Solar Agriculture Feeders

An innovative Govt. of Maharashtra and MSEDCL, MSPGCL initiative

Chief Minister's Solar Agriculture Feeder Scheme

Mukhyamantri Saur Krushi Vahini Yojana

Opening remarks by Mr. Sanjeev Kumar, CMD, MSEDCL

Webinar presentation by Ashwin Gambhir / Shantanu Dixit

Moderation by Ashwini Chitnis

21st November, 2018

Prayas (Energy Group)

Outline

- Agriculture and electricity

- Solar agriculture feeder concept
  - Economic viability and sensitivity
  - Existing status and regulatory updates in Maharashtra
  - Other advantages

- Summary

Agriculture and electricity distribution

- **Long standing and vexed issue**
  - Critical political economy & ground reality considerations important.
  - No silver bullet, will take time to solve
  - Demand for day-time reliable quality power supply from consumers
  - Significant subsidy and cross-subsidy support from DISCOM/GoM

- **No one size fits all solution**
  - Should be appropriate for specific state in consideration

- *However, any scalable solution should reduce cost/subsidy for state/DISCOM while improving farmer satisfaction of power supply.*

Existing context in Maharashtra

- Well laid out distribution network, separated feeders for agriculture
- Need to rapidly increase solar RPO in line with national commitment and take advantage of low costs
- Need for providing day time, reliable quality power supply to agriculture

- A win-win situation being adopted is that of tail end distributed solar PV plants (2-10 MWs) dedicated to agriculture feeders, connected at sub-station.

Key Drivers of the solar feeder approach

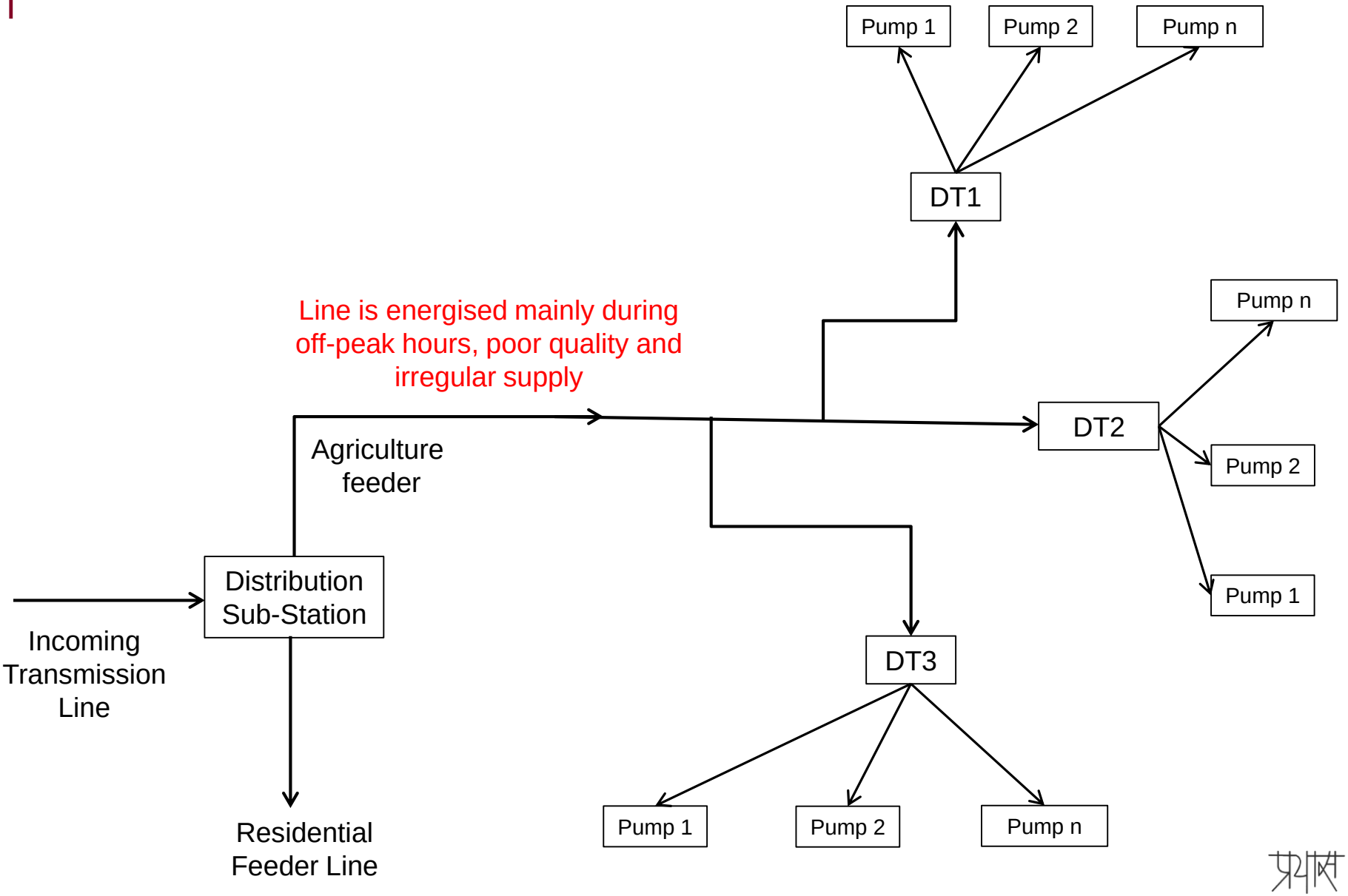
- Ensures day-time reliable power for the farmers

- No capital subsidy (State or GoI)
- Rather, cost-effective, enables reduction in subsidy (cross subsidies / revenue subsidies from state Govt)

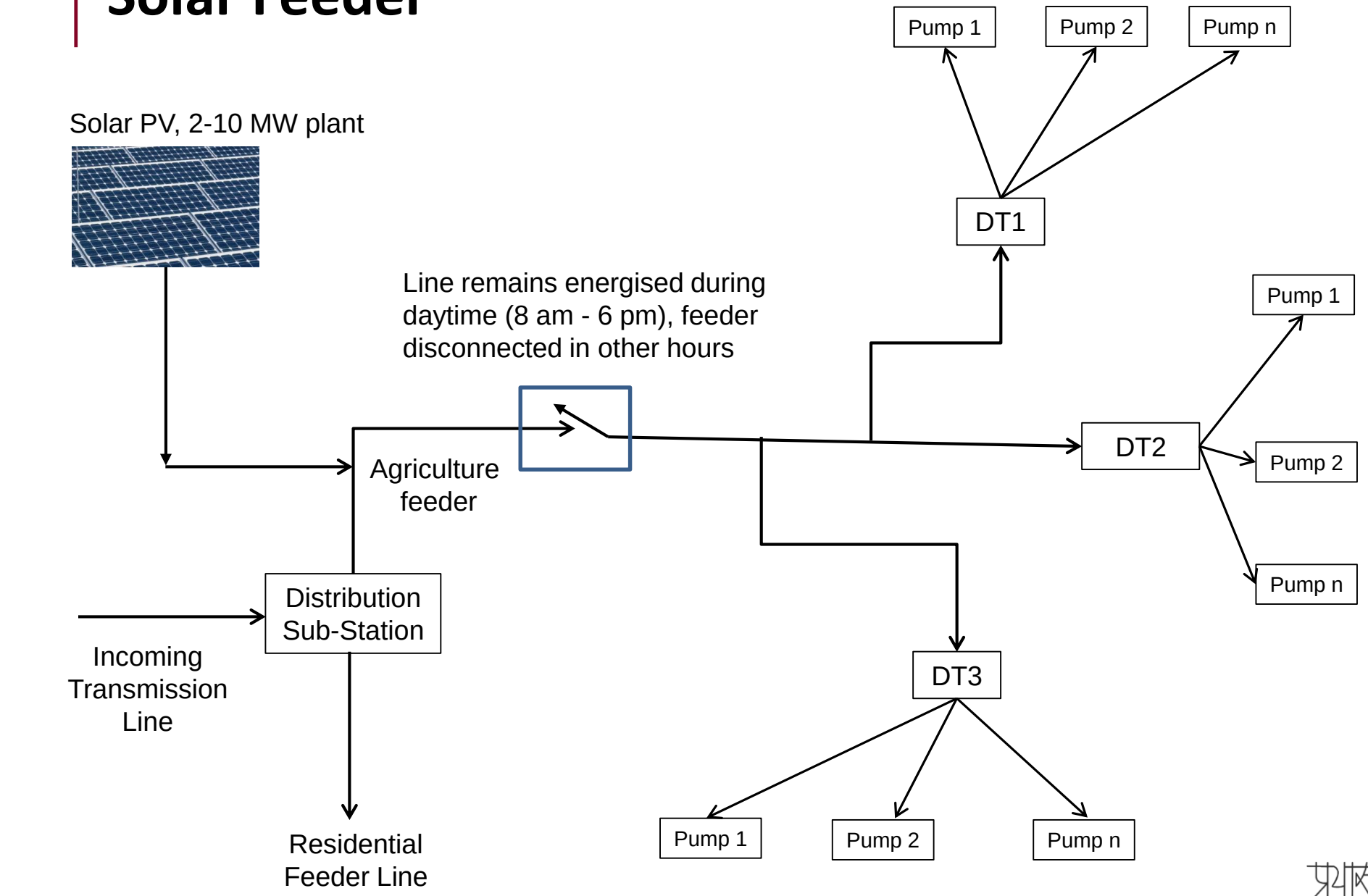
- Ease of scalability; Rapid deployment ability
- No behavioral changes or undertakings needed from farmers

- Possible under existing regulatory framework,
- Qualifies for solar RPO of DISCOM

Existing agriculture supply



Solar Feeder



Financial analysis for a typical feeder – Year 1

- **A typical feeder**
  - One 11 kV feeder, 500 Ag Pumps, 5 Hp/pump,
  - Operating hours 1250 hrs/yr; 6% losses in 11 kV+LT line
    ➔ Annual feeder input – **2.47 MUs**
- **Existing agriculture supply scenario**
  - Energy cost from grid supply **Rs 4.95/kWh**, (incl. APPC (Rs 4.09/kWh), transmission charges (0.4/kWh), both escalating at **1% per year** and losses (9.3%)).

  A] ➔ Year 1 - Annual landed energy cost for feeder

  2.47 MUs * 4.95 Rs/kWh = Rs. 1.22 crore/year (rising each year)
- **Solar feeder scenario**
  - Solar PV energy price-feeding at 11 kV level: Rs. 3.15 /kWh (2018); Cost is fixed over life of project

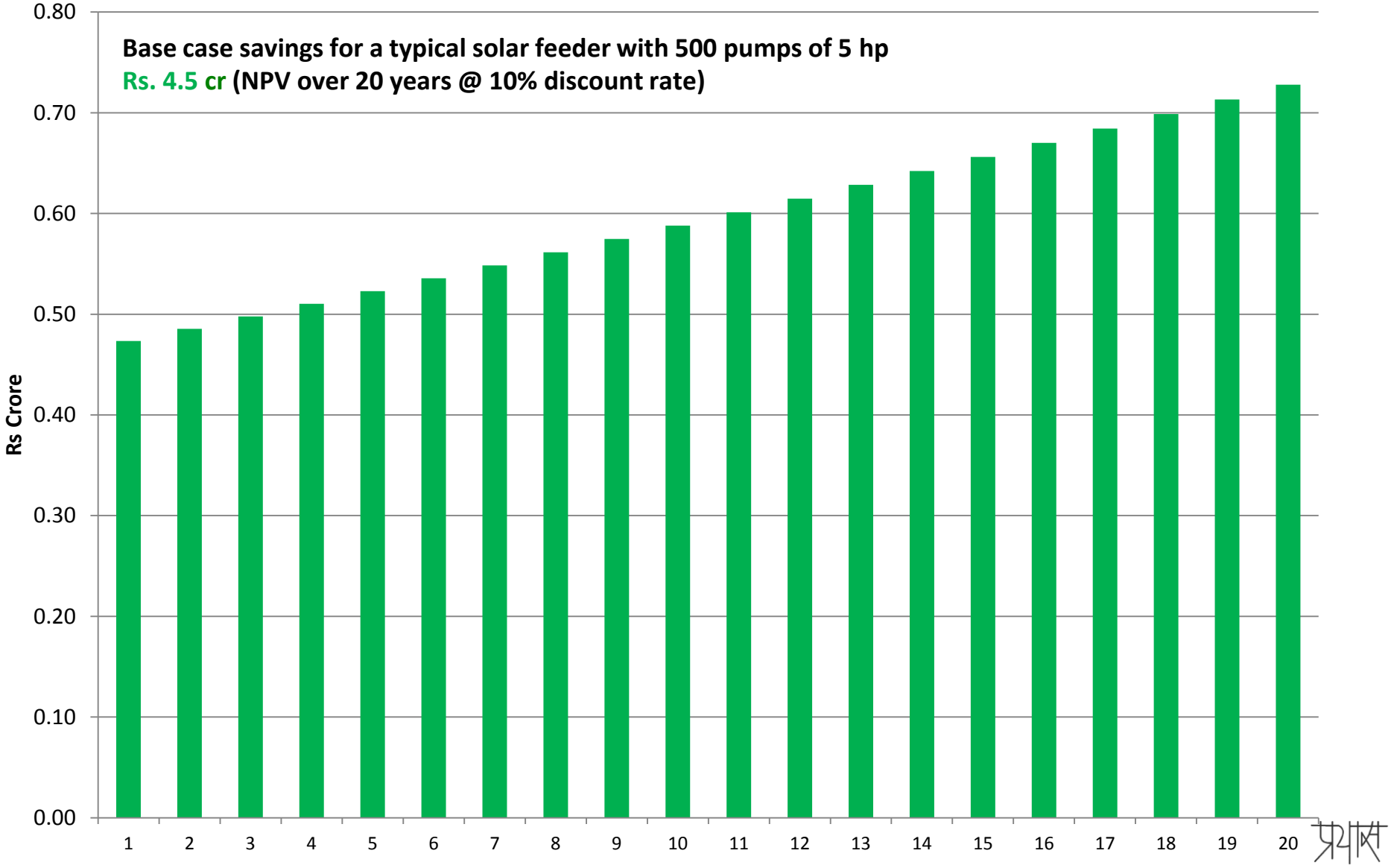
  B] ➔ Annual energy cost for solar feeder

  2.47 MUs * 3.15 Rs/kWh = Rs. 0.78 crore/year (fixed over life)

Difference – i.e. (A – B = 0.44 crore in first year) is decrease in MSEDCL / GoM cost (cross subsidy / subsidy)

Cost of distribution same in all scenarios and hence not considered in analysis.

Yearly savings (Rs cr) per feeder to MSEDCL from Solar Feeder over grid supply over 20 yrs



Sensitivity Analysis

Cost of supply to a typical agriculture feeder (500, 5 hp pumps, 1250 hours/year use) from various options	Sensitivity Parameters	Better Scenario for Solar Feeder	Base Scenario for Solar Feeder	Worse Scenario for Solar Feeder
Sensitivity Parameters	Price of solar power in Rs/kWh	3	3.15	3.5
	Escalation in grid power purchase cost (%)	2	1	0.5
Cost of supply from various options (NPV @ 10% discount rate over 20 years, Rs crore per feeder)	Grid supply with APPC at Rs 4.09/kWh for 2018-19	11.9	11.1	10.8
	Solar Feeder	6.3	6.6	7.4
Savings (NPV @ 10% discount rate over 20 years, Rs crore per feeder)	Savings in solar feeder	**5.6**	**4.5**	**3.4**

Status in Maharashtra

- Chief Minister's scheme notified in June, 2017, amended in March, 2018.
  - 2 pilot projects in Ahmednagar (Rs 2.94/kWh) and Yavatmal (Rs 2.97/kWh) with 25 year PPA completed, already supplying day-time power.
  - ~ 2000-3000 MW under various stages of tendering/auctioning

- ~ 2335 MW bid out by MSEDCL, MahaGenco
  - Consumption of roughly **3653 MUs, @ 19% CUF**
  - Equivalent to supplying power to **7.8 lakh pumps** (of 5 hp each) for 1250 hours per year. i.e. ~19% of electric pumps in Maharashtra
  - Saving Rs. **~343 crore/first year** in terms of subsidy support.
  - Over 20 years, APPC @ Rs 4.09/kWh and assumed to be rising at a conservative 1%/year; solar price fixed at Rs 3.15/kWh, **the NPV of savings is Rs 3800 crore**.
  - Developer selection and bidding for **24 talukas (235 MW)** is complete, petition before MERC for tariff adoption

Scheme Details …1

- Government of Maharashtra Policy
- MSEDCL and MSPGCL as implementing agencies
- Developer to be selected through reverse competitive bidding
- MSEDCL signs 25 year PPA with winning developer
- Govt. land near substation can be made available on lease at nominal rate, lease of pvt. land also possible
- Group of farmers can also develop projects through bidding process and sign PPA with MSEDCL

Scheme Details …2

- Regulatory process: After due process and hearings MERC has approved
  - Competitive bidding framework and consequently power procurement by MSEDCL
  - Supply of day time power to solar feeders (8 hours between 8 a.m. to 6 p.m.)
  - Consideration of solar generation under the scheme for solar RPO compliance

Other advantages

- No need for additional transmission evacuation infrastructure
  - presently limiting factor for various GW scale national/state wind/solar tenders

- Reduced need for balancing resources at the system level.

- Income/Job creation across the state
- Various future possibilities
  - Efficient pump, improve metering and revenue collection etc.

Summary

- Reliable day-time supply for agriculture
- Rapid deployment possible at scale
- Extremely cost effective not only in comparison to solar pumps but also to existing grid supply
  - Economics only improves with time as solar prices fall
- No capital subsidy requirement, but upfront savings from 1st year, while increasing renewables.
  - Savings for a typical feeder: **Rs 4.5 cr/feeder over life** (NPV @ 10% discount rate). Equivalent to saving of **Rs 10,500/pump/year**.
  - Savings could be used for various purposes including increasing farmer incomes, water saving measures, loan waivers etc.

Related policy and regulatory documents

- **Industries, Energy and Labour Department**
  - Govt. of Mah GR dated 14-06-2017- To start Chief Minister Solar Agri Feeder Scheme in the state
  - Govt. of Mah GR dated 17-03-2018- Amendment in Mukhyamantri Sour Krishi Vahini Yojana for effective implementation

- **Maharashtra Electricity Regulatory Commission**
  - Case No. 164 of 2017, dated 9th Jan, 2018: MSEDCL seeking approval for procurement of 200 MW of solar to be set up in the premises of its existing substations.
  - Case No. 131 or 2018, dated 12th June, 2018: MSEDCL seeking approval for deviation in SBGs for procurement of 1000 MW of Solar Power capacity under "Mukhyamantri Saour Krishi Vahini Yojana" with 2 to 10 MW size through reverse competitive bidding.
  - Case No. 172 of 2017, dated 16th October, 2018: MSPGCL seeking removal of difficulties in implementating "Mukhyamantri Solar Agricultural Feeder Scheme", approval of draft PPA & PSA.
  - Case No. 178 of 2018, dated 19th July, 2018: MSEDCL seeking approval for supplying day-time power to Ag consumers connected to solar feeders.
  - Case No. 270 of 2018, dated 16th October, 2018: MSEDCL seeking approval for deviation in SBGs for procurement of 1400 MW of Solar Power capacity under "Mukhyamantri Saour Krishi Vahini Yojana" with 2 to 10 MW size through reverse competitive bidding.

THANK YOU

shantanu@prayaspune.org
ashwin@prayaspune.org

Prayas Energy Group
www.prayaspune.org/peg