

Silver Bullet

Are Solar Pumps a Panacea for Irrigation, Farmer Distress and Discom Losses?

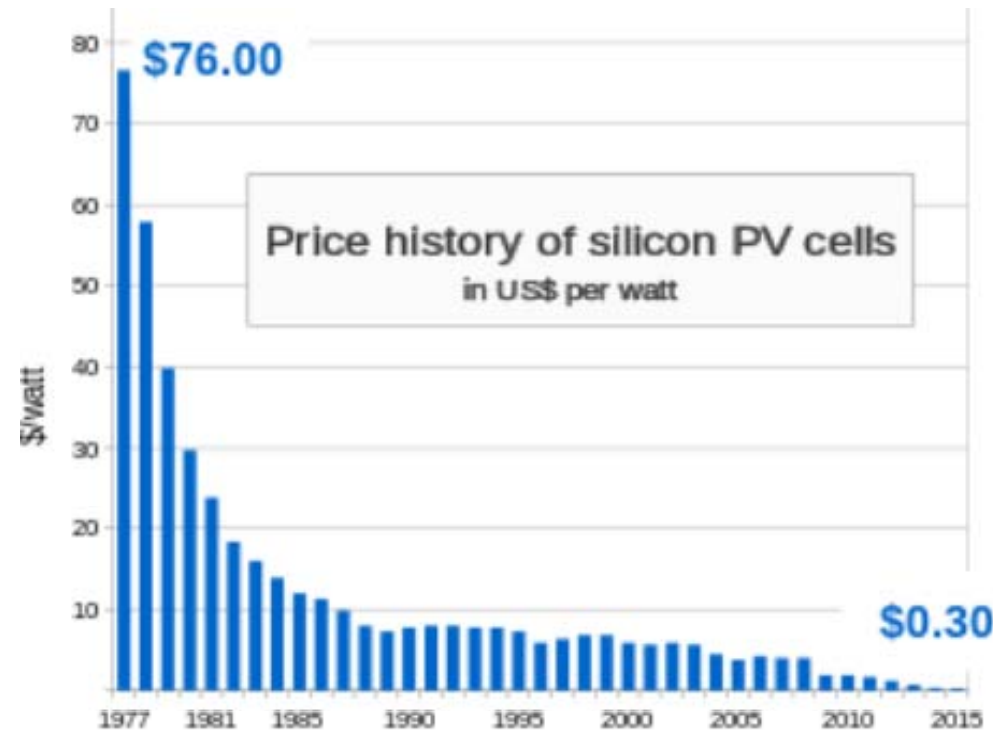


Solar Energy in India – Expanding role

- INDC commitment to increase share of non-fossil-fuel sources in generation to 40% by 2030.
- 175 GW RE target, including 100 GW solar.
- Unprecedented capacity addition and tariff decline

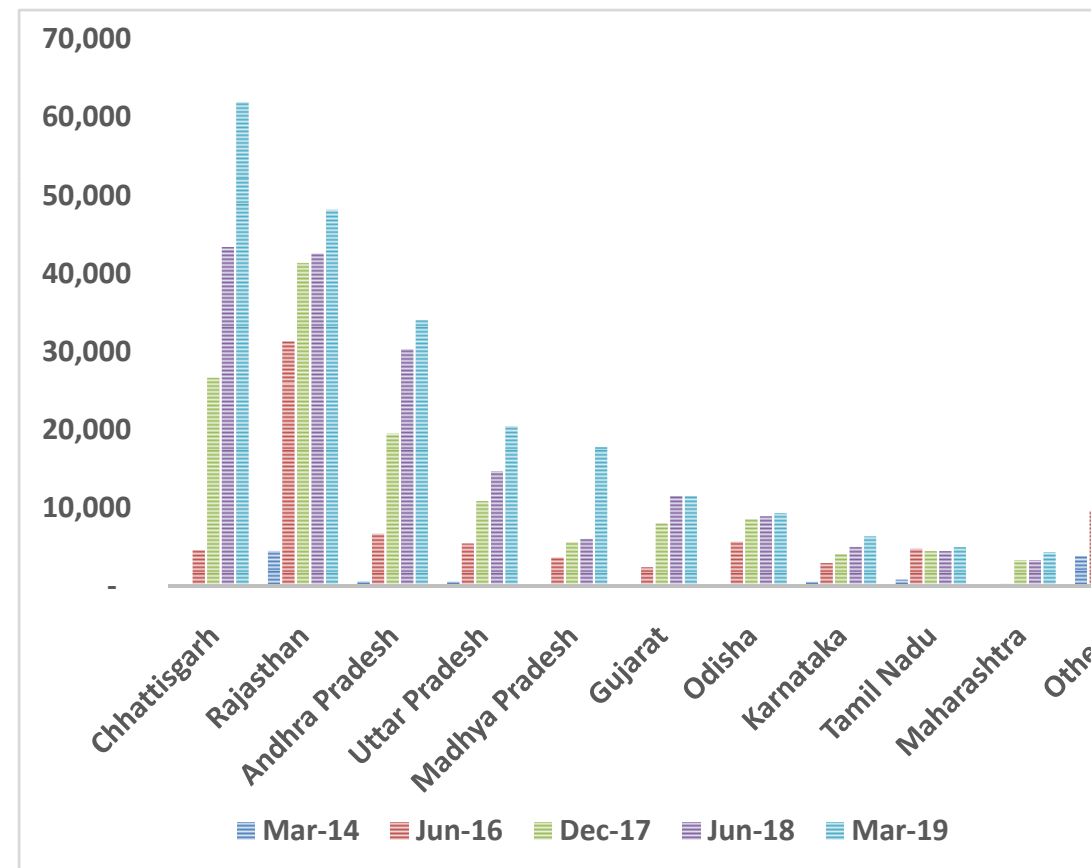
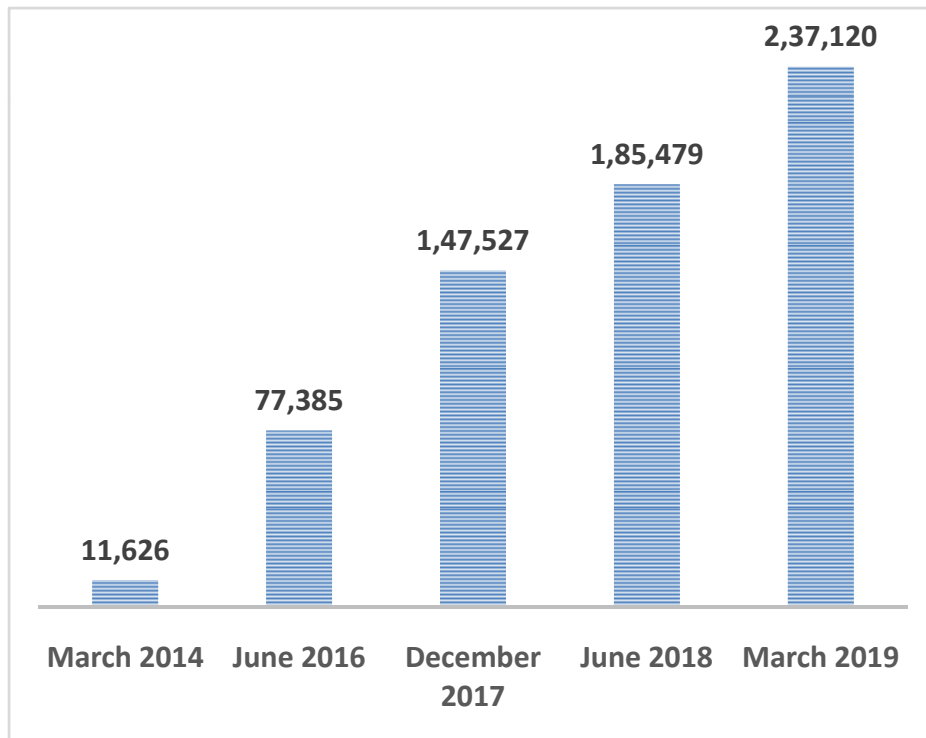
Year Cumulative Capacity (in MW)

2010	161
2011	461
2012	1,205
2013	2,319
2014	2,632
2015	3,744
2016	6,763
2017	12,289
2018	21,651
2019	28,181



Solar for Agriculture

- Promoted since 1990s, initially under MNRE schemes and later also under state govt schemes
- Subsidy of 60 to 100 per cent provided to farmers.
- Crippled implementation, not a single scheme could achieve targets
- Only recently picked up



Why solar pump?

Farmer's perspective

- Assured irrigation
- Reduced fuel cost
- Poor state of electricity
- Reliable day time power

Government/Discom's perspective

- To meet increasing agricultural irrigation/energy demand
- Reducing subsidies
- Distributed RE
- Source of additional income to farmers

PM KUSUM

Components	Details
Component B: Off-grid solar pumps	<ul style="list-style-type: none"><li data-bbox="653 488 1997 634">● 17.50 lakh off-grid solar pumps to be installed, of individual capacity of up to 7.5 HP<li data-bbox="653 662 2039 987">● Centre and state to share 30 per cent of pump cost each; farmer to provide the remaining 40 per cent (Can access bank loan for up to 30 per cent of the cost)<li data-bbox="653 1036 1997 1182">● Tendering to be carried out by designated central public sector units(CPSUs)

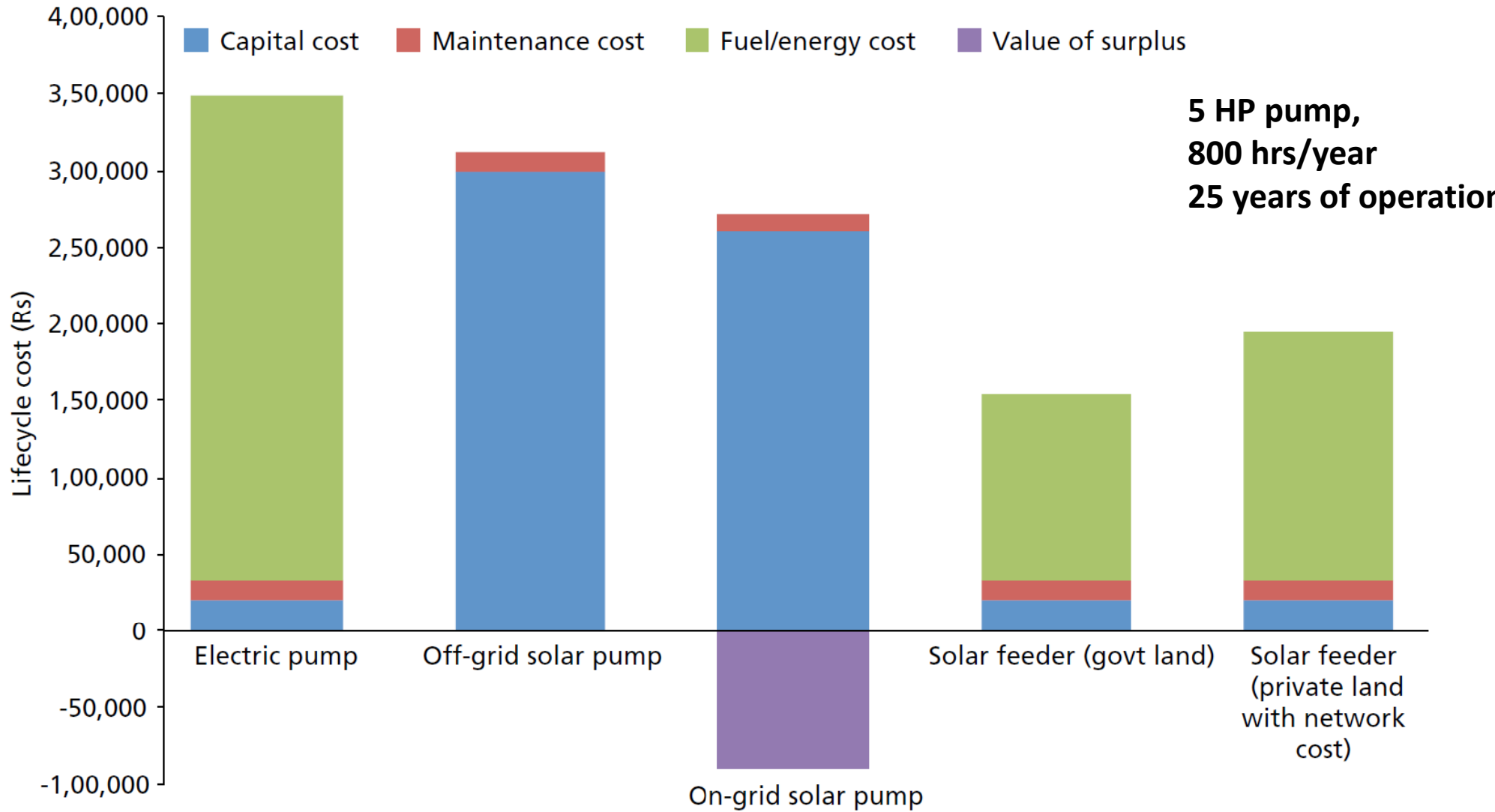
PM KUSUM

Components	Details
Component A: Decentralized ground-mounted grid-connected solar plants	<ul style="list-style-type: none">● 10,000 MW of solar capacity to be set up as 500 kW to 2 MW plants● To be developed and owned by farmers, co-operatives, panchayats, or farmer producer organizations for sale of power to discoms at a feed-in-tariff determined by state electricity regulator● Discoms to be provided performance-based incentives of Rs 0.40 per unit for five years● 1,000 MW to be taken up on pilot basis first

PM KUSUM

Components	Details
Component C: Solarization of grid-connected electric pumps	<ul style="list-style-type: none">● Solarization of 10 lakh grid-connected electric pumps of up to 7.5 HP each.● Allowed solar PV capacity up to two times the pump capacity in kW terms, to enable sale of excess power to discoms.● PBI of Rs 0.60 per unit for discoms to purchase of surplus power● Both net-metering and one-way transfer of power allowed● Centre and state to share 30 per cent of pump cost each; farmer to provide the remaining 40 per cent (Can access bank loan for up to 30 per cent of the cost)

Comparative Economics



CSE Survey – Buldhana

Findings

- Inability to invest in new electric pumps [upto 1 lakh for new connection]
- High cost of irrigation (diesel – Rs. 9,800/acre/year, electric – Rs. 3,800/acre/year)
- Load-shedding, fluctuations, night time power and 6-7 hours supply
- Depleting water tables and reduced hours for irrigation

Implications and learning

- Very low utilization making off-grid solar pump uneconomical
- On-grid and solarized feeder better solutions
 - Feeder supply can be controlled
 - On-grid can help generate additional income

CSE Survey – Pilibhit

Findings

- Inadequate solar pump capacity
- Inefficient beneficiary targeting
- Pumps used for domestic needs
- Weak service market

Implications and learnings

- Solar pumps have little/no impact on agricultural power consumption – given parallel electric connections
- Higher subsidy for smaller pumps – bad policy design
- Poor farmers unable to pay even low upfront cost
- Lack of service market compromising performance of the pumps.

CSE Survey – Vizianagaram

Findings

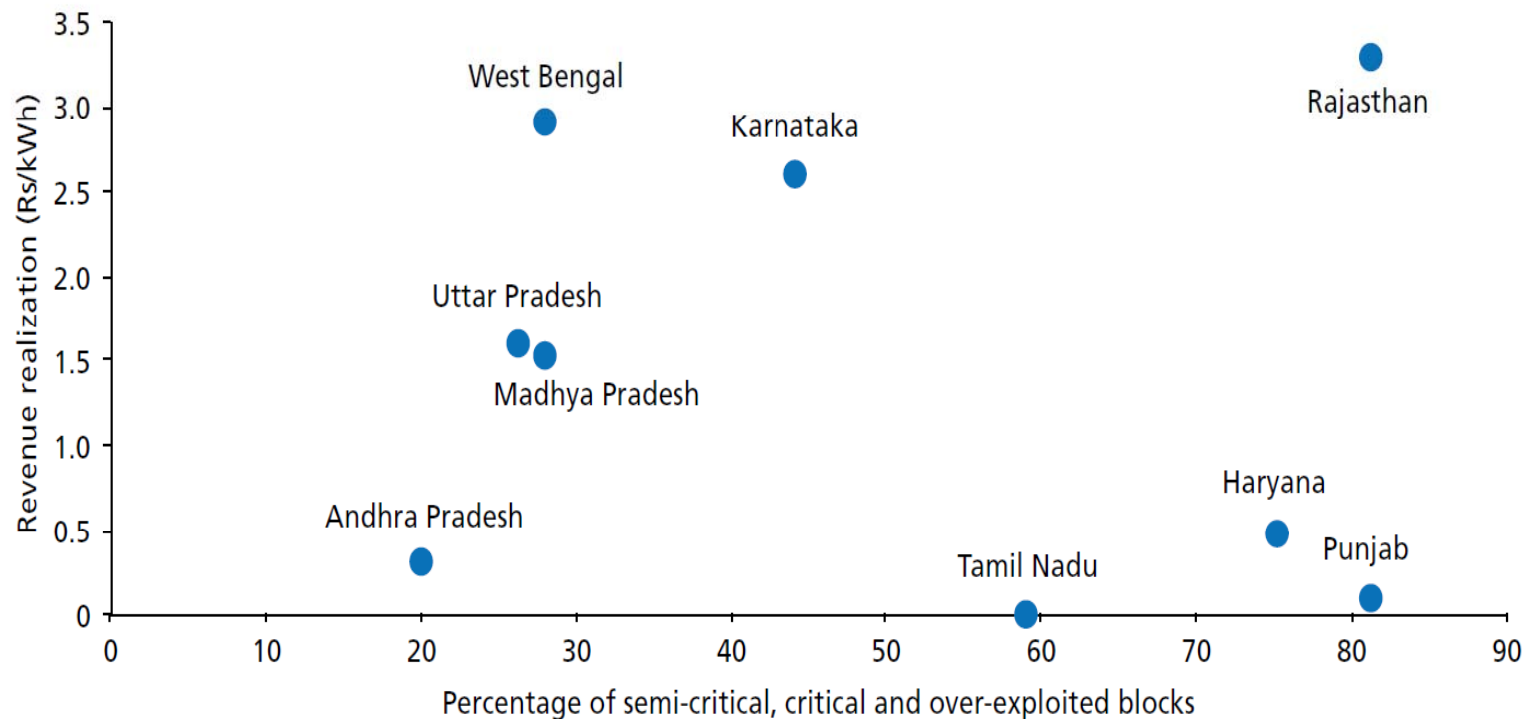
- Off-grid pumps replacing electric pumps - under utilization of capacity
- APEPDCL (one of best performing discoms) unable to pay small FiT to a very small number of farmers

Implications and learnings

- Free pumps with low FiT, bad policy design – no not incentivize farmers to restrict groundwater extraction
- Discom's role critical
- Transition from electric to off-grid pumps should be discouraged

Key Fundamental Challenges

Groundwater concerns are unaddressed



Other Key Fundamental Challenges

Inefficient Discoms

- ill prepared, benefit not in the design
- Not enough incentive to bring millions of prosumers on-board
- Hard to implement metering (one-way or two-way)

Unaddressed farmer distress

- Free electricity - not a solution
- Surplus generation has limits (FiT has limits)
- Will benefit small minority of large farmers (will further add to income divide)

Unaddressed subsidy burden

- No restriction on hours of supply, tariff increase
- New subsidy comes in picture

Weak beneficiary targeting

- Small and marginal farmers left out
- No targets to be inclusive
- Income divide may increase under new schemes

Key Fundamental Challenges KUSUM Scheme gaps

- Continued focus on off-grid pump
- Missing financing mechanisms
- Missing measures to ensure efficient discom participation

Discussion

	Off-grid pumps	On-grid pumps	Solarized feeders
Irrigation	Access to day time reliable electricity to farmers		
Additional income	Income increases due to assured irrigation, and reduction fuel/energy cost	Additional income due to sale of surplus power; benefit depends on FiT	No income change existing electric pumps solarized
Economics	Least economic with breakeven of 20-25 years; cheaper only than diesel pumps	Net benefit increases significantly due to higher utilization	Most economic option
Agriculture subsidy	Subsidy burden remains unchanged	Subsidy burden reduces, however unclear impact in case of net metered pumps	Subsidy burden reduced due to decrease in cost supply
Groundwater	Overuse may increase as there is no monitoring of use, and no incentive to restrict extraction	Extraction can be controlled if the FiT is sufficiently high	Extraction continues unless hours of supply limited or tariff increased

Recommendations

- Solarization of feeders most economical, but needs to be accompanied by agricultural tariff increase and limits on hours of power supply.
- On-grid pumps are an alternative for water-scarce regions with high farmer distress but adequate FiTs and one-way power flow (as opposed to net meter) is necessary.
- Off-grid pumps should be considered only in exceptional cases, in un-electrified regions with relatively high water-table, and utilization should be increased through sale of electricity or water.
- Explicit and strict measures of monitoring and control to manage groundwater extraction necessary. Funds should be extended only to states willing to take strong measures.
- Clear targets must be set for small and marginal farmers.
- Providing access to financing is a crucial determinant in this.
- Efficient discom operations should be ensured by regulatory mandated for regular reporting on installations, operations, evacuation, billing and payment to farmers.