INTERNATIONAL SOLAR ALLIANCE

PPP Contractual Mechanisms: Solar Rooftop Programme in India

June 2026

Agenda

Context and Scale of Challenge

40 GW

National Target

Rooftop by 2030 (PM Surya Ghar)

10 Crore

Households Targeted

Residential installations

1–10 kW

Avg System Size

Per individual rooftop

Fragmentation

The Core Problem

Millions of tiny dispersed assets

Why is Public Private Partnership (PPP) Model needed?

The fundamental challenge is that rooftop solar involves thousands of small, distributed assets, each economically too small to finance individually and too dispersed to manage. PPP structures solve this by **aggregating individual rooftops** into **bankable, manageable packages**, while **shifting** installation, financing, and O&M **risk** to a capable **private developer**.

The Aggregation Problem

Challenges limiting individual rooftops/roof-owners to attract private finance on their own:

Transaction Cost Barrier

Cost of due diligence, legal, and connection for a 2kW system exceeds its economic value; making it less attractive to lenders

Credit Risk Dispersion

Revenue depends on thousands of individual household payment behaviors; unmanageable for project finance

Regulatory Fragmentation

Each connection requires separate DISCOM approval, net-metering application, and inspection; adds to regulatory hurdles

Rooftop Availability Uncertainity

Structural adequacy, shading, orientation, lease willingness unknown until surveyed individually; due-diligence constraints

How PPP solves Aggregation

WITHOUT PPP

- Each household negotiates own PPA
- Each owner secures own financing
- Separate DISCOM connection per site
- No single point of O&M accountability
- Developer faces 1,000 counterparties
- Unviable transaction economics

WITH PPP

- Govt aggregates 100s of rooftops in one tender
- Single developer raises project finance
- One bulk grid-connection application
- Developer owns O&M responsibility
- Utility deals with 1–2 counterparties
- Bankable package for lenders

PPP model brings in an added advantage where Government acts as an aggregator. It bundles individual rooftops, procures a developer through competitive tender and then entire package becomes financially attractive to the investors.

Core PPP Business Models

CAPEX / Self-Ownership

ASSET OWNER

Consumer/Government

RISK BEARER

Consumer bears all risk

REVENUE

Upfront investment + subsidy (CFA)

PPP NOTE

Low PPP content; consumer owns asset

RESCO / OPEX Model

ASSET OWNER

Private Developer (RESCO)

RISK BEARER

Developer bears capex, performance, O&M

REVENUE

PPA tariff over 10–25 years

PPP NOTE

Core PPP model - developer finances & operates

Utility-Led Aggregation (ULA)

ASSET OWNER

DISCOM / State Entity

RISK BEARER

Public sector retains most risk

REVENUE

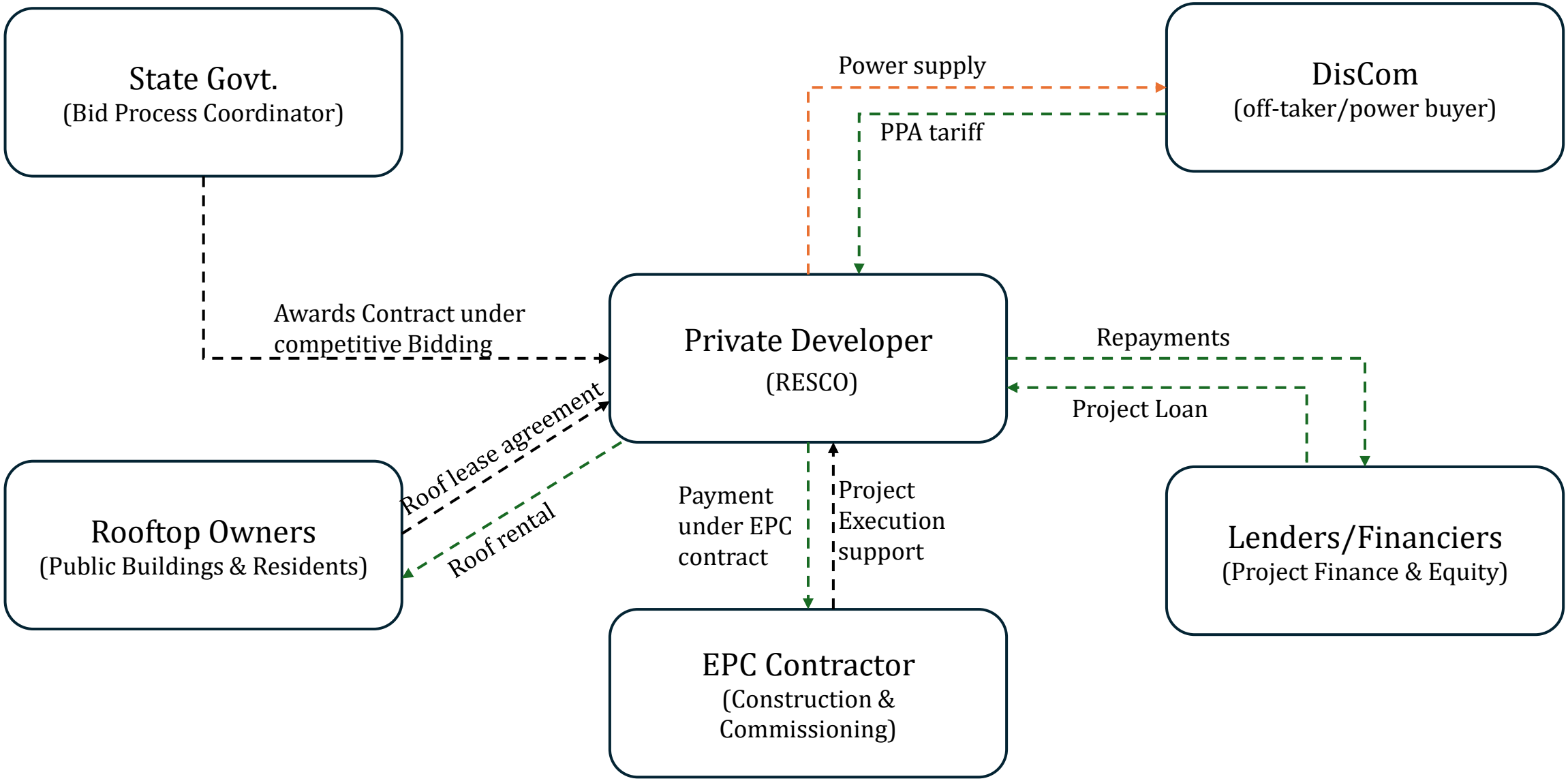
Feed-in tariff / net metering credits

PPP NOTE

Utility aggregates demand, developer installs

RESCO is the basic and most prevalent PPP model followed by Utility-led Aggregation model, that brings together government and private sector and hence manages risk sharing

PPP Contractual Architecture: RESCO Model



Power Purchase Agreement (PPA) serves as a strong Revenue Engine

Tenor

20-25year contracts; provides revenue visibility for project financing

Tariff Structure

Discovered via competitive bidding (lowest quoted tariff wins); fixed or with annual escalation (typically 3–5%)

Off-taker

DISCOM (e.g., GUVNL) is the off-taker — sovereign credit, not household credit — making PPA bankable

Deemed Generation

If curtailment occurs due to grid unavailability, deemed energy payments protect developer revenue

Payment Security

Letter of Credit (LC) covering 1–3 months of billing; escrow mechanism for payment flows

Termination

Developer compensation for early termination; change-in-law protections built in

Risk Allocation Matrix

Risk Category	Public Sector	Private Sector	Shared
Policy & Regulatory Change	●		
Grid Curtailment / Outage	●		
Rooftop Availability (Public)	●		
Rooftop Availability (Private)		●	
Construction / Completion Risk		●	
Solar Resource / Generation		●	
O&M Performance Risk		●	
Payment / Off-taker Credit			●
Force Majeure			●

● Public ● Private ● Shared

Managing Payment and Credit Risk

Managing payments is one of the biggest barrier to RESCO viability, PPP contracting addresses this.

DISCOM as Single Off-taker

Instead of billing thousands of households, all power sold to the state DISCOM. This converts consumer credit risk → quasi-sovereign credit risk.
One PPA with developer (RESCO), one payment stream.

Payment Security Corpus (PM Surya Ghar)

The Ministry of New and Renewable Energy (MNRE)-funded corpus created at state level. RESCOs contribute ₹2,000/installation as co-contribution. Corpus covers developer dues if DISCOM defaults for >30 days.

Letter of Credit (LC) Mechanism

DISCOM must maintain an LC equal to 1–3 months of projected billing.
Developer (RESCO) can draw on LC if payment is delayed beyond contracted timeline.

Escrow Account Structure

Revenues flow into a project-level escrow account.
Priority waterfall: debt service → O&M → developer equity.
Lenders have first charge on revenue

Case Study

Gujarat "Rent-a-Roof": The Pioneering PPP Model

Gandhinagar Solar City Pilot | Launched 2010 | World Bank–IFC Advisory

~5 MW

Total installed capacity (pilot)

$12M

Private finance mobilized

25 Years

Concession Tenor

10,000

People with better power access

Developers: Azure Power & SunEdison (each 2.5 MW) | Off-taker: GUVNL | Bid Coordinator: GPCL

Transaction Structuring under the Gujarat PPP model

01

Govt Rooftop Survey

GPCL & GERMI identified 500+ public buildings in Gandhinagar. Structural assessments done. Shadow, orientation, load-bearing capacity checked. Only suitable rooftops included in the tender package.

02

Competitive Tender (RFP)

Two packages of 2.5 MW each tendered separately. Award criterion: lowest quoted feed-in tariff (Rs/kWh). Developers pre-qualified on financial capacity and technical experience.

03

25-Year Concession Awarded

Azure Power and SunEdison each won a package. Concession agreement signed with GPCL. PPA signed with GUVNL. Roof lease agreements executed with individual building owners.

04

Private Residential Top-up

Developers marketed to private rooftop owners to supplement public building capacity. Owners received Rs 3/kWh "green income" rental — incentive designed by government to encourage participation.

05

Grid Connection & Commissioning

GETCO provided grid connectivity at standard terms (waived certain charges under solar policy). Net metering regulations issued by GERC. Fully commissioned January 2014.

Payment and Incentive Structure

Tariff Discovery through Competitive Bidding

Developers bid for lowest Feed-in Tariff (Rs/kWh). Award to L1 bidder. Tariffs have fallen ~60% since then. GUVNL now routinely gets bids below Rs 3/kWh for larger rooftop packages.

Central Financial Assistance (CFA)

MNRE subsidy: Rs 30,000 per kW (first 2 kW) + Rs 18,000/kW (next 1 kW) for residential. Under PM Surya Ghar. Reduces consumer tariff or boosts RESCO viability.

Green Income / Roof Rental

Rooftop owners receive Rs 1–3/kWh generated OR fixed annual rental. Incentivizes participation. Reduces rooftop acquisition friction.

Accelerated Depreciation

40% accelerated depreciation benefit for private investors under Income Tax Act. Reduces effective project cost. Key incentive for C&I RESCO developers.

RPO / REC Mechanism

DISCOMs have Renewable Purchase Obligations. RESCO-supplied power counts toward RPO compliance, adding derived value for utility as buyer. RECs tradeable as additional revenue stream.

Risk Mitigations – Specific Contractual Solutions

Rooftop Availability	80% government-guaranteed public rooftops; surveyed pre-tender; structural certificates provided; force majeure exit right if rooftop becomes unavailable
Grid Connectivity	GETCO required to connect within fixed timeline post-commissioning; deemed generation payments if curtailment exceeds 5% annually; technical standards pre-agreed with GERC
Regulatory Change	Change-in-law provisions in PPA; net metering framework locked for project life under GERC order; state policy commitment in writing
Payment Default	Letter of Credit (3 months billing); GUVNL state government backing; early termination compensation clause with defined formula
Private Rooftop Churn	"Green income" clause runs with property — binding on property buyer; GPCL intermediates to resolve disputes; developer can replace a non-performing rooftop from a pre-approved waiting list

Under Gujarat Case study

Utility-Led Aggregation (ULA) Model

DISCOMs act as a master aggregator under the Rooftop Programme (PM Surya Ghar)

How ULA Works

- DISCOM/State Entity issues single bulk tender for rooftop installations across many households
- Developer installs at each site; DISCOM owns the asset for project period (min. 5 years)
- Households pay DISCOM for energy consumed; DISCOM remits to developer
- DISCOM uses its billing relationship to collect payments — solves collection risk entirely
- After project period, asset ownership may transfer to household

Why ULA is Contractually Powerful

Eliminates Payment Risk:

DISCOM is the sole payer — utility credit, not household credit

Scales Aggregation:

DISCOM can aggregate 10,000+ households in a single tender; developer deals with one counterparty

Regulatory Alignment:

DISCOM already has billing, metering, and connection rights — no new access agreements needed

CFA Pass-through:

Central subsidy flows via DISCOM, reducing tariff to consumer further

Contractual Challenges that remain despite the best PPP structuring

Net Metering Policy Inconsistency

States frequently revise net metering caps and compensation rates, undermining long-term PPA economics. No national standardisation. Gujarat itself reduced export compensation in 2021, causing mass PPA exits.

Rooftop Owner "Churn"

Property sales, renovation, or owner disputes disrupt lease agreements. Even with binding-on-successors clauses, enforcement is costly. High churn in urban India makes long lease management complex.

DISCOM Financial Stress

Many state DISCOMs carry large losses and payment backlogs. Even with LCs and escrow, delays occur. Punjab, Rajasthan cases show DISCOM payment risk is real despite contractual protections.

Data & Metering Gaps

Accurate metering at each distributed site is critical for billing. Smart metering rollout is uneven. Data gaps create revenue leakage disputes. Real-time monitoring contracts add complexity and cost.

Point of Contact

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We look forward to your invaluable support and guidance to make this difference!