drafts Open Access Regulations 2025 To Enhance Renewable Energy Integration And Streamline Energy Access In Karnataka
- Karnataka Strengthens Power Grid With New Ancillary Service Draft Regulations 2024
- JSERC Introduces Fifth Amendment To Boost Rooftop Solar PV System In Jharkhand
- CSERC Drafts Intra-State Deviation Settlement Regulations 2025 To Ensure Grid Stability And Fair Energy Practices
- TNERC Amends Deviation Settlement Mechanism Regulations 2024 To Enhance Grid Discipline And Support Renewable Energy Integration
- CERC Rejects Petition To Replace Bank Guarantees With Payment On Order Instruments For Solar Project Connectivity
- Kerala's Path To 100% Renewable Energy: Shaping The Future With A New Regulatory Framework
- KERC Orders Suspension Of Grid Support Charges On Captive Power Plants, Including SRTPV Plants
- JERC Proposes Draft Resource Adequacy Regulations For Goa And Union Territories
- MNRE Mandates Stricter Standards For Solar PV Products To Ensure Quality And Efficiency
- Rajasthan Electricity Regulator Finalizes Terms And Conditions For Determining Tariffs In 2025 After Stakeholder Deliberations
- MERC Orders Refund Of Excess Wheeling And Transmission Charges, Ensures Consumer Protection Against Incorrect Billing
- GEDA Streamlines Off-Grid Renewable Energy Development With SOP For Solar, Wind, And Hybrid Systems
- HERC Seeks Stakeholder Input On Amendments To Green Energy Open Access Regulations 2023 For Enhanced Renewable Energy Adoption
- DERC Approves TPDDL's Short-Term Power Procurement Plan To Address Delhi's 2025 Summer Demand
- RERC Disposes Petition On Amendments For Renewable Energy Tariff Regulations, Considers Proposals For Future Green Energy Rules
- Kerala Electricity Regulatory Commission Issues Order To Streamline Electricity Connections In Residential Projects
- Telangana Aims For 20,000 MW Renewable Energy Boost With New Policy By 2030
- CERC Approves NTPC's Usage Charges For 1.99 GW Solar PV Project Under CPSU Scheme Phase-II
- CERC Adopts Tariffs For 900 MW Solar Projects Under SECI's Tranche XI With ₹0.07/kWh Trade Margin
- CERC Reviews SECI's 500 MW Battery Energy Storage System Projects For Grid Reliability And Renewable Integration
- KSEBL Secures Approval For 500 MW Solar Power Deal With SECI At ₹3.41-₹3.42 Per kWh
- CERC Approves ₹2.48/kWh Tariff For 450 MW Solar Project Under SECI's Tranche XVI
- GUVNL Faces SCOD Extension Request For 400 MW Solar Project Due To Force Majeure And Ongoing Settlement Talks
- APSPDCL Seeks APERC Approval For 400 MW Wind-Solar Hybrid Project To Boost Renewable Energy In Andhra Pradesh

BUSINESS NEWS

Investment >

Adani Green Energy Secures \$1.06 Billion Long-Term Refinancing For Solar-Wind Hybrid Project

Adani Green Energy Ltd (AGEL) has successfully refinanced its maiden Construction Facility with a long-term financing arrangement of USD 1.06 billion. The original facility was taken in 2021 to develop India's largest solar-wind hybrid renewable energy cluster in Rajasthan. This refinancing marks a major milestone in the company's capital management journey.

Sunsure Energy Secures ₹129 Crore Financing From Tata Capital And Aditya Birla Finance

Sunsure Energy has secured ₹128.82 crore in long-term debt financing from Tata Capital and Aditya Birla Finance Limited (ABFL) to support its renewable energy expansion. This funding has been used for the construction of Sunsure's 49 MWp open-access solar plant in Augasi, Uttar Pradesh. The financing will further strengthen Sunsure's portfolio, which includes 145 MWp of commissioned open-access solar projects in the state. The total project finance amount is equally shared between the two financiers.

IREDA to Raise ₹5,000 Crore via QIP for Green Energy Projects

The Indian Renewable Energy Development Agency Ltd. (IREDA) has announced plans to raise up to ₹5,000 crore through a Qualified Institutions Placement (QIP) of equity shares. The decision, approved by IREDA's Board of Directors, aims to enhance the agency's financial capacity to meet the rising demand for renewable energy financing.

NTPC Green Energy Releases Monitoring Report On ₹10,000 Crore IPO Fund Utilization

NTPC Green Energy Limited (NGEL), a subsidiary of NTPC Limited, has released the Monitoring Agency Report for the quarter ending December 31, 2024. The report, prepared by CARE Ratings Limited, provides an update on the utilization of funds raised through the company's Initial Public Offering (IPO). The total IPO proceeds amount to ₹10,000 crore, which is being monitored as per SEBI regulations to ensure transparency and compliance.

Juniper Green Energy Secures \$1 Billion Debt Financing To Expand Renewable Energy Projects In India

Juniper Green Energy, a renewable energy developer, has secured US\$1 billion in phased debt financing from leading financial institutions, including Power Finance Corporation Limited (PFC), DBS Bank, HSBC Bank, and the Indian Renewable Energy Development Agency Limited (IREDA). This funding will support the company's growth and the development of its wind-solar hybrid and Firm & Dispatchable Renewable Energy (FDRE) projects.

EQT and Temasek Sell O2 Power to JSW Neo Energy for USD 1.5 Billion, Strengthening India's Renewable Energy Sector

EQT Infrastructure IV (EQT) and Temasek have announced the sale of O2 Power, a leading renewable energy platform in India, to JSW Neo Energy, a wholly owned subsidiary of JSW Energy, for USD 1.5 billion. The transaction marks the exit of EQT and Temasek from the company, which they had established in 2020 as a greenfield renewable energy start-up.



Power To The People

HOW DISTRIBUTED SOLAR IS SHAPING INDIA'S URBAN AND RURAL ENERGY FUTURE



Distributed solar energy is transforming India's energy landscape by providing affordable, reliable, and sustainable power to urban and rural areas alike. With India's ambitious target of achieving 500 GW of renewable energy capacity by 2030, distributed solar is emerging as a crucial component of this energy transition. It plays a key role in reducing dependence on traditional fossil fuels, enhancing energy access, and supporting the nation's broader climate goals.

In urban areas, distributed solar systems, such as rooftop solar panels, are becoming a popular choice for households, businesses, and industrial establishments. The government's push for solar adoption through initiatives like the Rooftop Solar Scheme has made solar installations more accessible and affordable. Subsidies for residential users and net metering policies have further incentivized people to switch to solar power. As of 2024 end, India has achieved 15.67 GW of Grid Connected Solar Rooftop capacity. These systems not only reduce electricity bills but also allow consumers to become prosumers—both producers and consumers of electricity—contributing excess power to the grid.

Rural India is witnessing a transformative impact of distributed solar through microgrids and solar home systems. In regions where access to electricity has historically been a challenge, these systems are providing reliable energy for lighting, cooking, and small-scale businesses. Solar microgrids, particularly in remote villages, offer a sustainable solution to bridge the energy gap. According to the Ministry of New and Renewable Energy (MNRE), solar microgrids and standalone systems have powered over 18,000 villages in India, significantly improving the quality of life for millions of people.

One of the most remarkable aspects of distributed solar is its ability to empower communities. It enables rural women to engage in income-generating activities, such as running solar-powered sewing machines or refrigeration units for preserving agricultural produce. Farmers are also benefiting from solar-powered water pumps, which have reduced their dependence on erratic grid supply and expensive diesel alternatives.

Another key advantage of distributed solar is its role in strengthening grid stability. By generating electricity closer to the point of consumption, these systems reduce transmission losses, which are a significant issue in India's vast and complex power network. Additionally, distributed solar can complement utility-scale renewable projects, ensuring a more balanced and resilient energy mix.

The financial aspect of distributed solar has also seen substantial improvement. Falling costs of solar panels and advancements in battery storage technology have made these systems more viable for a larger segment of the population. Innovative financing models, such as pay-as-you-go systems and solar leasing, are enabling low-income households and small businesses to adopt solar energy without upfront investment.

Despite its numerous benefits, challenges remain in the widespread adoption of distributed solar. Regulatory hurdles, a lack of awareness among potential users, and limited availability of skilled technicians are some of the barriers that need to be addressed. Strengthening policy support, streamlining approval processes, and investing in training programs can accelerate the growth of distributed solar in India.

As distributed solar continues to expand, it is shaping a more inclusive energy future for India. By decentralizing power generation, it is not just reducing carbon footprints but also ensuring that clean energy reaches the most marginalized communities. Distributed solar is truly giving power to the people, illuminating homes, energizing businesses, and driving the nation toward a sustainable tomorrow.



REimagine Energy REdefine Sustainability REnew the Future



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A View on Green Finance

The transition of national economies towards green, sustainable economics has now become imperative. Governments, regulators, private enterprise across the world are seized of this. We see an incremental implementation of de-carbonization measures and strategies aimed at greening not only manufacturing, service and supply chains, but also greening the financial systems while fostering green business opportunities. Achieving a low carbon economy necessitates an intensive approach of financing the transition and focusing on hard to abate sectors. In India we face very significant challenges in de-carbonizing hard to abate sectors without endangering industrialization. Since India is yet to peak in its emissions, circularity, energy efficiency and material efficiency will be the key in its de-carbonization strategies. In heavy industries material efficiency and circularity can reduce carbon emissions by an estimated 40%, short-term emissions can reduce by upto 20% (through improvements in energy efficiency). In the case of India, despite per capita emissions being below the global average, we are the third highest green house gasses emitter in the world.

Our power sector is the largest emitter. It is responsible for 37% of the total green house gasses emitted in the country. Agriculture follows next with 21%, manufacturing is 17% and the transportation sector is 9%. The energy sector de-carbonization involves transitioning to clean energy sources. Achieving a transition will require substantial capital flows. Estimates say we would require cumulative investments of US\$ 10.1 trillion by 2070 to meet net-zero. The caveat is that currently tracked finance flows to the mitigation account for only about 25% of the total investments needed in India. This indicates that our transition to net-zero will require increased climate investment not only in clean energy, but also in the hard to abate sectors. These investments must be supplemented by policies and incentives which enable the adoption of more efficient and clean alternatives without hindering economic growth. In my view there is very substantial potential for diverse sectors to collaborate, drive innovation and tackle common challenges through shared knowledge, joint innovation, risk mitigation and resilience planning.

Financing the transition will require a combination of green finance and transition finance. To clarify, green finance relates to financing those technologies that produce near net-zero emissions and are aligned with the Paris Agreement. An example is investing in roof-top solar or wind energy projects. Transition finance relates to finance for reducing emissions for hard to abate sectors. It typically allocates capital to companies and activities which are not green but are in the process of "becoming green" or reducing emissions, thereby emphasizing both inclusiveness and environmental integrity to avoid greenwashing. It caters to requirements of hard to abate sectors which cannot be green in the short term due to lack of green alternatives which are both economically and technically feasible. While green finance is a widely understood term, transition finance is newer and has multiple definitions. I believe we need a multi-faceted approach to address the need for green and transition finance. Our broad challenges are technical, economic and institutional. Near zero carbon technologies occupy a niche with high costs and performance risks making them less competitive compared to established processes. Added to this is the fact that the risk-return profile of these technologies are difficult to justify because of their capital intensive nature and long-term horizons. The perceived risks associated with these sectors compound the problem. On the institutional aspect, our capacities are weak and public as well as private institutions often work in silos with little co-ordination.

Clearly, we need an enabling ecosystem for transition to low carbon pathways. The second half of our challenges lie in policy, regulation, markets. In the area of policy we require urgent timelines for transitions across sectors, this in turn requires policy push from Government. The policies must include subsidies, tax breaks, on the one hand and on the

other they should increase the demand for mandates such as renewable energy targets, public procurement programmes, and consumer awareness campaigns. The regulators will have to build confidence (long-term policy commitments and transparent policymaking) among new players to invest in novel technologies. Policy levers will have to create an enabling environment, regulator support and implementation. From regulators will form the second bed-rock of this enabling environment. This includes setting standards, guidelines and benchmarks for emissions, energy efficiency and renewable energy integration, besides effective monitoring and evaluation. Finally, I think, market movement is equally critical. We need a cross-functional cross-sectoral approach to create models and pipelines which will attract and absorb capital. The irony is that while there is capital available, there are no bankable projects or pipelines to direct that capital.

We see that financial institutions are increasingly acknowledging the physical and transition risks which arise from climate change --- e.g. increasing risks of stranded assets from closed power stations or transport infrastructure. Despite efforts to keep pace with the growing need for green and transition finance, the uptakes are low. In India, so far, the tracked finance flows towards climate change mitigation are hardly a quarter of the total required. The increased ambitions reflected in the Nationally Determined Contributions (NDCs) and the commitment of India's G20 presidency, should see financing flows increase rapidly. For this, the financial sector must get support and a push towards introducing new fiscal products while increasing the uptake of existing ones which align with green and transition finance. The spectrum of financial institutions including retail and investment banks, capital markets, insurers, asset owners, operate under diverse contractual and regulatory environments owing to unique and individual characteristics - size, business model, sector coverage, fiduciary duty towards shareholders etc. We must also ensure fair taxonomy. Lack of it hinders not only the uptake of existing products but also the innovation of new ones. We should also quickly harmonize regulatory guidelines. The Reserve Bank of India has released draft guidelines, the formal guidelines notification must follow. The insurance and pension fund regulators have yet to even issue draft guidelines. Only the Securities & Exchange Board of India (SEBI) has released ESG rating guidelines and the Business Responsibility and Sustainability Reporting disclosure framework (BRSR). Without a formal, integrated set of regulatory fiscal guidelines we will continue to face challenges. Capacity building is yet another vital area. A formal and robust capacity building system is required. Finally, I think we need to enhance our play in market-led innovations {while ensuring adherence to guardrails and regulations, as well as the risk of greenwashing and transition washing}. Innovations in fiscal mechanisms and structures will increase cash flows to both green and transition activites. Our current incentive structures do not support levels of innovation required in the financial sector. This has to be corrected and supplemented by readily available concessional capital which is necessary to increase lending.

The final arbiter, naturally, is the immediacy with which we implement the above.



Udit Garg

Managing Director & CEO
Kundan Green Energy

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The Role of IoT in Monitoring and Managing Distributed Solar Systems

Introduction

The need to utilize renewable sources of energy has resulted in radical development being done on solar energy systems. There is also a rise of distributed solar energy systems, which is small-scale photovoltaic systems placed in homes, businesses, and even industrial buildings. While these systems help in the decentralization of energy and hinder the use of fossil fuels, they possess problems like supervision of energy output, effectiveness, and performance of the systems in various locations.

The IoT (Internet of Things) has grown into a huge game changer in dealing with these problems. IoT has introduced advanced capabilities like collection of data in real time, assumption of when maintenance is required and for management of energy. These aspects help in optimizing the IoT distributed solar systems. At the same time, there are problems that need to be addressed when IoT is utilized, especially in relation to cyber security, data protection, and policies that needs to be adhered to.

Understanding IoT in Solar Systems

IoT stands for the Internet of Things where devices are connected to each and interact with one another, electronically. In the solar energy systems, there are IoT devices like sensors, smart devices, meters, inverters, and even controllers that collect primary information about energy generation and consumption as well as the environment, and then transfer this data through the network. This information is then analysed instantaneously in the cloud or on edge applications to understand how well the system is performing while making it possible for algorithms to conduct actions on their own.

It helps remote solar energy systems to do away with segregated power generation and interference-free control of the components. It facilitates energy stakeholders to keep control of the energy systems even remotely, take quick action to mitigate problems, and carry out performance improvements. Such activities would reduce operating inefficiency and expenses

Applications of IoT in Monitoring and Managing Distributed Solar Systems

• IoT Devices Constantly Track And Store Data

The advancement of IoT tools has revolutionized the monitoring and management of distributed solar grids. These tools enable continuous monitoring throughout the system's operational lifetime, providing real-time updates on energy generation, system performance, and external environmental factors. For instance, smart sensors can detect shading, dirt accumulation, or damaged hardware components—factors that can reduce energy output. This granular level of monitoring allows system operators to anticipate and mitigate energy losses effectively. Additionally, IoT systems provide operators with sophisticated dashboards and analytical tools. These tools facilitate the examination of energy generation data, enabling accurate predictions and data-driven decision-making to optimize performance and maintain efficiency over time.

• Predictive Maintenance and Fault Finding

The possibility of predictive maintenance is one of the IoT's most groundbreaking achievements. IoT systems can analyse historical and present data to pin point indicators of possible equipment failure. For instance, a decline in voltage output from a solar panel might be reason enough for some maintenance. In the example of solar panels, predictive maintenance leads to lower repair costs, reduced downtime, and longer life for the components. It is a vital shift of a system's strategy to a proactive approach in achieving performance and reliability optimization.

• Optimization of Energy Use and Grid Integration

Smart energy management powered by IoT makes it possible to analyse energy usage data to improve distribution. For instance, smart inverters are capable of controlling energy output to match the needs of the grid. In this way, off peak generation is reduced when there is little demand. Besides that, IoT also makes it possible to combine distributed solar systems with other sources of energy like batteries and electric vehicles, making it easy to integrate with other resources. Electric cars and battery storage systems will enhance an energy ecosystem by adding flexibility to the supply and respond to changes in demand

• Remote Management of Distributed Systems

System operators are able to supervise and control solar installations across large territories through IoT. With this technology, one is able to observe control a solar powered system built on the top of a house or even a solar powered farm located in a secluded area. This is also appealing for utility solar projects and micro solar grids.

Benefits of IoT in Distributed Solar Systems

The distributed solar systems allow many benefits through the adoption of IoT -

• Increased Efficiency:

Processes are made more efficient through IoT ensuring systems are working at their full capacity with minimum wastes.

• Cost Savings:

Repair and downtime costs are reduced from prediction maintenance; energy optimization reduces electricity costs.

• Scalability:

Processes are made more efficient through IoT ensuring systems are working at their full capacity with minimum wastes.

• Enhanced Sustainability:

IoT helps to build a more sustainable energy system by cutting down on energy waste and fossil fuel energy consumption.



Legal and Regulatory Issues

The incorporation of IoT into distributed solar systems may raise some legal issues pertaining to cybersecurity, data privacy, and standards compliance which in turn can be taken as an advantage.

- **Cybersecurity Vulnerabilities**

Cyber-attacks on IoT devices in solar systems can impact power generation or the integrity of data collected. The coordinated attack of IoT enabled solar systems can greatly disrupt the supply of energy leading to outages or huge monetary losses.

- **Data Privacy Issues**

Patterns of energy consumption and user interfaces are a few examples of the type of data right now being harvested and stored. This available information needs to be safeguarded as it has significant legal implications due to regulations set by GDPR, CCPA, and the public's willingness to trust businesses privacy philosophy. Legal frameworks set will be expected to put these measures in place preventing the misuse of the accessible personal and sensitive information stored.

- **Compliance With Regulations**

IoT introduction into solar systems depends on a number of existing general industry regulations and policies. For The National Institute of Standards and Technology (NIST) provides recommendations for securing IoT devices, while international organizations work toward establishing global standards for IoT security and interoperability. Compliance with these standards is essential for ensuring the safe and efficient operation of IoT-enabled solar systems.

Conclusion

The IoT revolutionizes the efficiency of distributed solar systems monitoring and control fields. Real-time data reception brings prediction in maintenance and optimized energy usage: together, it erases the inefficiency and unreliability present in solar energy systems. However, there is the corresponding lagging law creation particularly in cybersecurity and data privacy in response to the technical progress.

To maximize IoT in the context of solar energy, a balanced view toward the advantages gained by adopting IoT will include implementing tough security protocols, subjecting one accompanied as well upon regulatory frameworks, and driving innovation through collaborative efforts among technology providers, energy companies, and lawmakers of a combined innovative movement.



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POLICY VS. PRACTICE: ARE INDIA'S DISTRIBUTED SOLAR GOALS ON TRACK?



Recently, India's renewable energy installed capacity crossed the 200 gigawatt ("GW") mark. And, solar power played a major role therein with the lion's share (of 97.86 GW) being attributable to it.¹ While the growth story for utility scale solar projects and, more recently, even the large-scale commercial and industrial open access solar projects has been splendid, the same cannot be said for rooftop/decentralized solar projects.

India realized the role distributed solar can play in our clean energy story, early on; and thus, the 'Jawaharlal Nehru National Solar Mission' ("JNNSM") launched in 2010 envisaged development of such projects. In 2015, the Government of India's ("GoI") target for rooftop solar was 40 GW to be achieved by 2022.² Unfortunately, the installed grid connected rooftop solar capacity achieved until December, 2024, was a meagre 15.67GW.³

GoI's desire to promote distributed solar projects cannot really be questioned in light of various schemes launched by it. In addition to the push through the JNNSM, GoI notified the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyaan in March, 2019 with an aim to provide financial support to farmers for installation of standalone solar pumps and solar power plants and solarization of existing grid-connected agriculture pumps to add 30.80 GW of solar capacity by 2022. Thereafter, on February 29, 2024, the PM Surya Ghar: Muft Bijli Yojana was notified by the GoI ("Muft Bijli Yojana").⁴

Growth of distributed solar has been bleak thus far, despite GoI's policy push. Some of the main reasons for the same appear to be:

- lack of clarity on regulatory requirements for setting up rooftop solar power plants within states. Despite almost all states issuing net and/or gross metering policies for rooftop solar power plants, grid connection regulations/processes for such project remain challenging in most parts of the country;

- unwillingness of power distribution companies ("DISCOMS") to promote them, as the growth of these means, revenue loss for them;
- delay in grant of regulatory approvals for setting up these plants;
- additional charges (such as, network charge, grid support charge) being levied on these projects; and
- limited financing options for such projects.

It now seems that with the issuance of Muft Bijli Yojana, the GoI intends to strongly target the residential sector for setting up solar rooftop projects. As of date, the reported progress of this policy is very impressive. Greater awareness and better implementation of the policy and the gamut of incentives being offered to the various stakeholders such as consumers, DISCOMS, local bodies (such as, municipal corporations and gram panchayat), perhaps are some reasons for its success.

Though, GoI's heart with respect to distributed solar seems to be in the right place, the on-ground reality has been different. Incentivising the DISCOMs to adopt distributed solar with adequate financial support, ensuring steady availability of quality domestic modules, net meters and other equipment and addressing some of the issues discussed above may help the distributed solar sector grow finally!



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Distributed Solar Financing

Unlocking Investments for a Greener Future

The proliferation of distributed solar energy in India faces significant challenges, primarily due to the high initial investment costs of setting up a solar energy system. Also, the motivation to invest in these solutions is often found lacking, despite government subsidy schemes like the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyaan (PM-KUSUM) and the PM Surya Ghar: Muft Bijli Yojana. This is because the sectors for which these schemes are applicable already enjoy electricity subsidy: electricity for the agriculture sector is subsidised across India, while more and more states are providing subsidised electricity to residential consumers. Thus, to augment investments in distributed solar energy, innovative financing approaches need to be implemented.

One such mechanism involves aggregating local demand and installing distributed solar energy systems at centralised locations. Third parties can invest in such a model and leverage innovative metering solutions like virtual net metering or group net metering to achieve economies of scale. However, protecting the interests of third parties is a challenge, necessitating robust frameworks for contracts and power purchase agreements to ensure mutual benefits.

Another effective strategy is presented by the community solar model, which encourages groups of consumers to collectively invest in distributed solar installations at a centralised location. Besides providing the benefits of economies of scale to the consumers, this approach enables risk-sharing, thus fostering community development, particularly in rural areas where co-operatives can be formed. The main challenge here lies in maintaining harmony among community members, since a collaborative spirit is essential for this model to thrive and deliver its full potential.

To attract investment in distributed solar energy from consumers that have electricity subsidy support, further innovations are needed. Some states are providing subsidies in addition to the central financial assistance available under the PM-Surya Ghar and PM-KUSUM schemes. This minimises the initial investment needed from consumers. Since such mechanisms require coordination between the central and state subsidy schemes, streamlining the processes is crucial for facilitating access and preventing delays.

States are also exploring schemes that oversize the solar system to a level that is slightly higher than the consumption of the households. The central financial assistance available is used as equity and the remaining investment is sourced as low-cost debts from nationalised banks or other institutions such as the National Bank for Agriculture and Rural Development (NABARD). Revenue generated from selling the surplus electricity to electricity distribution companies (DISCOMs) can be used to repay the debt. For these schemes, the limited availability of suitable rooftop spaces is a major issue. The variations in consumption and in the resultant surplus generation also poses a challenge. Designing flexible equated monthly instalments (EMIs) can help in dealing with this problem.

Finally, as carbon markets mature in India, introducing carbon credits for distributed solar projects could provide an additional revenue stream beyond electricity sales. This incentive would make distributed



solar more attractive to consumers and help in increasing its uptake. By monetising the environmental benefits of solar energy generation, this mechanism can further enhance the economic viability of distributed solar systems.

Enhancing consumer engagement through innovative financing solutions is crucial for scaling up distributed solar energy in India. Though these models come with their unique advantages and challenges, they collectively represent viable pathways to unlock investments in this area for a sustainable future. By prioritising their implementation and fostering collaboration among all the stakeholders, India can accelerate its transition towards a greener energy future.

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Distributed Solar: The Future of Energy Resilience in Urban India

The urban population in India—the world's most populous country—is expected to reach 675 million by 2035 as per the World Cities Report 2022 by UN-Habitat. As most commercial and industrial activities occur in urban areas and electricity is a major factor for development, this population increase will fuel a surge in electricity demand, leading to acute pressure on traditional energy grids and frequent blackouts. At the same time, Indian cities, similar to their global counterparts, are facing increasing climate disasters, highlighting the need for more resilient and decentralised energy solutions.

Building urban energy resilience by embracing distributed solar

The widespread adoption of distributed solar technologies such as rooftop solar (RTS) systems, building integrated photovoltaics (BIPVs), and urban PVs could be a promising solution. With a decentralised and clean approach for electricity generation, these systems offer some key advantages.

Power during outages

Solar-powered off-grid establishments and mini/microgrids with battery storage offer significant benefits during power outages. By providing independent power for buildings during crises, they can also serve as a backup for essential services such as hospitals.

Resilience during disasters

Electricity grids are vulnerable to infrastructure damage during extreme weather events, leading to widespread outages. For instance, after Cyclone Fani in 2019, several power lines were damaged in Odisha, leading to power outage for weeks. However, some households with RTS systems were able to generate electricity by removing and reinstalling the systems following the cyclone.

Peak load reduction

In sprawling urban areas, electricity demand often peaks during the day, particularly in summers due to the increased need for cooling. As per the State Load Dispatch Center, Delhi, the city's peak load touched 8,656 MW in the financial year (FY) 2024–25, 16% higher than the previous FY's peak. With abundant solar energy during daytime, distributed solar technologies could effectively address this peak demand by generating clean energy during these critical hours.



Distributed solar and vehicle-to-grid (V2G)

RTS systems allow homeowners to generate renewable energy, which can be used to charge electric vehicles (EVs) directly, reducing reliance on grid electricity. During peak hours, if EVs are fully charged and stationary, power can be fed back into the grid through a V2G system. This combination of solar power and V2G makes the energy system more flexible and resilient, particularly in urban areas with limited space for large-scale storage.

However, distributed solar systems need to have robust designs to tolerate extreme climate events. For instance, in extreme heat, PV systems suffer significant dips in performance along with shortening of module lifespans. Innovative designs such as rooftop agrivoltaics with circulating water systems can reduce ambient temperatures.

In conclusion, distributed solar represents the future of India's urban energy landscape, empowering consumers with greater energy independence and resilience against climate disasters.

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THE SMART SOLAR REVOLUTION: INNOVATIONS DRIVING DISTRIBUTED ENERGY SOLUTIONS

The Indian solar market is witnessing a transformative shift as innovations in distributed energy solutions are helping reshape the way energy is produced and consumed across the country. With an increasing emphasis on sustainable energy, India is positioning itself as a global leader in solar energy, and the rise of smart solar technology is playing a critical role in this journey.

Distributed energy solutions (DES) are decentralizing the production of power by shifting away from large, centralized power plants to smaller, locally distributed solar systems. This change allows for more efficient energy use and improved grid resilience. India's vast and diverse landscape presents an ideal opportunity for these systems to thrive, as they can be deployed in rural and remote areas where traditional electricity infrastructure is often lacking or unreliable.

One of the key innovations in this space is the integration of smart technologies with solar power. Advanced systems such as solar panels with built-in sensors, IoT (Internet of Things) devices, and AI-powered platforms are helping optimize energy generation and consumption. These systems can monitor performance in real time, adjust energy distribution based on demand, and identify faults or inefficiencies before they become major issues. This not only ensures a more efficient and reliable energy supply but also reduces maintenance costs and extends the lifespan of the equipment.

In India, companies are developing and deploying innovative solar energy solutions, including rooftop solar systems, solar microgrids, and energy storage technologies. Rooftop solar systems, in particular, are becoming increasingly popular among residential and commercial users. These systems allow individuals and businesses to generate their own electricity, reducing their dependence on the grid and helping to lower electricity bills. Additionally, they contribute to the broader goal of reducing carbon emissions, as India seeks to meet its renewable energy targets.

Another notable trend is the rise of solar-powered microgrids. These small, self-sustaining networks are designed to provide reliable power to areas that are not connected to the central grid. Microgrids can be powered by solar panels and equipped with energy storage systems to ensure a continuous supply of power even during periods of low sunlight. These systems are particularly valuable in rural areas, where the grid may be unreliable or nonexistent, offering communities a sustainable and resilient energy solution.

Energy storage technologies are also advancing rapidly in India. With energy storage systems, solar power can be stored during the day and used at night or during periods of high demand. This solves one of the major challenges of solar energy – its intermittency. As energy storage technologies become more efficient and cost-effective, they will further enable the widespread adoption of solar power, helping to balance supply and demand more effectively.

In addition to these technological innovations, India's solar market is benefiting from supportive government policies and incentives. The government has set ambitious targets for solar energy installation, with



plans to achieve 500 GW of renewable energy capacity by 2030. Policies such as subsidies for rooftop solar installations, tax incentives for solar manufacturers, and grid connectivity for solar systems are helping drive growth in the sector.

The shift towards distributed energy solutions is not just a technological revolution, but also an economic one. As solar technology becomes more affordable and accessible, it is empowering individuals and businesses to take control of their energy needs. This decentralized approach to energy generation has the potential to reduce energy poverty, create jobs, and boost local economies across the country.

India's solar market is rapidly evolving, driven by innovations in distributed energy solutions. The integration of smart technologies, solar microgrids, rooftop installations, and energy storage systems is creating a more sustainable and resilient energy future for the country. With continued support from the government and ongoing advancements in technology, India is on track to lead the way in the global solar revolution.

"The Bharat Solar Expo 2025" has come to a successful close, showcasing cutting-edge solar technologies, innovative solutions, and fostering key industry collaborations. The event brought together industry leaders, policymakers, and innovators, driving conversations on sustainable energy and future advancements. With record participation and insightful discussions, the expo marked a significant step towards a greener and energy-efficient future.

RAJASTHAN SUSTAINABILITY AWARDS



Sustainable Solar Business of the Year - Developer

Innovative Solar Technology Award - Excellence in Monitoring and Analytics

Amplus Solar



Sustainable Solar Business of the Year - EPC

Solar91 Cleantech Pvt. Ltd.



Sustainable Solar Business of the Year - Modules

Novasys Greenergy Pvt. Ltd.



Sustainable Solar Business of the Year - Transformers

Danish Power Limited



Rising Star in Sustainable Solar Business

Solaire - A Lagnuvo Initiative



Innovative Solar Technology Award - Modules

Gautam Solar



Most Efficient Solar Module Technology Award

Saatvik Green Energy Limited



Innovative Digital Solar Technology Award

Grossky Software Services Pvt Ltd

RAJASTHAN ENERGY AWARDS



Solar Panel Manufacturing Company of the Year

**Insolation Energy Ltd.
(INA Solar)**



Solar Developer of the Year

Rays Power Infra Limited



Best EPC Company of the Year - Kusum Scheme

Outstanding Large-Scale Solar Park



Innovative Solar Technology Award - SCADA Solution for PM-KUSUM

Logics PowerAMR Pvt. Ltd.



Best Solar Energy Storage Solution

iNVERGY India Pvt. Ltd.



Innovative Solutions in Research and Consulting

Verified Market Research



Solar Ground Mount Project of the Year - IPP

Acme Heergarh Powertech Private Limited



Solar Ground Mount Project of the Year - EPC

Vikram Solar Limited



Solar Commercial Project of the Year

Vareyn Solar



Best Industrial Solar Project of the Year - Platinum

Sky Volt Private Limited



Best Industrial Solar Project of the Year - Diamond

Pinaka Power and Electricals

RAJASTHAN CHANNEL PARTNERS AWARDS



Fastest Growing Solar Channel Partner - Wires & Cables

PARK CABLES



Top Rooftop Solar Channel Partner

MK SOLAR ENERGY
Authorized Super Stockist
Rajasthan - INA Solar

RAJASTHAN ENERGY LEADERSHIP AWARDS



Women in Solar Leadership

DIVYA KUMAWAT

Director

Sky Volt Private Limited



Solar Energy Leader of the Year - Platinum

ISHAN CHATURVEDI

Director & Co-Founder

Vareyn Solar



Solar Energy Leader of the Year - Diamond

YASHVARDHAN SHARMA

Director

Pinaka Power and Electricals



Most Influential Solar Leader

PAWAN SHARMA

Whole Time Director

Rays Power Infra Limited



Rising Solar Energy Leader - Platinum

CHANDRAPRAKASH YADAV

Head- EPC Projects

Saatvik Green Energy Limited



Rising Solar Energy Leader - Diamond

HARSH LAKHWANI

Designation

Company Name



Visionary Leader in Solar Innovation

SHIVAM TALWAR

Managing Director

Danish Power Limited



Young Leader in Solar Energy

KULDEEP CHOUDHARY

Managing Director

Hyper Green Renewable Energy Pvt. Ltd.



Business Leader of the Year

VAIBHAV ROONGTA

Chief Business Officer

Rays Power Infra Limited



Outstanding Contribution to Solar Energy Expansion

JITENDER SINGH

Managing Director

Adhiraj Technocrats Pvt. Ltd.



Public Sector Solar Leadership

MANISH GUPTA

Chairman

Insolation Energy Ltd.
(INA Solar)

UNLOCKING BUSINESS OPPORTUNITIES IN DISTRIBUTED SOLAR: CHALLENGES, STRATEGIES, AND MARKET GROWTH



Distributed solar energy is gaining significant traction in India, offering a promising avenue for businesses to explore as the country transitions to cleaner, renewable energy sources. Unlike traditional large-scale solar power projects, distributed solar involves generating electricity from solar panels installed on rooftops or smaller ground-mounted systems, typically at a local level. This model has the potential to transform India's energy landscape, providing businesses with opportunities to meet their energy needs while reducing their carbon footprint. However, as promising as this shift is, several challenges need to be overcome to unlock its full potential.

One of the key challenges in the distributed solar market in India is the regulatory and policy framework. While the Indian government has introduced various initiatives to promote renewable energy, including the Solar Rooftop Program, the regulatory environment remains fragmented across states. Different states have different policies, incentives, and grid integration guidelines, which can create confusion for businesses looking to invest in distributed solar solutions. To unlock business opportunities, there is a need for more uniform policies and clear regulations to streamline the process of setting up distributed solar projects across the country.

Another significant challenge is the high initial capital investment. Although the cost of solar technology has decreased over the years, the initial investment for rooftop solar installations can still be a barrier for many businesses, particularly small and medium-sized enterprises. Financing options, such as loans or Power Purchase Agreements (PPAs), are available, but the complexity of the financial instruments and the long payback period often deter potential investors. Innovative financing models, such as Solar-as-a-Service, can help businesses overcome this hurdle by offering pay-per-use models that require no upfront investment.

Grid connectivity and the lack of a robust infrastructure also pose obstacles to the growth of distributed solar in India. Many regions of the

country still face challenges with grid stability, making it difficult for distributed solar systems to seamlessly integrate with the grid. Additionally, net metering policies, which allow businesses to sell excess power back to the grid, need to be implemented consistently across all states to make distributed solar financially viable.

Despite these challenges, there are several strategies that businesses can adopt to unlock the full potential of distributed solar. First, businesses can take advantage of government incentives and subsidies designed to encourage the adoption of renewable energy. These include subsidies for solar installations and tax incentives for green energy investments. Companies should also consider forming partnerships with solar solution providers to reduce the upfront costs of installation and maintenance. Collaboration with industry leaders can provide businesses with the necessary technical expertise and financing options to scale their distributed solar projects.

The growth of the distributed solar market in India is also linked to the growing awareness of sustainability among businesses and consumers. As companies increasingly recognize the importance of reducing their carbon footprint, there is a strong business case for investing in renewable energy. Furthermore, as energy costs continue to rise, businesses that invest in distributed solar can lower their electricity bills and reduce dependence on the grid.

Looking ahead, the distributed solar market in India is expected to grow at a rapid pace, driven by both policy support and increasing business awareness of its benefits. As businesses continue to explore renewable energy solutions, distributed solar presents a viable and sustainable option. With the right regulatory framework, financing models, and industry collaboration, India's distributed solar market can unlock significant business opportunities and contribute to the country's renewable energy goals.

FROM ROOFTOPS TO COMMUNITIES: THE SOCIAL IMPACT OF DISTRIBUTED SOLAR IN INDIA

Distributed solar power has emerged as a powerful tool for addressing India's energy challenges while making a significant impact on local communities. Traditionally, solar power has been associated with large-scale, utility-based projects, but the rise of rooftop solar systems has allowed individual households and small businesses to play an active role in India's energy landscape. This shift toward distributed solar is not just an environmental or economic shift, but a social one, transforming how energy is produced, consumed, and shared.

In recent years, India has witnessed an increasing number of residential and commercial rooftops equipped with solar panels. The government's initiatives, such as the Solar Rooftop Scheme, along with various state-level subsidies, have encouraged individuals to embrace solar energy. People from urban areas to remote rural locations have tapped into solar technology, reducing their reliance on the national grid. This move has proven beneficial, particularly for communities in regions with limited access to electricity or where power cuts are frequent.

For urban dwellers, rooftop solar installations have meant reduced electricity bills and greater energy independence. Homeowners now have the potential to sell excess power back to the grid, creating a new source of income. In many cities, residents have come together to form energy cooperatives or community-based solar groups, enabling shared access to solar energy. These groups help maximize energy savings and reduce the cost burden for each member. The communal sharing of solar power, especially in densely populated urban areas, also brings about a sense of solidarity, with individuals working together to promote sustainability and environmental responsibility.

In rural areas, distributed solar power is having an even more profound effect. Many off-grid villages, which previously relied on diesel generators or lacked reliable access to electricity, have turned to solar as a cleaner, more affordable alternative. Solar-powered microgrids and decentralized energy systems are providing electricity to thousands of households, powering homes, schools, hospitals, and small businesses. These systems are not only providing light but also enabling new economic opportunities. Small enterprises, such as local shops, workshops, and schools, now have access to reliable power, fostering economic growth and improving the quality of life.



The social impact of distributed solar goes beyond just providing electricity. It has empowered women and marginalized communities, offering them the opportunity to participate in energy production and management. In many rural areas, women have taken charge of maintaining and managing solar systems, which has enhanced their economic status and decision-making power within households and communities. Solar-powered schools and healthcare centers have improved education and health outcomes, with children being able to study at night and healthcare workers having access to better facilities.

The environmental benefits of distributed solar also play a critical role in India's transition towards a more sustainable future. Solar power is helping to reduce carbon emissions, which contribute to climate change. With the country's rapid urbanization and industrialization, solar energy is a key tool for mitigating the environmental impact of rising energy demand. As the cost of solar panels continues to drop and technological advancements make solar power more efficient, more and more households and businesses are expected to adopt solar solutions, further increasing its social impact.

Ultimately, the social impact of distributed solar in India is transforming communities and empowering individuals. As solar power moves from rooftops to entire communities, it is fostering a more sustainable, equitable, and economically viable energy system. By providing energy access to those who need it most, distributed solar is helping India move closer to achieving its renewable energy goals and creating lasting positive change for its citizens.



DISTRIBUTED SOLAR IN URBAN INDIA: ADDRESSING ROOFTOP ADOPTION AND INFRASTRUCTURE HURDLES



Distributed solar power has significant potential to reshape energy consumption in urban India. Rooftop solar systems, which are a major part of this distributed energy model, have been gaining attention due to their ability to provide clean, cost-effective electricity. However, their adoption in urban areas faces several challenges, including infrastructure limitations, regulatory hurdles, and public awareness.

Urban areas are densely populated, making rooftop space limited. Buildings often have uneven designs, shading from nearby structures, or lack the structural strength to support solar panels. These factors reduce the number of rooftops suitable for solar installations. Additionally, in multi-story apartments, shared ownership of rooftops creates complications in decision-making. Residents must agree on system installation, financing, and maintenance, which is often challenging to achieve.

Another barrier is the cost of installation. While the long-term benefits of solar power, such as reduced electricity bills, are well-known, the high upfront investment deters many households. Even with government subsidies and financing options, potential adopters find the process cumbersome due to lengthy paperwork and unclear guidelines. Simplifying these procedures could encourage more urban residents to explore solar energy solutions.

Regulatory and grid-related issues also add complexity. In many cities, grid infrastructure is not yet equipped to support the two-way flow of electricity that rooftop solar systems enable. This creates challenges in efficiently managing the energy surplus generated by these systems. Moreover, electricity distribution companies (DISCOMs) often hesitate to promote rooftop solar because it affects their revenue models. In some cases, delays in net metering approvals further discourage residents from adopting rooftop solar.

Public awareness is another critical factor. Many urban residents remain unaware of the benefits of solar power or are skeptical about its reliability. Educational campaigns could help dispel myths and promote rooftop solar as a viable energy solution. Providing real-world success stories, clear explanations of benefits, and practical guidance on installation could help build trust and interest.

Policy interventions and innovative business models are essential to address these hurdles. For example, government policies that incentivize building designs to incorporate solar-friendly rooftops could make a significant difference. Solar panel leasing models or community solar programs could also allow urban residents to benefit from solar power without bearing the full financial burden of installation.

Collaboration among stakeholders is vital. Policymakers, urban planners, DISCOMs, and private solar providers must work together to create a supportive environment for rooftop solar adoption. Strengthening grid infrastructure, streamlining approval processes, and ensuring fair compensation for surplus energy are crucial steps. Additionally, urban planners should consider integrating solar power into new construction projects to ensure future growth.

Despite these challenges, the potential for rooftop solar in urban India is immense. It can reduce dependence on conventional energy sources, lower electricity costs, and contribute to India's renewable energy targets. By addressing infrastructure and regulatory hurdles, as well as increasing public awareness, urban India can accelerate the adoption of distributed solar power. This shift will not only improve energy access but also contribute to a sustainable and greener future for cities.

FINANCING DISTRIBUTED SOLAR PROJECTS: EXPLORING INVESTMENT OPPORTUNITIES AND GROWTH TRENDS IN INDIA'S EXPANDING SOLAR MARKET

India's solar market is experiencing rapid growth, making it an attractive destination for investments, especially in the distributed solar sector. Distributed solar, which involves the generation of solar power at or near the point of consumption, is gaining traction due to its ability to provide cleaner energy while offering cost savings to consumers. As India works toward meeting its ambitious renewable energy targets, the role of distributed solar projects in the overall energy mix is becoming more critical.

The investment outlook for distributed solar projects is positive, driven by several factors. One of the main factors is the government's strong push for renewable energy, particularly solar power. With the aim to generate 500 GW of non-fossil fuel-based energy by 2030, the government is offering incentives, subsidies, and policies that encourage solar adoption. These policies are also facilitating the growth of rooftop solar projects, microgrids, and off-grid solutions, which are all part of the distributed solar market.

Investors are increasingly recognizing the potential of distributed solar in India due to the steady growth of the market. India's solar capacity has surged in recent years, and projections show continued growth in the coming decade. With more companies, residential users, and institutions looking to reduce their electricity costs and carbon footprint, the demand for distributed solar solutions is expected to rise significantly.

Financing distributed solar projects presents several opportunities and challenges for investors. One of the key challenges is the upfront cost of installation, which can deter many potential adopters. However, financial products such as rooftop solar loans, lease models, and power purchase agreements (PPAs) are emerging as popular solutions to make these projects more affordable for both businesses and homeowners. These financing models allow consumers to pay for the installation over time, reducing the initial financial burden.

Banks and financial institutions are playing an essential role in supporting the growth of distributed solar by offering tailored financing options. Additionally, private equity and venture capital firms are showing increased interest in solar startups and companies that provide innovative solutions to boost solar adoption. The increasing availability of such financing options is helping to lower the entry barriers for distributed solar projects, creating a more attractive investment landscape.

Another key driver of investment in distributed solar is the growing interest in sustainability and corporate social responsibility (CSR) among businesses. Companies are increasingly looking to invest in renewable energy to meet sustainability goals and reduce their environmental impact. Distributed solar projects offer them a chance to do so while simultaneously reducing operational costs. Furthermore, the long-term returns offered by solar projects, including savings on electricity bills and attractive incentives, make them an appealing choice for companies looking to balance financial returns with environmental responsibility.

The future of distributed solar in India looks bright, with continued government support, improved financing options, and an increasingly favorable market environment. Investors are expected to play a crucial role in scaling up these projects, contributing to India's renewable energy goals and creating new opportunities for growth in the green energy sector. As the country continues to prioritize sustainable development, the distributed solar market is poised to attract significant investment, paving the way for a cleaner and more energy-efficient future.



POLICY PUSH FOR DISTRIBUTED SOLAR: NAVIGATING INDIA'S REGULATORY LANDSCAPE FOR DECENTRALIZED RENEWABLE ENERGY

India's renewable energy sector continues to evolve, with significant emphasis on decentralized or distributed solar energy systems. Distributed solar is playing a key role in meeting the country's energy needs while contributing to its environmental goals. The Indian government has been actively shaping policies that encourage the adoption of decentralized solar, ensuring energy access to underserved areas, and reducing dependence on centralized power grids. Recent policy developments reflect the growing importance of distributed solar within India's renewable energy framework.

The most notable update came with the introduction of the National Solar Mission (NSM) Phase III. This policy update focuses on expanding solar installations at a smaller scale, particularly for residential, commercial, and industrial users. It aims to create a favorable environment for rooftop solar systems, reducing India's carbon footprint while providing economic benefits through job creation and energy independence. The government's goal is to facilitate the installation of over 40 GW of rooftop solar capacity by 2030.



Under the revised policy, the government has made efforts to simplify the process for individuals and businesses looking to install rooftop solar panels. The introduction of financial incentives, subsidies, and tax benefits has been instrumental in reducing the upfront costs of solar installations. For instance, under the Ministry of New and Renewable Energy (MNRE) schemes, residential consumers can receive up to 40% subsidy for rooftop solar systems. The increased support for both private and public entities highlights the government's commitment to distributed solar growth.

To further support decentralized solar, India's electricity regulations are evolving. The recent amendments in the Electricity Act aim to empower consumers, enabling them to sell excess electricity back to the grid. This move, known as "net metering," offers additional incentives for solar adoption by ensuring consumers can recover a portion of their investment. Net metering policies have been rolled out at the state level, with some states offering more attractive compensation rates for surplus power, making rooftop solar systems even more economically viable.

The integration of energy storage systems (ESS) with distributed solar has also been encouraged. The government has proposed policies to incentivize the adoption of battery storage technology alongside solar installations, allowing consumers to store excess energy for use during non-sunny hours. This enhances the stability and reliability of decentralized solar power, making it an increasingly attractive option for households and businesses alike.

Despite these positive developments, challenges remain. Regulatory barriers and inconsistent policies across states have hindered the rapid expansion of distributed solar. For example, states like Tamil Nadu, Maharashtra, and Uttar Pradesh have different standards for rooftop solar installations, leading to confusion for consumers and installers. The government is working towards harmonizing these regulations, ensuring a more uniform approach across the country.

Additionally, there is a need for more robust infrastructure, such as improved grid connectivity and monitoring systems, to fully realize the potential of decentralized solar. Investments in these areas are crucial for ensuring that distributed solar systems can be effectively integrated into the national grid, contributing to India's renewable energy targets.

India's push for decentralized solar is gaining momentum thanks to favorable policy developments, financial incentives, and technological advancements. However, continued efforts are necessary to overcome regulatory challenges and improve infrastructure to ensure the sector's sustainable growth. With the right policies and investments, distributed solar can play a vital role in India's renewable energy future, supporting the nation's transition to a greener and more energy-efficient economy.

The Rooftop Revolution: Insights from India's 16.28 GW Rooftop Solar Installations

India has made remarkable progress in its renewable energy journey, with solar power playing a pivotal role in this transition. By January 2025, the country achieved 100.329 GW of installed solar PV capacity, a significant milestone that reflects its commitment to clean energy. Within this, rooftop solar installations have contributed 16.28 GW, accounting for over 16% of the total installed solar PV capacity. The rapid expansion of rooftop solar projects highlights the growing importance of decentralized power generation and its role in ensuring energy security.

Rooftop solar has gained momentum due to government incentives, falling solar module prices, and increasing awareness among consumers. The PM Surya Ghar: Muft Bijli Yojana, launched to promote residential rooftop solar, has further accelerated adoption. The scheme aims to provide subsidies, reduce dependence on grid electricity, and lower power costs for households and businesses. Additionally, commercial and industrial (C&I) consumers are increasingly adopting rooftop solar to reduce operational costs and meet sustainability goals. Large corporate houses, IT parks, and manufacturing units are integrating solar rooftops into their energy mix to hedge against rising electricity tariffs and ensure long-term cost savings.

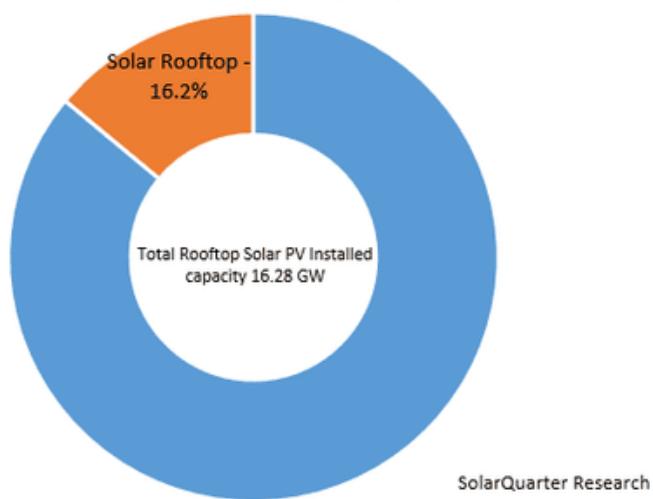
Several factors have contributed to the growth of rooftop solar in India. Net metering policies allow consumers to export excess power to the grid, making rooftop installations more financially viable. The declining cost of solar panels, along with improved financing options, has made solar energy accessible to a broader range of consumers. Additionally, states like Gujarat, Maharashtra, and Rajasthan have emerged as leaders in rooftop solar adoption, driven by favorable policies and high electricity demand.

Despite these achievements, challenges remain in scaling rooftop solar further. One of the biggest obstacles is policy inconsistency across states, leading to delays in approvals and installations. Many states have placed restrictions on net metering, limiting the financial benefits for consumers. Additionally, high upfront costs and lack of awareness still prevent widespread adoption, particularly in rural and low-income areas. Distribution companies (DISCOMs), which face revenue losses due to increased rooftop solar adoption, often create hurdles in implementation, delaying approvals and interconnection processes.

India's rooftop solar expansion suggests that a more uniform policy framework and greater financial support could further accelerate installations. Strengthening net metering policies, simplifying approval processes, and promoting innovative business models such as leasing and community solar projects can enhance adoption rates. The commercial and industrial segment remains the biggest driver of rooftop solar, while the residential sector needs further policy support and consumer awareness initiatives.

India's solar power growth, particularly rooftop installations, underscores its commitment to achieving 280 GW of solar PV capacity by 2030. With continued policy reforms, infrastructure development, and financial incentives, rooftop solar can play a crucial role in the country's clean energy transition. The 16.28 GW rooftop solar achievement is a significant step forward, but sustained efforts will be necessary to ensure continued expansion and maximize the benefits of decentralized solar power generation.

Total Rooftop Solar PV Installed Capacity, January 2025



India's solar revolution is not just about energy—it's about empowering communities and securing a sustainable future."

Shaping the Future of Distributed Solar: Insights from Fourth Partner Energy on Trends, Challenges, and Innovation



Jay Kumar Waghela

CEO Distributed Solar
Fourth Partner Energy

KEY HIGHLIGHTS

- Fourth Partner Energy leads in integrating IoT, AI, and energy storage for optimized solar solutions.
- Rising corporate sustainability goals and government policies drive growth in distributed solar adoption across sectors.
- Customized energy solutions cater to commercial and industrial clients, maximizing cost savings and sustainability.

What is Fourth Partner Energy's vision for distributed solar, and how has it evolved to meet growing demand?

Founded in 2010, Fourth Partner Energy set out with the mission to address the challenge faced by customers in receiving a reliable and greener source of energy. Over the years, FPEL has evolved to become India's leading renewable energy solutions provider, catering to the diverse needs of Commercial and Industrial clients. Today, we provide comprehensive renewable energy solutions including OnSite, Inter State and Intra State open-access, wind-solar hybrid, energy storage, and renewable energy certificates. The company is committed to helping businesses switch to a cleaner, sustainable, and economical source of energy - thereby enabling India and Southeast Asia to emerge as global leaders in the transition to a low-carbon economy through its customer-centric and innovative approach.

What are the main challenges and opportunities for distributed solar adoption in India and key markets?

The key challenges in adoption of distributed solar are as follows:

- Regulatory complexity:** Navigating diverse state-wise policies and approvals related to net metering, net billing and gross metering lead to increase in project execution timelines.
- Inconsistency between intent and adoption:** There is often lack of uniform understanding of policies and regulations leads to discrepancies between intent and on-ground implementation by DISCOMs.
- Lack of financing options:** A significant portion of the SME sector remains untapped due to the limited availability of financing

options for organizations with lower credit ratings, restricting their ability to adopt distributed solar.

However, the distributed solar market is growing at a rapid pace due to several opportunities:

- Corporate sustainability goals:** Rising demand from businesses aiming to achieve net-zero targets which drives the adoption of distributed solar.
- Energy cost optimization:** Distributed solar offers significant savings over grid tariffs, making it an attractive option for businesses and individuals.
- Favourable policies:** Government initiatives such as PM Surya Ghar and PM-KUSUM are driving increased adoption of distributed solar in the residential and agricultural sectors by providing financial incentives and subsidies.

How are technologies like IoT, AI, and energy storage enhancing distributed solar systems at Fourth Partner Energy?

Fourth Partner Energy integrates cutting-edge technologies to optimize system performance and deliver enhanced value to its clients:

- IoT:** Early on, we made a strategic decision to develop an in-house system for real-time monitoring of generation, consumption, and asset performance. Today, this system seamlessly tracks data across our 1000+ onsite and open-access plants, empowering our performance management team with actionable insights for data-driven decision-making and enhanced operational efficiency.
- AI:** As an early adopter, Fourth Partner Energy leverages AI for predictive analytics

and advanced weather forecasting, enabling precise power scheduling for open-access projects and ensuring greater reliability.

- Energy storage:** Fourth Partner Energy has been a pioneer in delivering solar-plus-energy storage solutions tailored to diverse client needs. We have successfully demonstrated multiple use cases, enabling some clients to achieve complete energy independence by going off-grid. By integrating battery storage, we not only help smoothen the generation curve of variable renewable energy sources but also offer an ideal solution to enhance grid stability and reliability, making renewable energy more accessible and consistent.

The adoption of these advanced technologies has significantly enhanced system reliability, improved efficiency, and strengthened our ability to provide comprehensive, innovative energy solutions for our clients.



The future of distributed solar is being shaped by rapid innovation, including high-efficiency bifacial solar panels, floating solar farms, agrivoltaics, and AI-powered grid management.



How do policies impact distributed solar growth, and what policy changes could further boost the sector?

Policies are instrumental in driving distributed solar adoption by offering regulatory clarity and financial incentives. Since energy from distributed solar is the most cost-effective alternative compared to other sources, promoting it can significantly enhance the global competitiveness of products and services manufactured in India.

The adoption of distributed solar in the C&I sector gained momentum with the introduction of the Net Metering policy allowing installations of up to 1 MW in 2015. Similarly, the residential sector has witnessed a surge in rooftop solar adoption, driven by subsidies introduced under the PM Surya Ghar policy.

To further accelerate the growth of distributed solar, the following policy changes could be implemented:

- **Uniform policies across states:**

Establishing uniform definitions, rules for additional charges, and consistent net metering regulations to eliminate regional discrepancies.

- **Single-window approval system:**

Introducing a transparent approval mechanism with defined timelines. Approvals not processed within the stipulated timeframe should be automatically deemed granted.

- **Increase in net metering capacity:**

Raising the allowable capacity for net metering to at least 5 MW to enable larger installations.

- **Flexibility for net metering and open access:**

Allowing consumers to simultaneously avail of net metering/net billing along with open access, enabling greater flexibility and scalability for diverse energy needs.

By addressing these areas, policies can create a more supportive and efficient ecosystem, driving the widespread adoption of distributed solar and contributing to India's clean energy transition.

How does Fourth Partner Energy customize its solutions for commercial, industrial, and residential clients?

At Fourth Partner Energy, we take a highly customer-centric approach to tailoring energy solutions for commercial and industrial clients. The process begins with a thorough understanding of the client's objectives, such as cost savings, sustainability goals, or energy independence, as well as any operational constraints.

We then conduct a detailed analysis of Annual electricity consumption and load profile, Available space within the premises for solar installations, prevailing state regulatory framework and its implications, Potential savings

across different energy solutions and estimated reduction in carbon footprint to align with sustainability targets.

- Based on this comprehensive evaluation, we develop a customized roadmap that may include a mix of onsite solar installations, offsite renewable energy procurement, energy storage systems, and renewable energy certificates. This tailored approach ensures that each client receives a solution that maximizes value while meeting their unique energy requirements.

What emerging trends in distributed solar could shape the industry over the next five years?

Emerging trends in distributed solar that could shape the industry over the next five years include the integration of advanced energy storage solutions, the adoption of higher Wp, more efficient TOPCon bifacial solar panels, installation of floating solar plants, carports, agrivoltaics, use of AI and machine learning for predictive maintenance and grid management, innovative policies like virtual net metering, group net metering, peer to peer trading, financing solutions and introduction of subsidies/incentives for MSMEs enabling wider participation



Prioritizing Safety: ENGIE's Approach to Overcoming HSE Challenges in India's Renewable Energy Sector



Prakash Morankar

Head of HSE & Construction
ENGIE India

KEY HIGHLIGHTS

- ENGIE achieved 28 million hours without a Lost Time Accident through its robust safety-first approach.
- Leadership engagement and the "No Life at Risk" philosophy reinforce ENGIE's global and local HSE alignment.

What are some of the most significant HSE-related challenges ENGIE encountered in solar project construction in India, and how did you overcome them?

The construction of solar projects in India presents several Health, Safety, and Environment (HSE) challenges, including working in remote locations with limited infrastructure, managing high-voltage equipment.

To overcome these, companies are implementing comprehensive safety frameworks that integrate advanced technologies, such as real-time monitoring systems, to identify and mitigate risks at every stage of the project. Workforce training remains a cornerstone of these efforts, ensuring employees are well-equipped to work safely. Empowering employees with the authority to halt unsafe activities—often referred to as "Stop Work" authority—fosters a culture of accountability.

For instance, ENGIE has successfully addressed these challenges through a robust safety-first approach, achieving 28 million hours without a Lost Time Accident (LTA). till date "No Life at Risk" philosophy and the implementation of the "5 Safety Essentials" have further strengthened our commitment to safety.

How does ENGIE ensure alignment with global HSE standards while addressing local challenges?

Ensuring global HSE standards align with India's local requirements involves a combination of adopting international best practices and tailoring them to address region-specific challenges, such as extreme weather conditions and remote location and project specific risk.

Organizations often adapt safety protocols to suit diverse operational environments while maintaining compliance with global benchmarks.

Regular leadership involvement, including Management Site Visits (MSVs), reinforce these standards and promotes a culture of transparency and accountability. Extensive training programs also empower employees to identify and address risks effectively, ensuring alignment with both global and local safety expectations.

ENGIE demonstrates this balance by integrating global HSE standards with locally relevant solutions. Their proactive leadership engagement and commitment to the "No Life at Risk" philosophy exemplifies this approach.

What makes ENGIE's health and safety practices in the renewable energy sector distinct?

In the renewable energy sector, technological advancements and cultural shifts are driving HSE practices. Processes such as predictive analytics, real-time monitoring, and drones for inspections have significantly enhanced safety outcomes by identifying and addressing risks proactively.

Another important element is fostering a shared culture of safety. Initiatives such as daily safety briefings, risk assessments, and last minute risk assessments are creating workplaces where safety is a collective responsibility.

ENGIE's "Minute that Saves" practice, which encourages teams to pause, assess risks, and mitigate hazards before commencing tasks, is a prime example of this shift. Such practices not only improve safety outcomes but also contribute to operational excellence.

Could you highlight how ENGIE balances operational efficiency with health and safety priorities?

Operational efficiency and safety are increasingly being viewed as complementary rather than conflicting priorities. By embedding safety into

every phase of project planning including quality requirements and execution, companies are able to optimize processes while safeguarding their workforce.

The use of advanced technologies, such as drones for inspections and predictive maintenance tools, enhances productivity without compromising safety standards. Additionally, ongoing training programs ensure that employees are both skilled and safety-conscious, further aligning these objectives.

ENGIE exemplifies this approach, dedicating over 33,000 hours to safety training in 2024 alone. Their integrated strategy ensures that operational goals are met while maintaining a steadfast focus on health and safety.

How leadership influence health and safety practices at ENGIE?

Leadership plays a critical role in cultivating a strong safety culture within organizations. By actively engaging with teams through site visits and direct communication, senior management reinforces the importance of safety - importance of safety.

Transparent communication channels encouraged by leadership ensure that safety concerns and best practices are effectively shared across all levels of the organization. This approach builds trust and accountability, fostering a proactive safety culture.

Regular Management Site Visits, combined with visible commitment to safety initiatives, reinforce the organization's dedication to achieving HSE excellence.

Health & Safety is ENGIE's top most priority.

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HFM Solar's Vision for Expanding Distributed Solar and Strengthening Energy Resilience in India



Dharmendra Jain

Director
HFM Solar Power

KEY HIGHLIGHTS

- HFM Solar aims to make distributed solar more affordable and accessible through innovative technology and flexible financing models.
- Advocating for standardized regulations, streamlined approvals, and better incentives to accelerate solar adoption across India.
- Enhancing urban energy reliability with decentralized solar solutions, reducing grid dependency, and ensuring uninterrupted power supply.

What is HFM Solar's vision for India's distributed solar market, and how will it drive growth?

The distributed solar market in India holds immense potential, driven by rising energy demand, government incentives, and a growing focus on sustainability. As more businesses and households seek cleaner energy solutions, the sector is poised for rapid expansion, creating opportunities for decentralized, renewable power generation.

HFM Solar aims to contribute significantly to this growth by offering innovative solar solutions that prioritize efficiency, affordability, and scalability. With a strong focus on quality and customer satisfaction, HFM Solar plans to expand its reach to underserved regions, ensuring accessible clean energy for all. The company will leverage advanced technologies, such as AI-driven monitoring and predictive maintenance, to enhance system reliability and performance. Additionally, HFM Solar is committed to supporting India's decarbonization goals by empowering local communities with sustainable energy solutions, fostering energy independence, and driving long-term resilience in the renewable energy sector.

How is HFM Solar enhancing solar efficiency and access?

HFM Solar is leveraging cutting-edge technology to enhance the efficiency and accessibility of distributed solar solutions. By incorporating AI-driven monitoring systems, HFM Solar optimizes energy production, ensuring that solar panels operate at peak performance. Real-time data analytics enable proactive maintenance and early detection of potential issues, minimizing downtime and improving system longevity.

In addition, the company uses advanced software for precise site assessment, ensuring solar installations are tailored to each location's unique energy needs. This technology-driven approach allows for faster, more accurate installations, reducing costs and improving customer satisfaction.

To increase accessibility, HFM Solar is adopting flexible financing models, including pay-as-you-go and leasing options, which make solar energy more affordable for residential and small business owners. Through these innovations, HFM Solar is making clean, renewable energy more efficient, cost-effective, and widely available, contributing to the growth of India's distributed solar market.

HFM Solar's scaling challenges and opportunities?

HFM Solar faces several challenges in scaling distributed solar adoption, primarily around high initial capital costs, limited awareness, and regulatory hurdles. Despite falling prices of solar technology, many consumers still perceive solar as expensive, making financing options crucial. Additionally, educating potential customers about the long-term savings and benefits of solar energy is an ongoing task. Navigating through varied regional regulations and securing incentives also remains a complex challenge.

However, these challenges present significant opportunities. As solar technology continues to evolve, HFM Solar can capitalize on the decreasing costs of solar panels and energy storage solutions to provide more affordable and efficient systems. Growing government support and incentives for renewable energy, along with increasing demand for sustainable solutions, create a favourable market environment. Moreover, with rural and semi-urban regions still underpenetrated, there's a vast opportunity to expand clean energy access, particularly through innovative financing models and targeted awareness campaigns.

How do policies impact solar growth, and what changes do you suggest?

Government policies and regulations play a pivotal role in shaping the growth of distributed solar in India. Incentives like subsidies, tax breaks, and net metering have significantly lowered the financial barriers for consumers and businesses adopting solar solutions. However, inconsistent policies, delayed approvals, and regional regulatory discrepancies continue to hinder scalability.

HFM Solar advocates for clearer, standardized policies across states to streamline the adoption process. Simplified permitting, faster approval timelines, and improved grid integration support would enhance efficiency. Additionally, enhancing the availability of financingschemes, such as low-interest loans and pay-as-you-go models, would make solar adoption more accessible for a larger demographic.

Further, expanding incentives for energy storage solutions would help overcome intermittency challenges, encouraging more people to invest in solar systems. By creating a more cohesive regulatory framework and increasing incentives, the government can significantly accelerate the shift toward distributed solar energy, driving long-term growth and sustainability.

How will distributed solar strengthen urban resilience, and HFM Solar's role?

Distributed solar has the potential to transform energy resilience in urban India by decentralizing power generation and reducing dependency on centralized grids. As urban areas face increasing power demand and grid instability, rooftop solar systems provide a reliable, cost-effective solution for consumers and businesses, ensuring uninterrupted power supply duringoutages and reducing grid congestion.

HFM Solar plays a crucial role in this transformation by offering tailored solar solutions that cater to the unique energy needs of urban environments. Through efficient, scalable systemsand smart monitoring technologies, HFM Solar enhances energy reliability and optimizes performance. Additionally, HFM Solar's focus on affordability and flexible financing options ensures wider adoption, empowering urban communities to take control of their energy needs.

By promoting sustainable, decentralized energy, companies like HFM Solar are key to fostering long-term energy resilience in urban India, aligning with the country's goals for clean, reliable, and self-sufficient energy systems.

Driving Innovation and Efficiency: Solidus Techno Power's Approach to Solar Solutions in India



Jaspal Singh

CTO
Solidus Techno Power Pvt Ltd

KEY HIGHLIGHTS

- Tailored solutions with advanced planning for maximum energy output and cost efficiency.
- Cost-effective procurement and streamlined processes to reduce project expenses while maintaining quality.
- Investing in workforce training and emerging technologies to meet India's renewable energy.

What key technologies make Solidus Techno Power stand out in solar?

At Solidus Techno Power, our ability to deliver tailored solutions is what truly sets us apart. We prioritize precision and efficiency at every stage of a project, from initial planning to final execution. By leveraging advanced planning techniques, we ensure that our designs are optimized for site-specific conditions, delivering maximum energy output while minimizing costs.

Our streamlined project management processes enable us to foresee potential challenges and address them proactively. This ensures that our clients experience seamless execution without unnecessary delays. Moreover, our focus on precision allows us to achieve exceptional results, whether we're working on smaller rooftop systems or large-scale solar farms.

What also differentiates us is our commitment to maintaining a client-first approach. We take the time to understand the unique needs and goals of each client, ensuring that the solutions we deliver are not only technically sound but also aligned with their long-term vision.

How does Solidus Techno Power optimize EPC for efficiency and cost?

Innovation at Solidus Techno Power isn't about complexity—it's about finding smart, practical ways to enhance outcomes. We adopt processes that streamline workflows, eliminate inefficiencies, and ensure that projects are completed on time and within budget.

For example, by optimizing the design and procurement stages, we reduce material waste and maximize energy generation. We also employ advanced tools to carefully plan installations, ensuring faster and more efficient execution. These efforts result in significant cost savings for our clients without compromising on quality or reliability.

Furthermore, we maintain strong partnerships with trusted suppliers, allowing us to source high-quality components at competitive prices. By

combining these cost-effective procurement practices with efficient installation techniques, we consistently deliver value while keeping project expenses under control.

What challenges hinder advanced solar adoption in India, and how is your company tackling them?

India's renewable energy goals are bold, and achieving them requires addressing several challenges. One major obstacle is the high upfront investment needed for cutting-edge solar solutions, which can deter smaller businesses and organizations from making the transition. At Solidus Techno Power, we're working to make these solutions more accessible by offering cost-effective options tailored to the specific needs of each client.

Another challenge is the limited awareness of the long-term benefits of modern solar systems. Many potential clients are hesitant to adopt advanced solutions because they don't fully understand the financial and environmental advantages. To overcome this, we focus on educating our clients and stakeholders about the returns they can expect, both in terms of energy savings and sustainability.

Additionally, the adoption of innovative solutions requires skilled manpower. We've made it a priority to invest in training and upskilling our workforce so that they are well-equipped to implement even the most advanced systems efficiently. By tackling these challenges head-on, we aim to play a significant role in helping India meet its renewable energy targets.

What challenges hinder advanced solar adoption in India, and how is your company tackling them?

Emerging technologies are transforming how solar projects are designed, built, and managed. They enable us to monitor systems more closely, identify inefficiencies faster, and maintain installations with greater precision. At Solidus Techno Power, we've embraced these

advancements to provide better performance and reliability for our clients.

For example, by adopting advanced monitoring systems, we ensure that every project operates at peak efficiency. These systems allow us to track key performance metrics and identify any issues before they escalate, reducing downtime and optimizing energy output.

We also prioritize forward-thinking approaches to ensure long-term value for our clients. By integrating smarter methods into every stage of a project—from design to maintenance—we deliver systems that are not only cost-effective but also built to adapt to future needs.

What is your strategy for adopting and deploying new solar module technologies in your projects?

Our strategy for deploying advanced solutions is centered on careful evaluation and customization. We analyze each project's specific requirements, such as location, energy goals, and environmental conditions, to determine the best approach. This ensures that the systems we implement deliver maximum output and efficiency.

We place great emphasis on testing and validating components to ensure they perform reliably in real-world conditions. For instance, when adopting newer solar modules, we assess their performance under various scenarios to ensure they meet the high standards our clients expect.

Our approach also includes building strong relationships with trusted partners to source the best materials and solutions at competitive prices. This allows us to provide our clients with cutting-edge installations without exceeding budget constraints.

Ultimately, our focus is on delivering solutions that strike the perfect balance between innovation, reliability, and affordability, ensuring that our clients benefit from the latest advancements in solar energy.

Unlocking the Potential of Distributed Solar in Urban India: Challenges, Opportunities, and the Road Ahead



Bhawna Tyagi

Programme Lead
CEEW

KEY HIGHLIGHTS

- Distributed solar reduces grid stress, provides backup power, and supports energy independence in urban India.
- Regulatory inconsistencies, financing barriers, and net metering delays hinder widespread rooftop solar implementation.
- Innovative business models, regulatory support, and financing solutions are crucial for accelerating distributed solar adoption.

How do you see the role of distributed solar in enhancing energy resilience in urban India?

Distributed solar provides an opportunity for consumers to become prosumers (producers + consumers) while allowing them to shift their electricity consumption to cleaner sources and generate clean energy. As the generation is happening closer to the demand centres, distributed solar systems offer energy independence through decentralised power generation, localised benefits, and support discoms' financial health by reducing losses and effective demand management, thereby contributing towards energy resilience in urban cities. It can be critical in alleviating the stress on the grid during peak hours and provides backup power during outages when combined with battery storage.

What are the key challenges and opportunities that urban India faces when it comes to adopting distributed solar systems?

India can leverage the opportunity provided by distributed solar systems to decarbonise its electricity demand and contribute towards net zero commitment by 2070. As per CEEW estimates, rooftop solar potential within the residential sector stands at 118 GW — enough to meet the residential sector's annual electricity demand of 353 billion units as of 2023. However, several factors limit the adoption across consumer segments. For example, limited consumer awareness, delays in net metering approvals, limited financing options, and restrictions on minimum system size and penetration ratios at the distribution transformer level impact the adoption in the residential segment. Uncertain and inconsistent regulations across states impact the adoption in commercial and industrial

segments, such as net metering limits and applicability, variation in banking charges and provisions, and implementation of green open access regulations. MSME segment also faces challenges pertaining to access to affordable finance for initial investment requirements.

How can distributed solar contribute to addressing the rising demand for energy in urban areas, especially during peak hours?

As temperatures are soaring each summer, increasing heatwaves and humidity lead to the rising need for indoor cooling and high electricity demand. IMD announced 2024 as the hottest year ever recorded, with peak demand in India touching 250 MW in May. This surge has further increased the demand for electricity from power markets at higher prices, impacting the financial health of distribution companies. Distributed solar energy can play a critical role in meeting growing demand in urban centres by generating it locally and easing pressure on the grid. Solar generation hours align with the daytime peak consumption and can contribute towards peak shaving and easing out the impact on discoms' finances.

In your opinion, how can policymakers and regulatory bodies support the growth of distributed solar installations in cities?

Unlocking the potential of distributed solar in cities requires twofold interventions. First, there is a need to move beyond traditional business models such as CAPEX and OPEX to a more customised business model based on paying capacities, land availability, and consumption profile of the target consumer segment. Second, regulations must support the implementation of innovative business

models, such as the adoption of virtual net metering and group net metering mechanisms by states. One such example is the extension of capital subsidy to systems installed under the virtual net metering mechanism by The Ministry of New and Renewable Energy (MNRE). This opens opportunities to implement the community solar business model that can expand access to solar power and its applications to underserved communities, especially for consumers with a demand of less than 1 kW.

In your opinion, how can policymakers and regulatory bodies support the growth of distributed solar installations in cities?

The future of distributed solar in India looks promising and can play a key role in building a sustainable and resilient urban energy infrastructure. Accelerating the adoption requires targeted consumer awareness campaigns coupled with innovative tools like AI-driven chatbots in local languages to enhance consumer awareness and engagement. Streamlining the regulations across states for distributed solar systems, for example, benchmarking the process across states, including the net-metering approval and testing process, load enhancement and upgradation, to accelerate deployment and ease the financial burden on consumers. Introducing financing solutions focusing on economies of scale and customised financing options for small-scale consumers. Leveraging the potential across consumer segments by rolling out innovative business models supported by enabling regulations. Finally, creating a robust vendor ecosystem through targeted capacity building and fasttracking vendor rating programs to ensure access to quality vendors across states.



Driving India's Solar Revolution: The Inspiring Tale of Saatvik Solar

In a world increasingly moving towards renewable energy, one company stands as a beacon of innovation and determination—Saatvik Green Energy Limited. Saatvik was incorporated with a simple yet powerful mission of providing sustainable solutions for a greener future. Incorporated in 2016, Saatvik Solar began as a modest venture in the renewable energy sector with a small production capacity of 200 MW per annum. Focused on manufacturing high and premium quality Solar PV modules, the company's mission was simple yet ambitious: to provide high-quality and efficient solar energy solutions to power a sustainable future. Despite its humble beginnings, Saatvik Solar demonstrated an unwavering commitment to excellence. The company invested heavily in cutting-edge technology, skilled manpower, and innovative manufacturing processes, enabling it to deliver top-notch products.

Saatvik's ability to adapt to the evolving demands of the solar industry soon set it apart from its competitors. As the years progressed, Saatvik's growth trajectory became nothing short of extraordinary. Leveraging its strong R&D foundation and operational efficiency, the company expanded its production capabilities manifold. By 2025, Saatvik had catapulted its annual production capacity to a remarkable 3.8 GW/Annum, a milestone that underscored its rapid evolution into an industry leader. This significant leap in capacity was complemented by Saatvik's ability to cater to diverse market needs, from residential and commercial solar applications to utility-scale projects. Its product portfolio

expanded to include cutting-edge Monocrystalline, Bifacial, and N-Type TopCon modules. These innovations not only enhanced energy efficiency but also solidified Saatvik's position as one of the "Top Solar PV Module Manufacturers in India."

Saatvik's success can also be attributed to its customer-centric approach. With a steadfast commitment to delivering quality and reliability, the company built a reputation for excellence among its domestic and international clients. Key partnerships and high-profile mandates, such as supplying solar modules for large-scale projects by industry giants like L&T, Enrich, Blupine, Mahagenco ETC., further bolstered its standing in the market. Today, Saatvik Solar is not just a manufacturer—it is a symbol of India's potential in renewable energy. With ambitious plans to establish fully integrated solar manufacturing ecosystems in Ambala and Odisha, the company is setting benchmarks in backward and forward integration of wafers, cells, and modules. These efforts align with India's vision of energy independence and a greener tomorrow.

From a 200 MW startup to a 3.8 GW powerhouse, Saatvik Solar's journey exemplifies how vision, innovation, and resilience can transform a dream into a reality. As it continues to grow and innovate, Saatvik remains steadfast in its mission to illuminate the world with clean and sustainable energy.





Innovation, Visionary Leaders, State Leadership

The State Leadership Awards - North East 2025 honors visionary leaders driving progress and innovation across the region, recognizing their exemplary contributions to growth and development.



State Market Leader Award - Inverter

Sungrow India Pvt. Ltd.



Emerging EPC Company of the Year

Zenergy Greens LLP



State Market Leader Award (Modules) - Platinum

Saatvik Green Energy Pvt. Ltd.



Solar EPC Company of the Year - Institutional

Best Engineering Team of The Year - Platinum

Natsakee Incorporation



State Market Leader Award (Modules) - Diamond

Novasys Greenergy Pvt. Ltd.



Solar EPC Company of the Year - Commercial

ATLANTA ENERGYS PVT LTD



10-Year Milestone of Inverter Excellence in India Award

Sungrow India Pvt Ltd



Solar System Integrator of the Year - Residential

RNS Green & Renewable Pvt Ltd



Smart Technology of the Year: Advanced Solar Batteries for Critical Infrastructure

Best Engineering Team of The Year - Diamond

Volks Energie Pvt Ltd



Emerging Leader of the Year

HARSH AGARWAL

Director

Zenergy Greens LLP



Best Project of the Year - Commercial

Solar System Integrator of the Year - Commercial

Renergy Solutions Pvt. Ltd.



Outstanding Technical Leadership Award

NATARAJA MS

Technical Head - APAC

Sungrow India Pvt Ltd

INDIVIDUAL LEADERSHIP AWARDS



Strategic Leader of the Year: CleanTech

PRAVEEN KUMAR SOOD
Chairman
Regnant Energy Solutions



Visionary of the Year

AKASH GARG
Proprietor
Natsakee Incorporation



Entrepreneur of the Year

FAZLE MUZTABA
Founder & Managing Director
Envo Renewable Energy Services Private Limited



The “**Sustainability Leadership Awards 2025**” celebrates outstanding achievements in sustainability, honoring organizations and individuals who lead the way toward a greener, more sustainable future. This prestigious event recognizes innovators and trailblazers who are addressing pressing environmental challenges, reducing carbon footprints, and championing sustainable practices. Join us as we spotlight transformative solutions and acknowledge those setting new standards for environmental responsibility and impact.”



**Company of the Year:
Sustainable Technology
Integration**

Shreyani Consulting And Testing Services Pvt Ltd



**Company of the Year:
Innovative RE Initiative**

Nestech Enterprise



Company of the Year: Circular Economy through Recycling & EPR

Mahesh Engineering Works & MEW Consultants (subsidiary company)



**Company of the Year :
Sustainable Technology Integration**

Renergy Solutions Private Limited



Company of the Year: Achieving Carbon Neutrality through RE

Hindustan Coca-Cola Beverages Pvt Ltd (Vizag Depot)



Project of the Year: Renewable Energy

Envo Renewable Energy Services Private Limited



Sustainability Team of the Year: Consumer Satisfaction Excellence

SUSCONNECT Pvt. Ltd



Contendre Greenergy Limited: Ready for the Next Leap in Solar Module Manufacturing

The Indian solar industry is at a pivotal moment, and Contendre Greenergy Limited is gearing up for its next big leap. Formerly known as Contendre Greenergy Private Limited, the company has now transitioned into a public limited entity, reinforcing its commitment to exponential growth, long-term vision, and industry leadership.

This transformation is not just a name change—it is a bold step towards scaling operations, expanding market reach, and solidifying Contendre's position as a key player in India's solar manufacturing ecosystem.

Expanding Horizons: A 1.2 GW State-of-the-Art Manufacturing Hub

From a 100 MW automated facility in 2019 to a 200 MW capacity serving diverse solar projects, Contendre Greenergy Limited has steadily expanded its manufacturing footprint. Now, the company is taking its biggest leap yet with the development of a 1.2 GW world-class manufacturing facility in Maharashtra.

This advanced plant is designed to support next-generation solar module technologies, catering to the growing demand for high-performance, high-efficiency solar panels. It reaffirms Contendre's vision to remain a dominant force in the industry, now and in the future.

Pushing Boundaries with Next-Gen Solar Module Technology

Innovation has always been at the heart of Contendre's success, and the company is bringing the latest advancements in PV module technology to the market, including:

- TopCon Modules – Offering higher efficiency and lower degradation, ensuring long-term performance.
- Bifacial Modules – Enhancing energy yield by capturing sunlight from both sides.
- Mono PERC Half-Cut Modules – Optimized for higher power output and improved durability.
- Advanced Customised High-Durability Modules – Designed for extreme environmental conditions, ensuring reliability and various flexible applications.

By continuously investing in R&D and process automation, Contendre Greenergy Limited ensures world-class module manufacturing, empowering India's transition to clean energy.



A Commitment to Quality, Scale, and Sustainability

At Contendre Greenergy Limited, quality is non-negotiable. Every module is produced using fully automated European machinery, ensuring zero human error and consistent efficiency.

The company adheres to the highest global standards, with IEC & BIS certifications, stringent in-house testing, and automated EL quality checks to guarantee reliability.

With a strong domestic presence and growing export ambitions, Contendre is not just scaling up—it is shaping the future of solar manufacturing in India.

We Are Here to Stay: Contendre's Future Vision

By transitioning into Contendre Greenergy Limited, the company is setting the stage for further exponential growth, with long-term plans for:

• Expanding global market reach and strengthening India's solar export footprint.

• Increasing module manufacturing capacity to support utility-scale and industrial demand.

• Enhancing technology adoption, ensuring Contendre stays ahead of industry trends.

As Contendre Greenergy Limited embarks on this journey, one thing is certain:

💡 We are not going anywhere—Contendre is here for the long run, stronger and more ambitious than ever.

Conclusion

With 1.2 GW of cutting-edge solar module manufacturing, industry-leading technology, and an unwavering commitment to quality, Contendre Greenergy Limited is ready to power India's next phase of clean energy growth.

As the company steps into the public domain, it remains dedicated to innovation, sustainability, and leadership in the solar industry—paving the way for a brighter, greener future.

The journey continues, and Contendre Greenergy Limited is just getting started.



Raychem **RPG**

RaychemRPG Solar Split Junction Box: Revolutionizing Solar Panel Efficiency

The RaychemRPG Solar Split Type Junction Box is a cutting-edge solution designed to enhance the performance and reliability of solar power systems. Built for utility-scale and commercial installations, this advanced junction box meets the demands of modern solar energy applications with its robust features and durable construction.

Innovative Design for Superior Performance

Equipped with an advanced thermal design, the RaychemRPG Solar Junction Box ensures efficient heat dissipation. This innovative feature prevents hot spots and maintains lower cell temperatures, enabling optimal performance even in high-temperature environments. The IP68 protection rating guarantees dependable operation under diverse environmental conditions, safeguarding the system from dust, water, and other external elements.

Enhanced Energy Yield

Specially tailored for bifacial solar panels, this junction box supports energy generation from both the front and rear surfaces, significantly boosting the overall energy output. Additionally, its compatibility with half-cut solar cells enhances efficiency and minimizes power losses, making it a vital component in high-performance solar modules.

Built for Extreme Environments

The RaychemRPG Junction Box stands out for its resilience in harsh climatic conditions. With a wide operational temperature range of -40°C to +85°C and compliance with global safety standards, it delivers consistent and reliable performance. The use of weather-resistant materials ensures durability, even in the most demanding environments, while the flammability class of UL-94 V0, 5VB reinforces safety.



Key Specifications

- Rated for currents of 25A and 30A and a voltage of up to 1500V DC.
- Equipped with high-quality diodes and globally standardized cables for seamless integration.
- Waterproof structure featuring two-component potting for enhanced protection.
- Supports a busbar width of up to 8.5mm with solder-type terminations.

Ideal Applications

The RaychemRPG Solar Split Type Junction Box is a perfect choice for utility-scale solar farms, commercial rooftop installations, and advanced solar projects requiring high efficiency and reliability. Its robust construction and innovative features make it indispensable in modern renewable energy systems.

In conclusion, the RaychemRPG Solar Split Type Junction Box is not just a component—it is an investment in efficiency, durability, and sustainability, underscoring RaychemRPG's commitment to advancing renewable energy technology.



Navigating Excellence, Defining Leadership

Leadership Guides Maharashtra Toward A Brighter Tomorrow. By Honoring Visionary Leaders, We Celebrate The Progress Of Our Great State.



State Market Leader Award - Inverter

Sungrow India Pvt. Ltd.



State Technology Leadership Award - Modules

Gautam Solar



State Market Leader Award (In DCR) - Modules

Mundra Solar Energy Limited



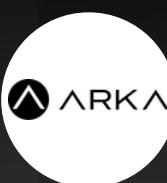
State Technology Leadership Award - Remote Monitoring Solutions

Oorjan Cleantech Pvt. Ltd.



State Market Leader Award - Mounting Structures

Dynamic Corporate Solutions Pvt. Ltd.



Smart Technology Innovation of the Year - Solar Design Software

ARKA 360 (formerly Solar Labs)



State Market Leader Award - Modules

Saatvik Green Energy Pvt. Ltd.



Smart Technology Innovation of the Year - Monitoring Solutions

SuryaLogix Private Limited



Emerging Solar PV Module Manufacturer

Contendre Greenergy Pvt. Ltd.



Smart Technology Innovation of the Year - Inverter

Feston S.E.V. Private Limited



Most Preferred Solar Panel Supplier of the State

Novasys Greenergy Pvt Ltd



State Channel Partner Award - Inverter

Celestial Renewexperts LLP



State Technology Leadership Award - Inverter

SolaX Power Network Technology (Zhejiang) Co., Ltd.



Best Engineering Consulting Company of the Year

V-TECH Renewables Pvt. Ltd.



Atmanirbhar India State Business Leader - EPC
Orbit Solar Solutions



Solar EPC Company of the Year (Residential) - Platinum
Deccan Rays Solar And Energy Projects Llp



Emerging Solar EPC Company of the Year
ECOTEAM SOLAR Pvt. Ltd.



Solar EPC Company of the Year (Residential) - Diamond
Swayamurja Renewable Energy Pvt Ltd



Solar Park Developer of the Year
Enrich Energy Pvt Ltd



Solar EPC Company of the Year (Residential) - Gold
Maya Power



Solar EPC Company of the Year - Open Access
Kalpa Power Pvt Ltd.



Best Project of the Year- Housing Society
Best Engineering Team of the Year
Reinitiatives Energy And Infra Pvt Ltd (Rei-infra)



Solar EPC Company of the Year - Utility
EESHA SOLAR LLP



Best Project of the Year - Industrial
Suravi Solar Systems



Solar EPC Company of the Year: Industrial Rooftop Solutions (Platinum)
B U Bhandari Energy Pvt Ltd



Best Marketing and Service Team of the Year
Celestial Renewexperts LLP



Solar EPC Company of the Year: Industrial Rooftop Solutions (Diamond)
Suravi Solar Systems



Solar EPC Company of the Year: Industrial Ground Mount Solutions
Dynamic Corporate Solutions Pvt. Ltd.



INDIVIDUAL LEADERSHIP AWARDS
Emerging Leader of the Year
AMAL NAYAK
President - Operations
Contendre Greenergy Pvt. Ltd.

INDIVIDUAL LEADERSHIP AWARDS



Sales Head of the Year

NITISH SINGH

Sales Head - West & East
Solis



Visionary of the Year

KUSHAL SHAH

Managing Director
B U Bhandari Energy Pvt Ltd



Young Leader of the Year

VIJAY S PAWAR

Director
**Reinitiatives Energy And Infra
Pvt Ltd (Rei-infra)**



Entrepreneur of the Year

SAURABH DALAL

Partner
Maya Power



The “**Sustainability Leadership Awards 2025**” celebrates outstanding achievements in sustainability, honoring organizations and individuals who lead the way toward a greener, more sustainable future. This prestigious event recognizes innovators and trailblazers who are addressing pressing environmental challenges, reducing carbon footprints, and championing sustainable practices. Join us as we spotlight transformative solutions and acknowledge those setting new standards for environmental responsibility and impact.”



Company of the Year: Sustainable Technology Integration

Shreyani Consulting And Testing
Services Pvt Ltd



Project of the Year: Green Building

Deccan Rays Solar And
Energy Projects LLP



Company of the Year: Green Manufacturing - Modules

ECE (INDIA) Energie
Pvt Ltd



Sustainability Team of the Year: Consumer Satisfaction Excellence in Innovation and Service Optimization

Deccan Rays Solar And
Energy Projects LLP



Company of the Year: Innovative RE Initiative

Project of the Year: Renewable Energy

Hysolwin Green Power
Solutions LLP



Sustainability Leader of the Year:
Consumer Satisfaction Excellence

RAMAN LADDA

Director
Infisol Energy



Sustainability Team of the Year: Consumer Satisfaction Excellence in Customized Solutions

Swayamurja Renewable Energy
Pvt Ltd

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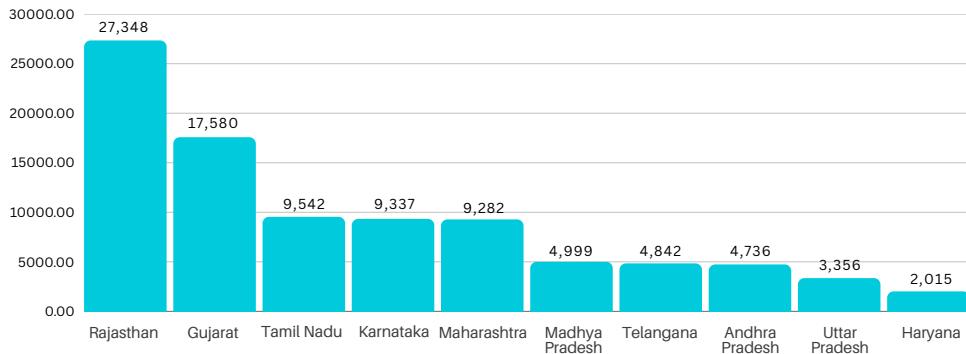
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Solar Installations by State

TOTAL SOLAR PV INSTALLATIONS AS OF JANUARY, 2025 (MW)



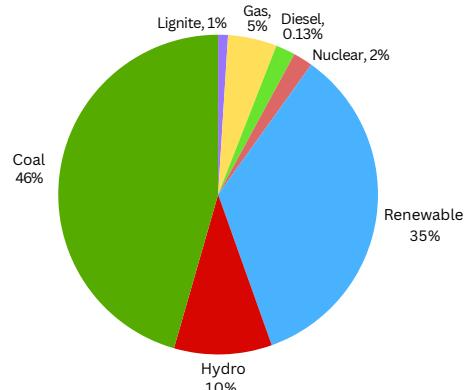
SOURCE: MNRE

SOLARQUARTER RESEARCH

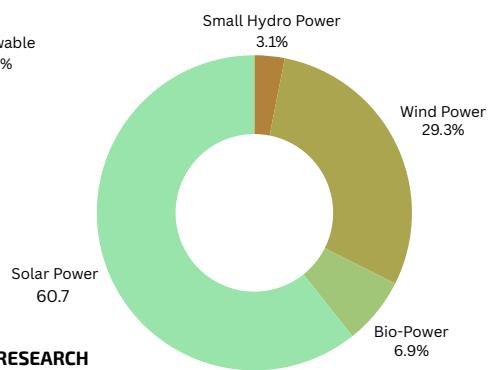
India achieved a remarkable milestone by installing an unprecedented 24,546.23 MW of Solar PV capacity between January and December 2024. By the end of January 2025, the country's total Solar PV installations surpassed 100 GW. During this period, rooftop Solar PV installations reached approximately 16.28 MW. Rajasthan led the way, with 27.348 GW installed, accounting for 27.26% of the nation's total Solar PV capacity. The county also added around 2.465 GW in the first month of the calendar year 2025. Rajasthan, Gujarat, Tamil Nadu, and Karnataka together contributed over 63.60% of the total installed Solar PV capacities across the country. While Rajasthan and Gujarat maintained their leading positions, Tamil Nadu moved up one spot, pushing Karnataka down to fifth place compared to installed solar PV capacity by January 2024. The overall Solar PV installations saw a growth of over 35.02% compared to the 74.30 GW recorded by the end of January 2025.

In the pie chart, Renewable capacity additions continue to increase at a rapid pace in India, accounting for approximately 35.4% of total India's power capacity at the end of January 2025. India's total installed power capacity stood at over 466.25 GW at the end of January 2025 from all the sources, with renewables accounting for 165.202 GW making up 35.4%, compared to cumulative renewable energy installations of 135.116 GW at the end of January 2024, which represented a growth of around 22.27% year-over-year. Solar power accounted for approximately 100.329 GW of installations, which represents 21.5% of the total installed power capacity. Among the renewable, Wind and Solar constitute around 90% of the total renewable (excluding large hydro), Wind Power installed capacity at the end of January 2024 was around 48.365 GW, which represents 10.1% of the total power capacity installed.

INDIA POWER MIX

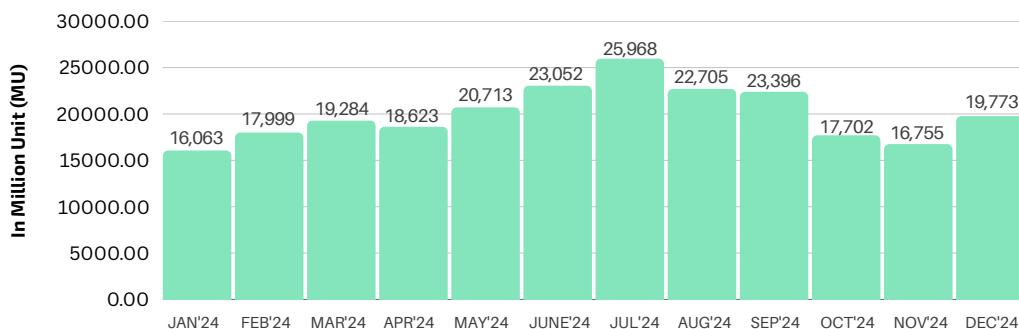


INDIA RENEWABLE MIX



SOURCE: CEA JANUARY 2025, SOLARQUARTER RESEARCH

Monthly RE Generation in India

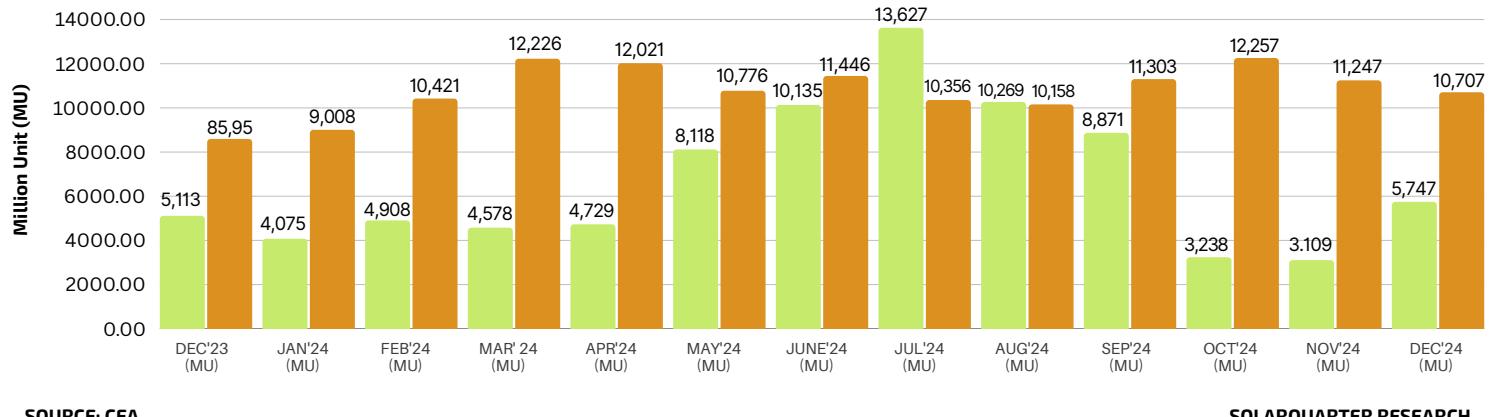


SOURCE: CEA

SOLARQUARTER RESEARCH

Total renewable energy generations in December 2024 reached 19,773.47 million units, there is an increase of RE generations by around 17.92% year-over-year from December 2023, where the RE generations were 16,768.08 million units. Solar Power generation has also increased by around 24.58% year-over-year from December 2024 (10,707.21 million units) to December 2023 (8,594.51 million units), Wind Power generation has increased by almost 12.41% in the same period and reached 5,747.49 million units in December 2024.

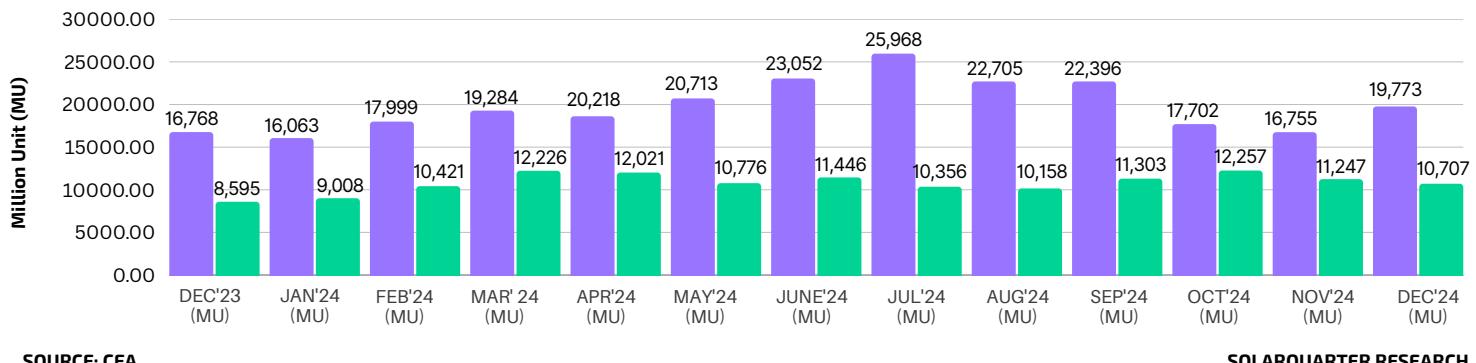
Solar Vs Wind Generation In India In 2023-24



SOURCE: CEA

SOLARQUARTER RESEARCH

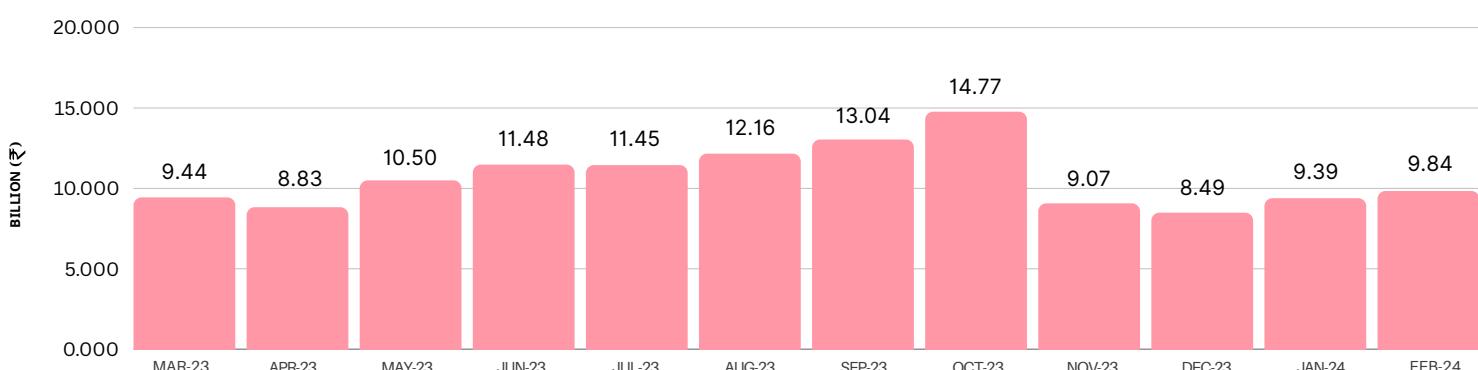
Renewable Energy Vs Solar Generation



SOURCE: CEA

SOLARQUARTER RESEARCH

SECI Monthly Purchase of Solar/Wind Power in 2023-2024



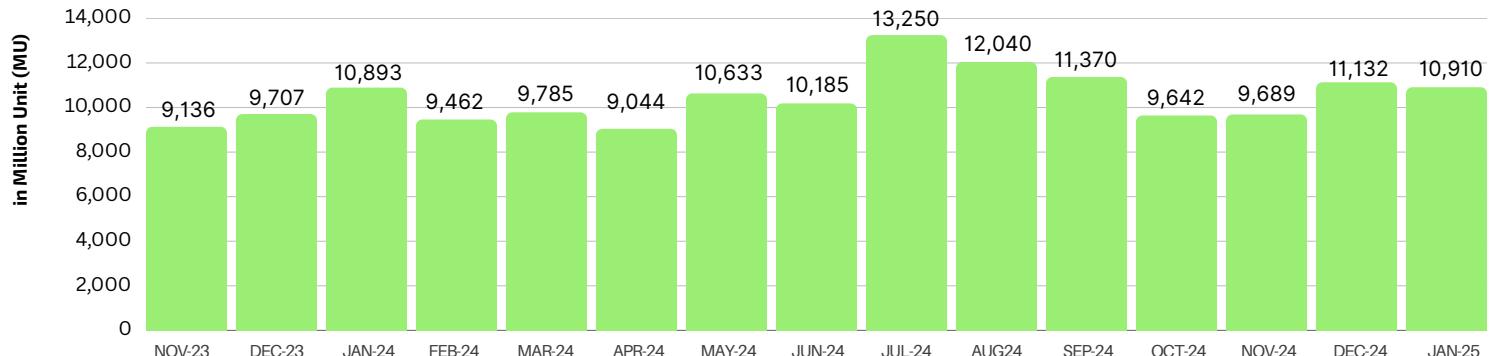
SOURCE: SECI

SOLARQUARTER RESEARCH

In 2023, Solar Energy Corporation of India (SECI) disbursed a total of ₹126.44 billion (~\$1.525 billion) for the purchase of solar and wind power, with the highest payment made in October. However, payments saw fluctuations throughout the year, with a noticeable decline following October 2023, continuing until February 2024. This payment pattern reflects the challenges faced by SECI in managing cash flows and settling dues with solar and wind developers, especially after periods of high disbursement. A clear trend emerges in 2023, with payments being relatively higher in the first half of the financial year, followed by a drop in the latter half. For 2024, SECI has already disbursed ₹19.24 billion in the first two months, indicating a continuation of this inconsistent payment trend. The payment cycle fluctuations suggest the need for better financial planning and resolution of pending payments to ensure smoother operations for renewable energy developers.

Electricity Market

IEX ELELCTRICITY MONTHLY TRADED VOLUME IN 2024-2025

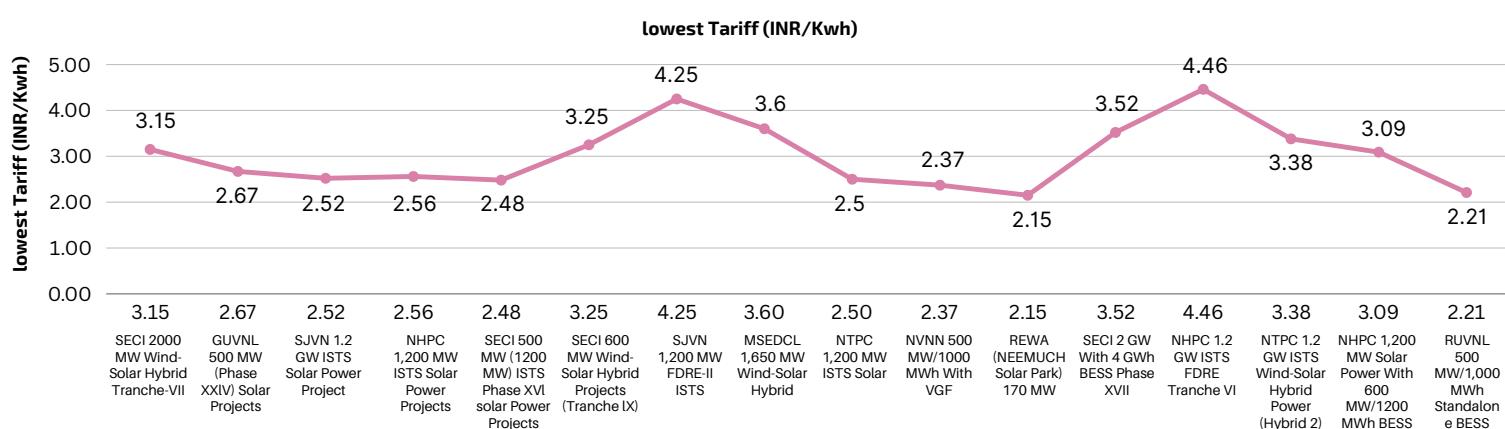


SOURCE: IEX

SOLARQUARTER RESEARCH

In January 2025, the Indian Energy Exchange (IEX) reached a total volume of 10,910 million units (MU), a 0.16% year-over-year increase. According to government data published in January 2025, the Indian Energy Exchange (IEX) recorded a 16% year-on-year increase in electricity traded volume in January 2025. It also achieved its highest-ever monthly trade of Renewable Energy Certificates (RECs), with 38.03 lakh RECs traded, marking a 150% YoY growth. The Day Ahead Market (DAM) price dropped 24% YoY to ₹4.43/unit, benefiting Discoms and industries by offering cost-effective power procurement. REC trading sessions on January 8 and 29 cleared at ₹325 and ₹340 per REC, respectively. Increased liquidity in the DAM segment contributed to price moderation, supporting India's growing energy demand, which reached 137.5 BUs, a 2.7% rise YoY.

Lowest Solar Tariff (₹/kWh), 2024-25



SOURCE: SOLARQUARTER RESEARCH

BIDDING DETAILS

The introduction of ALMM List-I for Solar PV modules and the upcoming ALMM List-II for Solar PV cells, effective from June 2026, has created challenges for solar auctions in India. Developers are facing compliance complexities, leading to fluctuating tariff rates. Additionally, currency exchange rate volatility, worsened by geopolitical tensions such as the Russia-Ukraine conflict, has disrupted the global solar supply chain, adding further uncertainty.

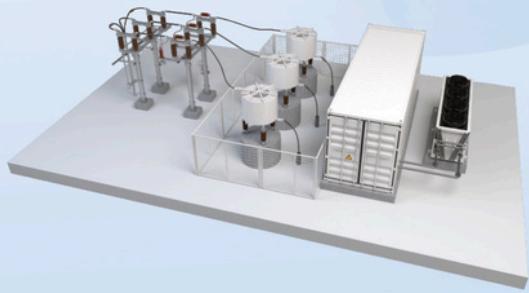
To ease some of these pressures, the government extended commissioning deadlines for solar projects, providing relief to developers. However, new anti-dumping duties on solar PV glass imports from China and Vietnam have impacted costs, leading to higher prices from domestic manufacturers. This has increased financial strain on project developers.

Solar tariffs in India have remained volatile in 2024, affected by rising panel costs, installation expenses, and global energy price shifts. Factors such as project location, size, and grid access continue to play a key role in determining tariffs.

A key development in the Union Budget 2025 was the reduction of customs duty on solar cells and modules to 20%, aimed at making solar equipment more affordable. Despite these challenges, technological advancements, competitive bidding, and government incentives continue to shape India's solar sector, ensuring long-term growth.



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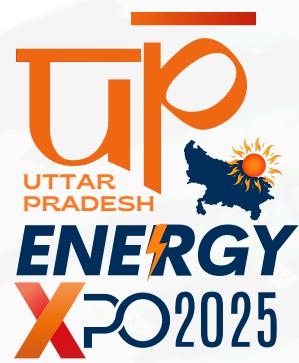
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