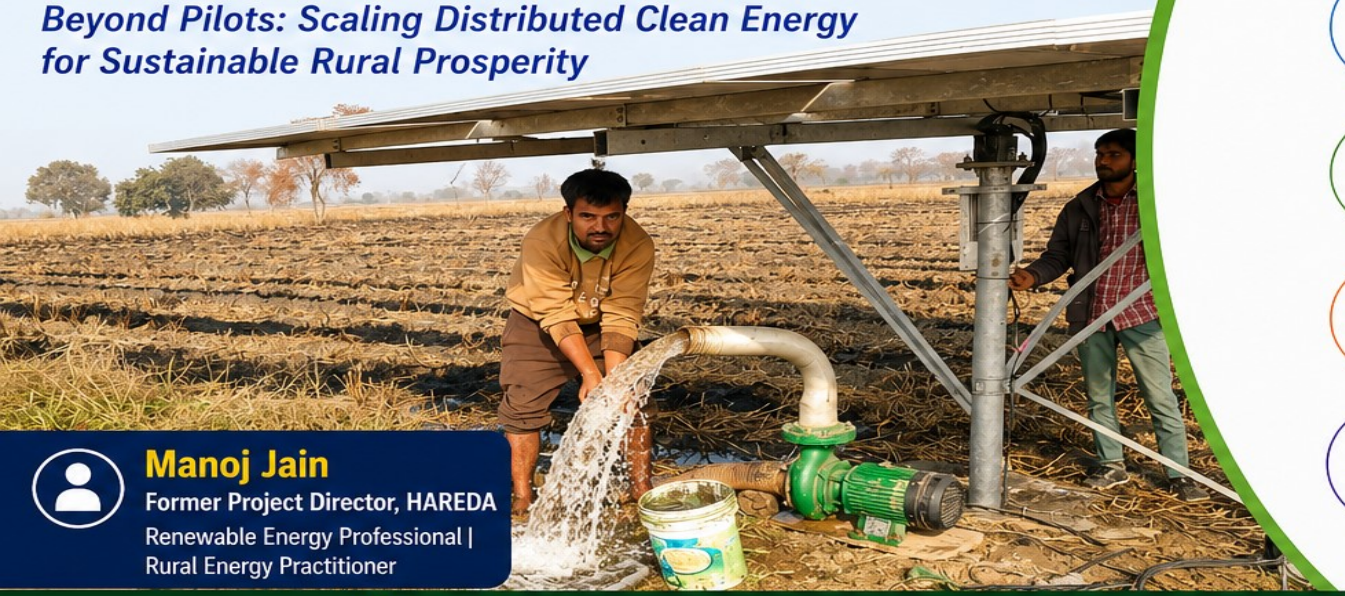
PM-KUSUM in Practice:

Lessons from the Field and the Road Ahead

Beyond Pilots: Scaling Distributed Clean Energy for Sustainable Rural Prosperity



Manoj Jain
Former Project Director, HAREDA
Renewable Energy Professional | Rural Energy Practitioner

SOLAR ENERGY
Clean • Reliable • Sustainable

↓

WATER SECURITY
Assured Irrigation • Conservation

↓

AGRICULTURAL PRODUCTIVITY
Higher Yields • Better Quality

↓

RURAL ENTERPRISE
Processing • Value Addition • Jobs

↓

FARMER INCOME
Sustainable • Resilient • Prosperous

> *"Policies are announced in capitals. Success is created in villages."*

"Small is Beautiful, Effective, Feasible & Powerful." | *Think Big for Small Things."*

PM-KUSUM → **LEARNING** From Implementation → **SCALING** Solutions that Work → **RURAL PROSPERITY** Inclusive • Sustainable • Resilient

AAETI–CSE National Roundtable | ***Beyond Pilots:*** Upscaling Distributed Clean Energy in India

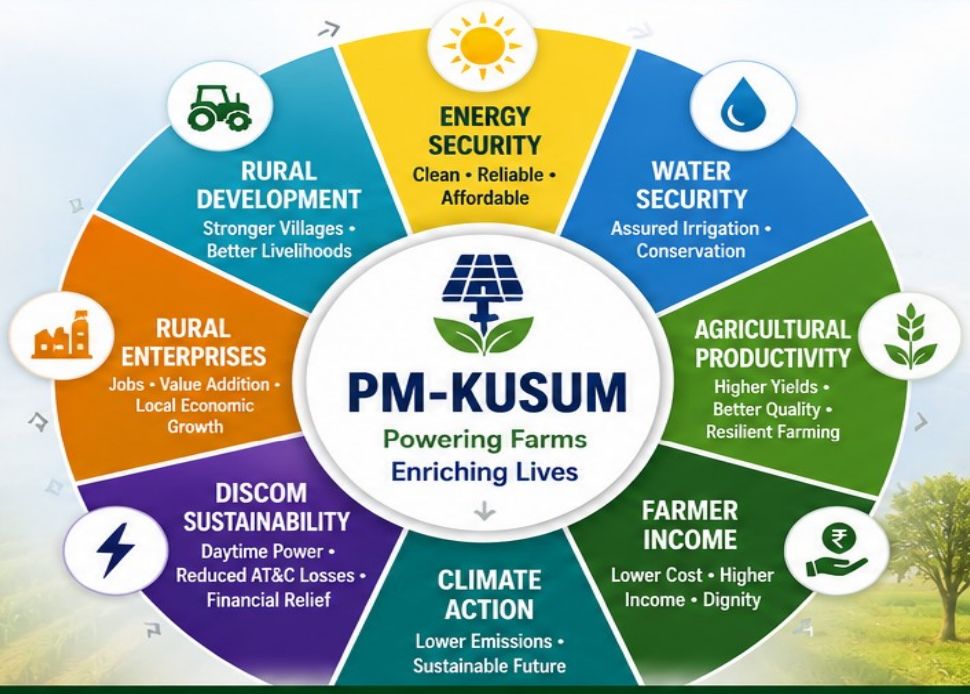
SLIDE 2

PM-KUSUM: MORE THAN A SOLAR PUMP PROGRAMME

India's Largest Initiative Integrating Energy, Water and Agriculture

WHAT PM-KUSUM HAS DEMONSTRATED

- Solar irrigation is technically viable
- Farmers readily adopt renewable energy when benefits are visible
- Decentralized energy solutions can be scaled
- Renewable energy can directly improve livelihoods
- Agriculture can participate in India's energy transition



STRATEGIC IMPORTANCE FOR INDIA

- Reduces dependence on diesel
- Lowers agricultural power subsidy burden
- Reliable daytime irrigation
- Creates climate resilience
- Supports Net-Zero and Renewable Energy goals
- Enables Agrivoltaics and Productive Use of Energy
- Creates opportunities for rural enterprises

> "PM-KUSUM is not merely a solar pump programme.
> It is India's largest experiment in integrating Energy, Water and Agriculture for Sustainable Rural Prosperity."

PM-KUSUM Clean Energy for Farms → **ENERGY ACCESS** Reliable • Clean • Affordable → **PRODUCTIVE USE** Water • Agriculture • Value Addition → **FARMER INCOME** Higher Income • Better Livelihoods → **RURAL PROSPERITY** Inclusive • Sustainable • Resilient

SLIDE 3

PM-KUSUM: What Worked & What Did Not

Clear Outcomes. Clear Lessons.

WHAT WORKED

COMPONENT B
Standalone Solar Pumps

Proven Success
- Strong Acceptance
- Measurable Impact

- High Farmer Acceptance
- Reliable Performance
- Daytime Power Availability
- Tangible Savings & Income Impact
- Easier Implementation

WHAT DID NOT WORK

COMPONENT A
Decentralized Solar Plants

- Poor Progress
- Implementation Challenges
- Limited Outcomes

COMPONENT C (IPS & FLS)
Solarisation of Existing Pumps & Feeder Level

- Slow Implementation
- Complex Approvals
- Low Offtake
- Limited Impact

> *"Component B delivered impact on the ground. Components A & C need structural and institutional rethinking."*

COMPONENT B
Works. Scalable. Impactful.

COMPONENT A
Not Working. Structural Issues.

COMPONENT C
Not Working. Implementation Bottlenecks.

PM-KUSUM
Powering Farms
Enriching Lives

PM-KUSUM: COMPONENT-WISE LESSONS FROM IMPLEMENTATION

Achievements as on 30.04.2026 | Different Components. Different Challenges. Different Solutions.

OVERALL ACHIEVEMENTS (as on 30.04.2026)

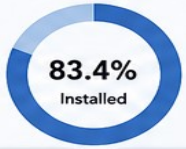
- **21.77 Lakh+** Farmers Benefitted
- **13.07 Lakh** Pumps Sanctioned (All Components)
- **10.90 Lakh** Pumps Installed (All Components)
- **~2.70 Lakh KL** Diesel Saved (Estimated)
- **~7.39 Lakh Tonnes** CO_2 Emission Avoided (Estimated)

COMPONENT A (DECENTRALIZED GRID CONNECTED SOLAR PLANTS)

10,000.00 Sanctioned (MW)	1,202.28 Installed (MW)

Sanctioned | Installed

COMPONENT B (STANDALONE SOLAR PUMPS)



13,07,190 Sanctioned (Nos.)	10,90,815 Installed (Nos.)

Sanctioned | Installed

COMPONENT C (IPS) (INDIVIDUAL PUMP SOLARIZATION)

55,392 Sanctioned	15,183 Installed

Sanctioned | Installed

COMPONENT C (FLS) (FEEDER LEVEL SOLARIZATION)

35,36,602 Sanctioned	15,71,826 Installed

Sanctioned | Installed

Note: Figures are as per MNRE Achievement Dashboard dated 30.04.2026

COMPONENT A – DECENTRALIZED SOLAR PLANTS

KEY CHALLENGES

- DISCOM approvals & PPA execution
- Land aggregation & availability
- Financing & bankability
- Grid connectivity & evacuation
- Developer participation & viability

LEARNING

Institutional coordination with DISCOMs, clear PPA frameworks, land pooling and innovative financial models are critical for scale.

WAY FORWARD

- Time-bound DISCOM approvals & standard PPA
- State facilitation cells & fast-track clearances
- Innovative aggregation & land pooling models
- Viable payment security & risk mitigation

COMPONENT B – STANDALONE SOLAR PUMPS

KEY SUCCESS FACTORS

- High farmer acceptance
- Proven technology
- Direct & visible economic benefit
- Significant diesel savings
- Simple implementation model
- Strong field support from States & Vendors

LEARNING

Farmers adopt solutions, not schemes. Service quality and after-sales support drive sustained adoption.

WAY FORWARD

- Maintain quality & O&M support
- Expand to all remaining eligible farmers
- Promote FPO / Group models for scale
- Monitor performance & impact outcomes

COMPONENT C – PUMP SOLARIZATION & FEEDER SOLARIZATION

KEY CHALLENGES (IPS)

- DISCOM integration & coordination
- Net metering arrangements
- Surplus power accounting
- Payment mechanssms & settlement
- Awareness & process complexity for farmers

KEY CHALLENGES (FLS)

- DISCOM approvals & planning
- Feeder identification & prioritization
- Grid infrastructure readiness
- Financing & viability
- Land for solar plant & evacuation

LEARNING (IPS)

Stronger DISCOM engagement, simplified net metering, transparent surplus power settlement and handholding are essential.

LEARNING (FLS)

Feeder solarization requires robust planning, grid readiness, innovative business models and long-term coordination with DISCOMs.

WAY FORWARD (C)

- Streamline net metering & documentation
- Strengthen DISCOM systems & processes
- Payment security & surplus settlement
- Awareness, handholding & technical support

PM-KUSUM HAS DELIVERED SIGNIFICANT PROGRESS, ESPECIALLY IN COMPONENT B.
Scaling Components A and C requires stronger institutional coordination, DISCOM participation, simplified processes, innovative business models and differentiated strategies.

One Goal – Sustainable Rural Prosperity
From Solar Pumps to Prosperous Farms

SLIDE 5

What the Field Taught Me

Lessons from PM-KUSUM Implementation in Haryana

Farmers adopt solutions, not schemes.

Trust matters more than technology.

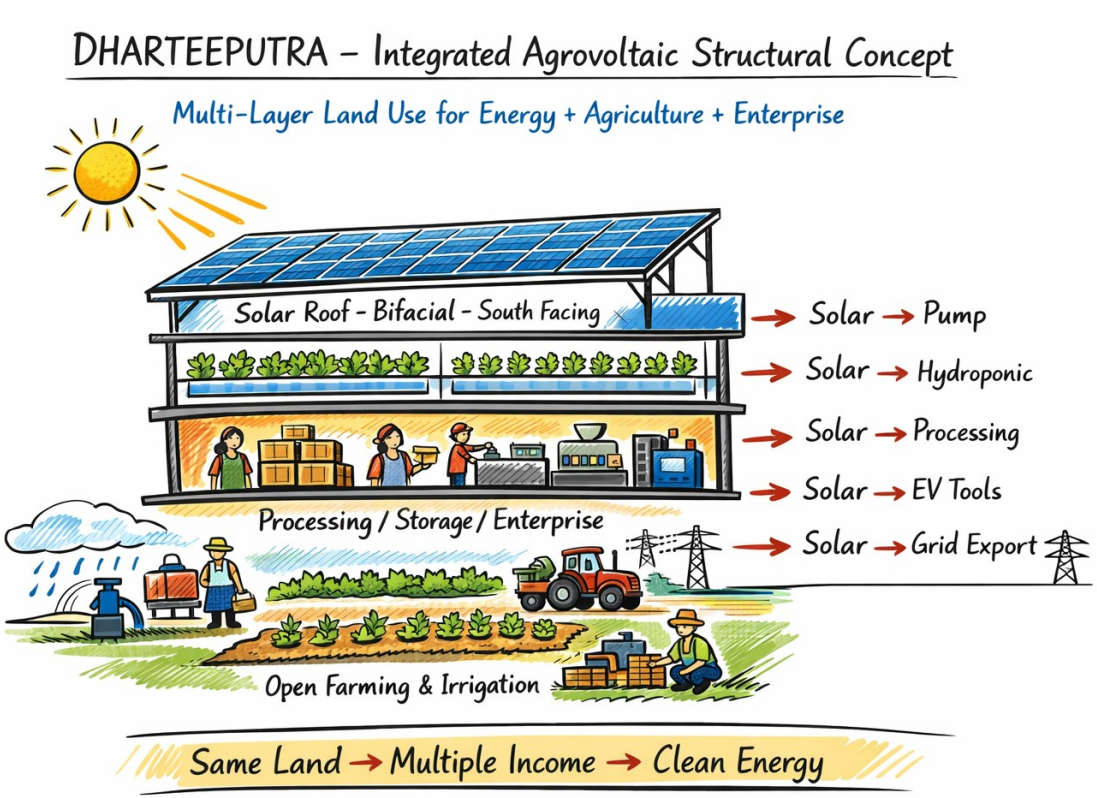
Service matters more than subsidy.

Demonstration matters more than publicity.

Farmers value income more than infrastructure.

> "After 34 years in renewable energy, I realized that technology is not the biggest challenge. Policy is not the biggest challenge. **The biggest challenge is implementation.**"

FIELD REALITY → FARMER NEEDS → NEW THINKING → **DHARTEEPUTRA** A New Path Forward



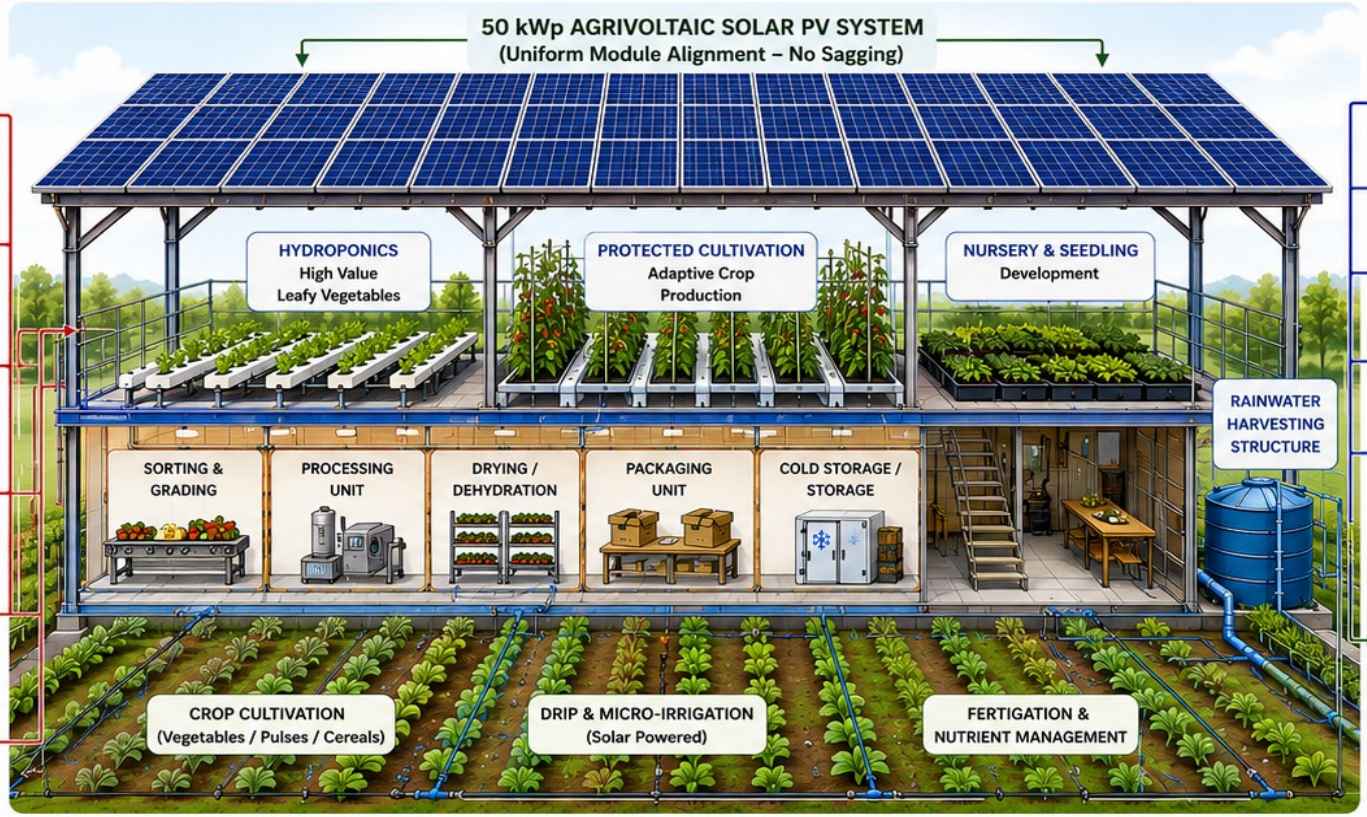
DHARTEEPUTRA

(Dual Harvesting in Agrovoltaics and Renewables Through Eco-Efficient Powering for Transformative Rural Advancement),

DHARTEEPUTRA MODEL – SYSTEM COMPONENTS AND FUNCTIONAL INTEGRATION

RENEWABLE ENERGY SYSTEMS

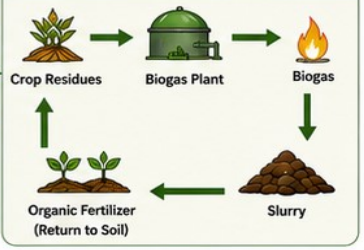
- **Solar PV** – 50 kWp Grid Connected Power for Farm & Productive Use
- Energy Inverter & Control Unit
- Net Metering (Grid Export)
- Energy Storage (Battery Bank) (Optional)
- Biogas Plant (2–5 m³/day)
- Thermal Energy from Biogas



RESOURCE MANAGEMENT SYSTEMS

- Solar Powered Irrigation Pump
- Micro Irrigation (Drip / Sprinkler)
- Water Storage Tank
- Hydroponic Nutrient Circulation System
- Rainwater Harvesting & Groundwater Recharge

CIRCULAR RESOURCE FLOW



PRODUCTIVE USE OF RENEWABLE ENERGY

Irrigation | Processing & Milling | Drying & Dehydration | Cold Storage / Refrigeration | Lighting & Ventilation | Digital & ICT Services | Farm Machinery

INTEGRATED OUTPUTS

Food Production | Clean Energy | Value Addition | Rural Enterprises | Employment Generation | Farmer Income | Sustainability & Resilience

SUPPORTING INFRASTRUCTURE & SERVICES

Farm Office & Digital Hub | Weather Station (IoT Based) | Surveillance & Security | Access Road & Transport | Training & Capacity Building Centre

Energy Flow → Water Flow → Resource Flow → Information Flow (AI & IoT Enabled)

DHARTEEPUTRA IN ACTION – FROM CONSTRUCTION TO PROSPERITY

Dual Harvesting in Agrovoltaics and Renewables Through Eco-Efficient Powering for Transformative Rural Advancement

ACTUAL EXECUTION ON GROUND

- Site preparation and civil construction in progress
- Foundation, structural and electrical works under execution
- Solar structure installation underway
- Water system, irrigation and enterprise units being established
- Building the foundation for a sustainable rural transformation

EXPECTED FINAL PRESENCE

POWERED BY THE SUN | BUILT FOR COMMUNITY | ROOTED IN NATURE INSPIRED BY DHARMA

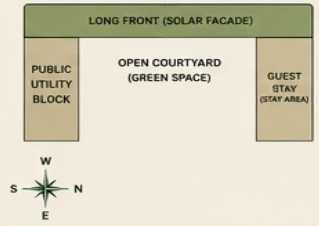

FOOD PROCESSING & STORAGE


SITTING AREA (GROUND FLOOR)


GUEST ROOM (FIRST FLOOR)


HYDROPONICS (TOP FLOOR)

U-SHAPE LAYOUT (AS PER SKETCH)



KEY AREAS

- Public Utility Block (Toilets, Drinking Water, Wash Area)
- Food Processing & Storage
- Hydroponics Farming (Top Floor)
- Eco Tourism & Sitting Area (Ground Floor)
- Guest Rooms (Stay Area)
- Solar Drier (For Food Drying)

SUSTAINABLE FEATURES

- Solar Power (Rooftop & Bifacial)
- Rainwater Harvesting
- Hydroponics Farming
- Natural Ventilation & Day Lighting

FROM TODAY'S FOUNDATION → TO TOMORROW'S PROSPERITY | ONE ACRE • MULTIPLE ENTERPRISES • MULTIPLE INCOMES • SUSTAINABLE RURAL PROSPERITY

"Empowering Rural India Through Sustainable Solutions and Clean Energy."


POWERED BY THE SUN
BUILT FOR COMMUNITY
Thanks
FOR YOUR TIME, ATTENTION AND SUPPORT
ROOTED IN NATURE INSPIRED BY DHARMA
SUSTAINABLE ENERGY SUSTAINABLE FUTURE
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Let's Build a Sustainable, Prosperous and Empowered Rural India
RENEWABLE ENERGY
WATER SECURITY
SUSTAINABLE AGRICULTURE
INNOVATION & TECHNOLOGY
SOCIAL IMPACT
ENTREPRENEURSHIP & RURAL PROSPERITY
PARTNERSHIP FOR PROGRESS
Empowering Rural India Through Sustainable Solutions and Clean Energy