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MINI-GRID & DRE FINANCE

The Mini-Grid Business & Financing Models

What makes distributed renewable energy investable at scale

Nimli, Rajasthan · June 2026

WHY THIS PERSPECTIVE

A finance-first view — from both sides of the table

I have spent my career on the two sides of this problem that rarely meet: building projects, and financing them.

As an operator — Simpa Networks

- Built one of India's largest rural solar / pay-as-you-go companies
- Lived the realities of demand risk, collections, and last-mile delivery
- Acquired by ENGIE — scale required institutional capital

As a financier — Odyssey today

- Platform unlocking finance for DRE across emerging markets
- Connecting thousands of developers to institutional & impact capital
- A cross-market view of what actually moves commercial debt

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THE QUESTION ON THE TABLE

The technology works. The pilots work. So why doesn't the capital flow?

After years of grants, subsidies and blended finance, most DRE still cannot raise commercial debt at scale. The binding constraint is not generation cost or project returns — it is capital structure and bankability.

Today: where the bottlenecks really sit — and what international experience says actually unlocks debt.

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THE VANTAGE POINT

Odyssey's lens on the market

The connective tissue between developers, equipment suppliers, and the world's capital — across emerging markets.

6,000+

renewable energy companies on the platform

$3B+

of capital available to DRE projects

50+

countries where Odyssey is deployed

~1.4 GW

of distributed renewables unlocked to date

~$135M of equipment procurement & finance unlocked · 80+ OEM partners · programs from Nigeria DARES to Madagascar DECIM

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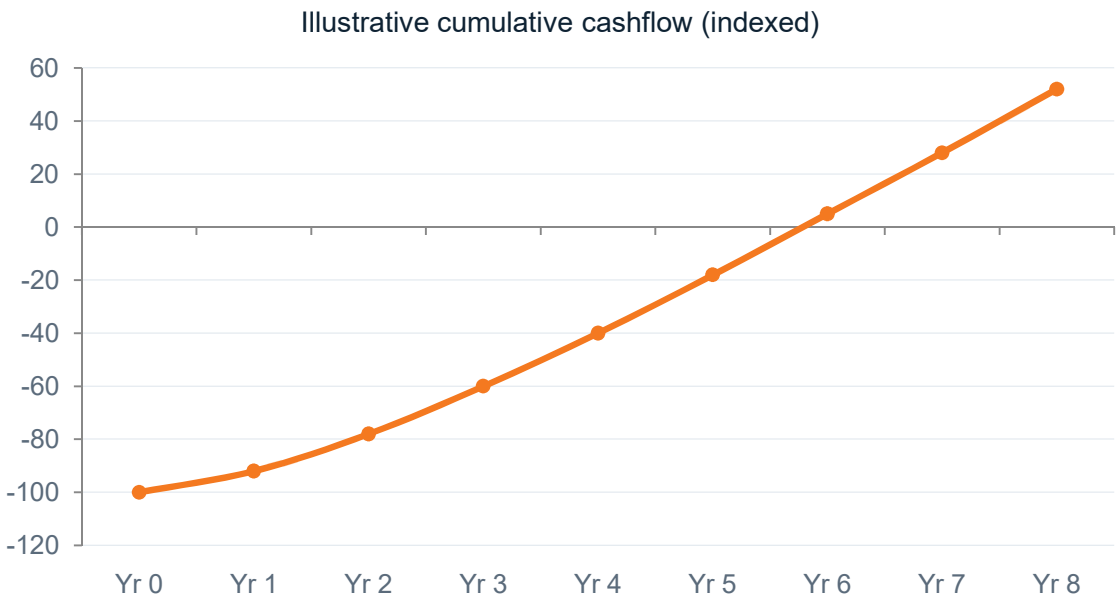
THE BUSINESS

Anatomy of a mini-grid business

Heavy upfront capex, a slow demand ramp, and a long payback — the shape of the cashflow curve is the whole financing problem.



Upfront capex dominates

Generation, storage & distribution built before revenue begins.

Slow demand ramp

Loads build over years; early utilisation is low.

Long payback

Breakeven often 6–8 years — far beyond typical loan tenors.

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LESSONS FROM THE FIELD

Hard-won lessons the sector keeps re-learning

Synthesised from the operating experience documented by INENSUS / Nico Peterschmidt across 100+ mini-grid companies in Africa and Asia.

Costs fall with standardisation

Repeatable designs, bulk procurement and modularity bend the cost curve — bespoke sites stay expensive.

Demand is the real risk

Revenue lives or dies on consumption; anchor loads and productive use must be engineered in from day one.

Interconnection changes economics

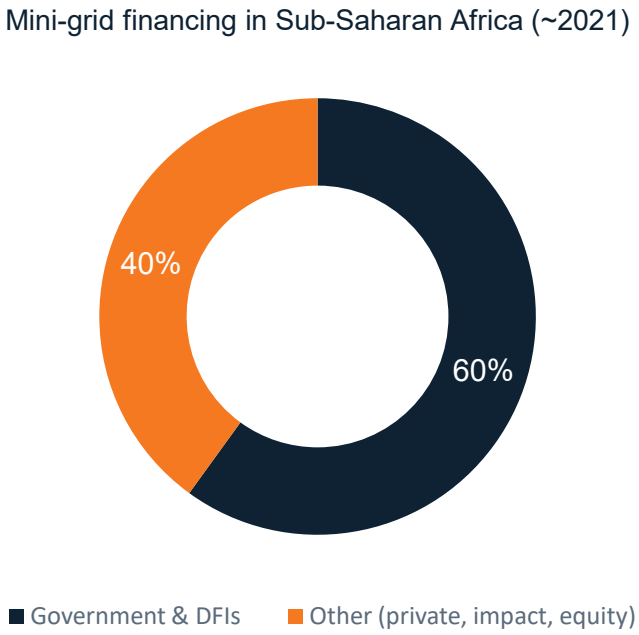
Linking mini-grids — and planning for grid arrival — protects asset value rather than stranding it.

Scale is a precondition for finance

Single sites are unbankable; portfolios of standardised assets are what lenders can actually underwrite.

WHO'S ACTUALLY PAYING

Most mini-grid capital to date has not been commercial



~60%

of mini-grid financing in Sub-Saharan Africa came from governments and DFIs — commercial capital is still the minority.

ESMAP: at least 50% of future mini-grid funding must come from private capital to electrify ~490M people by 2030.

The mandate is clear — crowd in private, commercial money. The question is how.

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THE BOTTLENECK

Why mini-grids resist conventional finance

Small ticket sizes

Deals too small to justify the diligence and structuring cost of institutional lenders.

Geographic dispersion

Assets scattered across remote regions — hard to monitor, service and aggregate.

Demand & offtake risk

Uncertain consumption and informal customers make revenue hard to forecast.

Grid-arrival risk

The main grid may arrive and strand the asset, with no clear compensation rule.

Thin SME balance sheets

Developers can't carry the debt their pipeline needs; lenders can't underwrite them.

Currency & tenor mismatch

USD capital vs local-currency revenue; long paybacks vs short loan tenors.

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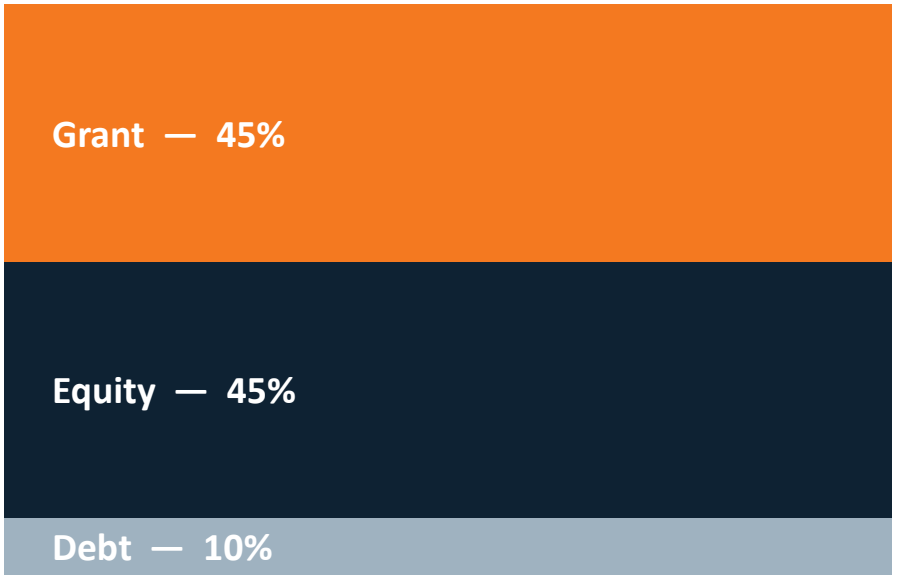
THE REALITY

The capital stack as it really is

A typical rural mini-grid portfolio is carried by grants and equity. Debt — the cheap, scalable layer — barely features.



Illustrative mini-grid capital stack (e.g. 45% grant / 45% equity / 10% debt)

Heavy grant dependence is the norm

- Grants de-risk, but don't scale — they are finite and slow
- Equity is expensive and scarce for rural assets
- Commercial debt — the layer that could scale — is the thin slice
- The whole game is migrating this mix toward debt

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THE PUZZLE

Years of subsidy — yet commercial debt stays marginal

Grants, subsidies, viability-gap funding and blended finance have all been deployed. Five structural reasons debt still doesn't follow:

No payment security

Nothing guarantees the lender gets paid if revenue falls short.

No repayment track record

Few proof points of DRE portfolios reliably servicing debt.

Tenor mismatch

Loans are too short for 6–8 year project paybacks.

Transaction costs too high

Small deals can't absorb diligence and structuring overhead.

Currency risk

Local-currency revenue against hard-currency capital.

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RBF UNDER THE MICROSCOPE

Results-Based Financing: how it's meant to work

Concessional capital paid against verified outcomes — connections made, kWh delivered — rather than against milestones.

1

Developer builds

Project is constructed and customers connected — fully funded by the developer.

2

Outcomes verified

An independent process confirms real connections and usage.

3

Subsidy disbursed

Results-based grant is paid out — after delivery is proven.

4

In theory: repeat

Freed-up capital recycles into the next project.

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THE HIDDEN BURDEN

RBF doesn't remove the upfront gap — it postpones it

$400–800

per connection

Odyssey's estimate of what developers must fund themselves — before any subsidy is disbursed.

The burden shifts, it doesn't disappear:

- Developers carry full project cost up front
- Verification and disbursement can take months
- Working capital is locked exactly when it's scarcest
- Thin-balance-sheet SMEs simply can't pre-fund at scale

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THE PROVOCATION

Is RBF bridging the gap — or re-packaging it?

The uncomfortable question

RBF moves the financing burden to the earliest, riskiest stage of the project cycle.

It rewards delivery — but only those who can already afford to deliver.

Does it scale developers, or filter for the few who are already well-capitalised?

What it would take to truly work

- Bridge / pre-finance facilities to fund the upfront gap
- Predictable, fast verification and disbursement
- A take-out lender lined up before disbursement
- RBF as an anchor for commercial debt — not a substitute for it

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INTERNATIONAL EXPERIENCE · 1

Aggregation at scale unlocks concessional capital

Nigeria's $750M World-Bank-funded DARES program shows how to disburse results-based capital across many small developers at once.

$750M

DARES program, with ~$410M reserved for Nigerian mini-grids

Many-to-one

One platform disburses to a long tail of small developers

Verification

Remote verification confirms real connections — and speeds payment

The lesson for India: platforms that aggregate projects and verify outcomes make small, dispersed assets financeable as a portfolio.

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INTERNATIONAL EXPERIENCE · 2

The DRE financing toolkit — and where each fits

Straight grants

Good for: De-risk early markets **Limit:** Finite, slow, don't scale

Repayable / recoverable grants

Good for: Stretch public money, recycle **Limit:** Still depend on the public purse

Results-based financing

Good for: Reward verified delivery **Limit:** Heavy upfront burden on developers

Concessional / blended debt

Good for: Crowd in commercial lenders **Limit:** Limited supply; structuring-heavy

Commercial debt

Good for: Scalable, repeatable capital **Limit:** Needs track record & security

Equity

Good for: Absorbs early risk **Limit:** Expensive and scarce for rural assets

Crowdfunding / P2P lending

Good for: Expands access (e.g. Rang De–SELCO) **Limit:** Small tickets; mainly consumer-side

Carbon finance

Good for: New revenue line **Limit:** Rarely closed as a bankable stream yet

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INTERNATIONAL EXPERIENCE · 3

Track record is what shifts grant money into debt

Demonstrated repayment is the single most powerful de-risker. Prove the asset class performs, and DFIs move from grants to debt.

Prove performance

A clean repayment record across facilities turns a 'pilot' asset class into an investable one.

Recycle the capital

Structured vehicles let the same capital fund project after project — a catalytic multiplier on every dollar.

Layer the risk

First-loss / concessional tranches sit beneath commercial lenders, giving them the comfort to participate.

INTERNATIONAL EXPERIENCE · 4

Supply-chain finance: attacking the cashflow gap

Odyssey's supply-chain credit (now live in India): pay OEMs upfront, developer pays ~15% deposit and ~85% after commissioning.

What it solves

- Working-capital / cashflow timing mismatch
- Equipment overpricing for small buyers
- Procurement friction and OEM access
- Equipment itself becomes the collateral / recovery route

What it does NOT solve

- Tariff adequacy and affordability
- End-customer demand and payment risk
- Long-tenor project / term debt
- Grid-arrival and regulatory uncertainty

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THE PATH FORWARD

From "possible" to "probable"

No single instrument makes DRE bankable. A stack of interventions does — the question is which public rupee buys the most leverage.

Productive-use demand

Build the load that underwrites the revenue

Project-prep capital

Fund pipeline of bankable, standardised projects

Aggregation platforms

Bundle small projects into efficient financeable portfolio

Payment security

Mechanisms that guarantee developers get paid

First-loss / guarantees

Public risk capital beneath commercial debt

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OVER TO THE PANEL

Points to ponder

1. If you had only ONE public intervention to unlock 10× more private debt — cheaper debt, first-loss guarantees, payment-security mechanisms, demand aggregation, or project preparation — which would you choose, and why?

2. Can a grant-heavy stack (e.g. 45/45/10) actually migrate toward commercial debt as a portfolio matures — and what concrete evidence do lenders need before they move?

3. Has anyone here closed commercial debt with RBF — or carbon credits — as a meaningful anchor? If not, what specifically has to change?

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