





**MITIGATION INITIATIVES THROUGH  
AGRICULTURE DEMAND SIDE MANAGEMENT**

(Market transformation of agriculture pump-sets market  
towards energy efficient pump-sets)

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***Agriculture Pump-set Scenario: India***



**Policy-Politics Cocktail**

- i. Total agricultural pump sets ~ 18 million
- ii. Agriculture sector consumes ~ 19% of total electricity supplied.
- iii. Electricity supply is free or applicable tariff is very low.

**Net Result → Inefficient Pump-sets**

- Market dominated by un-organised sector providing low cost (< INR 15,000) , low efficiency pump-sets (20-35%);
- Efficient pump-sets are available; though at higher costs (~ INR 30,000), efficiency 40-50%

Source: Directorate of Economics and Statistics;  
CEA 2008-09, pump energisation data  
Planning Commission Report on Financial position of Distribution Utilities ( Dec. 2011)

## ***Agriculture Pump-set Scenario: India***



### **Agriculture & Power**

- 48% of all irrigation water from groundwater sources; 52% is from surface water.
- Agriculture consumes 85% of all available freshwater resources
- 12% of all aquifers in the country are already severely overdrawn.
- No regulation

### **Status of Agricultural pumps**

- Low reliability of pumps
- Inefficient pumps
- Lack of incentives, given the low or no cost power supplied.
- High subsidy burden on State governments.
- Low extraction of water

## ***Energy Saving Potential***



### ➤ **Agricultural pump sets**

- in the country – 18 million
- new connections per year - (0.5 million\*)
- Average capacity : 5 HP

### ➤ **Average efficiency**

- old pump sets : 20% - 35%
- EE pump sets : 40% - 50%

- Total annual consumption in agri-sector – 131.96 billion Kwh (19 % of total electricity consumption)
- Saving Potential-33 billion Kwh annually (@ 25% saving potential) –
- Avoided power purchase by DISCOM- 44 billion Kwh (25% losses) (bus bar end)
- Annual gain to DISCOM by reducing their power purchase : Rs 15395 Cr (@average Rs 3.5 per unit power purchase cost)
- Reduction in annual subsidy of State Govt : Rs. 5014 Cr (@avg subsidy of Rs 1.52 per unit)
- Investments required: Rs 54000 Cr (@ avg Rs 30,000 per pump set of 5 HP)


Source: Directorate of Economics and Statistics;

\*CEA 2008-09,

MOSPI (Energy Stats 2012)

Planning Commission Report on Financial position of Distribution Utilities ( Dec 2011)


**The Stakeholder Log-Jam**



DISCOM	Pump Manufacturer	Investor / ESCO	Farmer
Political risk of farmer protest	Low incentive towards technology R&D	M&V carries transaction costs	No incentive to buy high cost EE pumps
Poor financial condition	Low market demand for EE pumps	Uncertainty of revenue stream	Fear of metered Tariff

**To break the stake-holder log jam, BEE is :**

1. Developed a monitoring and verification (M&V) methodology without metering and simple enough to reduce transaction costs.
2. Enable dedicated finance like Load Management Funds(LMC) through Electricity Regulatory Commissions (ERCs)
3. Demonstrate successful business model.

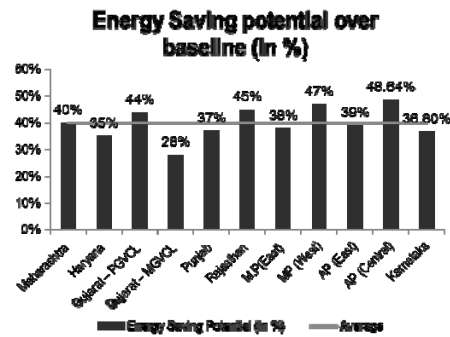


**BEE's Approach  
Ag DSM Programme**

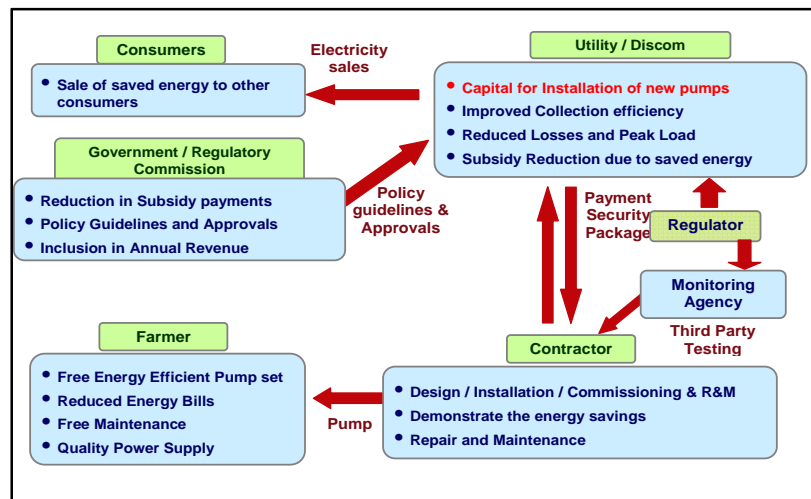
## Agricultural DSM: India



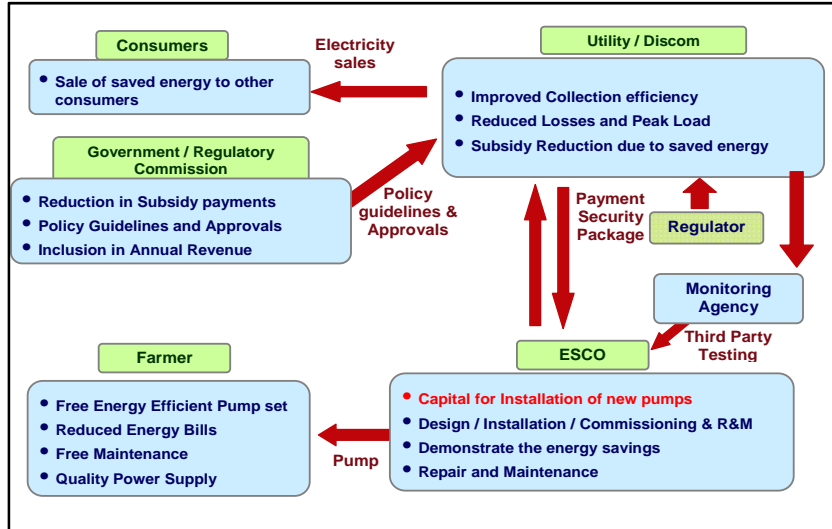
- Eleven bankable DPRs have been prepared in 8 states, viz; Maharashtra, Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh, Andhra Pradesh and Karnataka
- These 8 states account for 70% of energy consumption in agri-sector
- Total 20750 pump sets on 87 feeders energy audited. Average 40% (96 MU) energy saving potential assessed with payback of 3-4 years



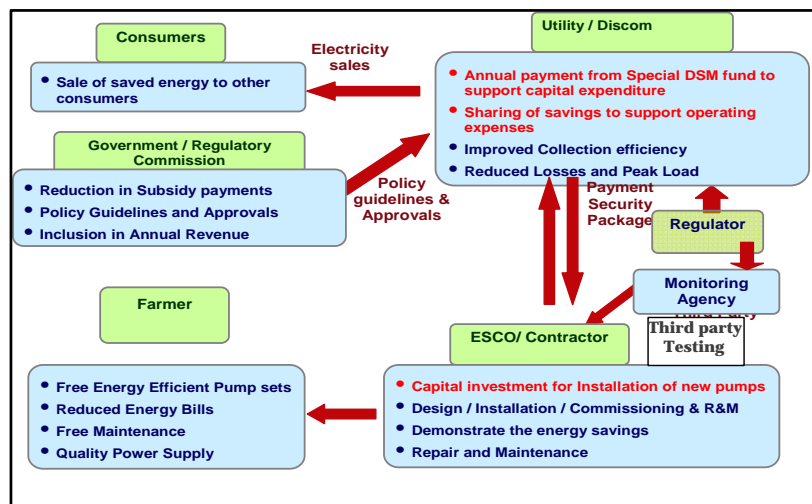
## Business Models – Discom Mode



## Business Models – ESCO Mode



## Business Models – Hybrid Mode





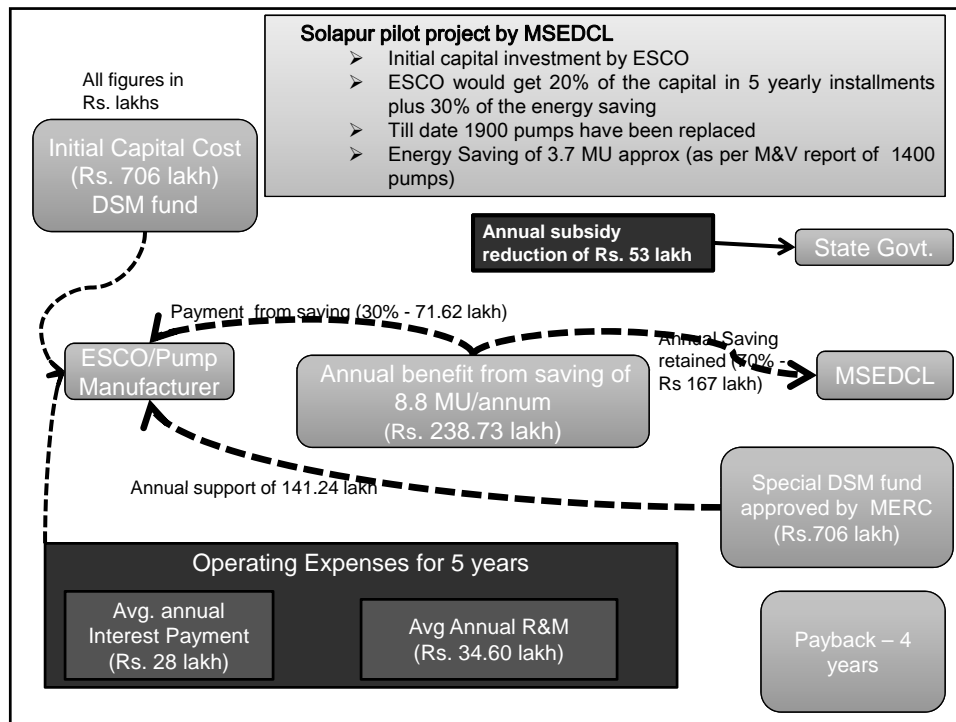
## Ag DSM pilot project in Sholapur

### Ag-DSM: Sholapur Project



- ✓ Pilot project on PPP mode in progress in Maharashtra (Sholapur Circle).
- ✓ Initial capital investment by ESCO
  - ESCO would get 20% of the capital in 5 yearly installments plus 30% of the energy saving
  - M&V methodology in place
  - Savings of 35% (after normalization) achieved; Energy Saving of 5 MU
- ✓ 1900 out of 2600 pump sets have been replaced.





### ***Barriers / Challenges in the pilot project***



- Farmer reluctant to have their pump HP reduced
- Farmer afraid of metering
- Farmer reluctance to sign the contract agreement with ESCO
- Pump ownership with 2 - 3 families is one of the biggest hurdles for entering into pump replacement agreement.
- Pump replacement is taking time as individual farmers have to sign the agreement.
- Low voltage issues.
- Some existing pump-sets are over loaded and to meet the discharge, implementing agency need to select Higher H.P pump-sets.
- Improper pumping systems leads implementing agency to change the entire system along with all the accessories to achieve the guaranteed power savings. Ultimately this leads to increase in the cost of the Project.



## Carbon Financing Business Model

### Development of New CDM methodology



The Indo-German Energy Programme of BEE/GIZ has developed a new CDM methodology (AMS IIP) for agriculture pump-sets.

#### Why ?

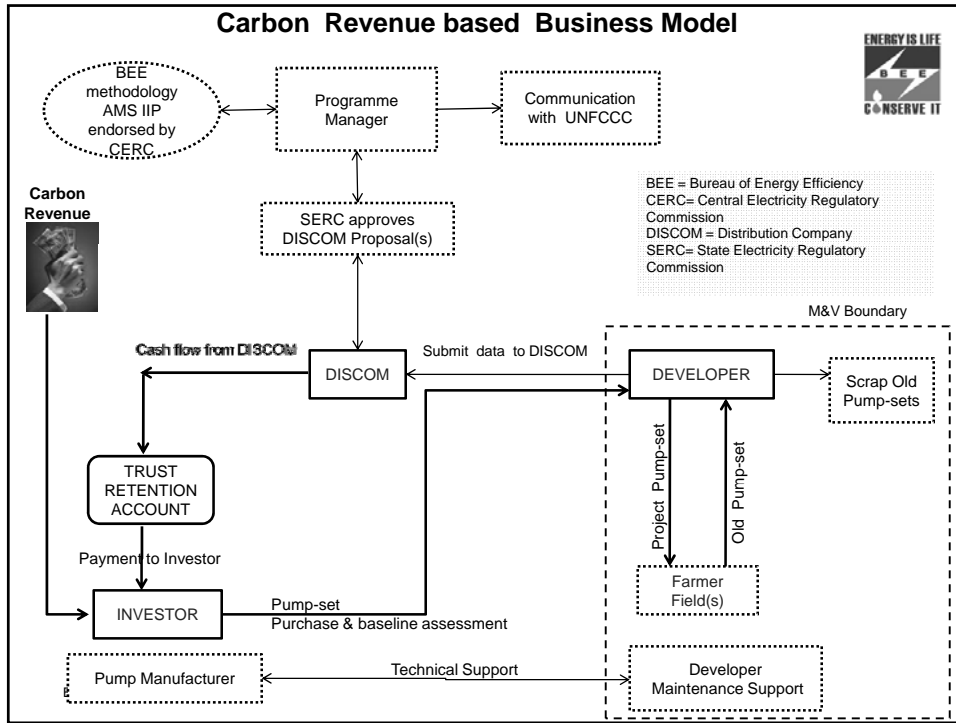
M&V for a large number of pump-sets requires intensive– effort, time and costs.

Thus to break the stake holder log jam and enable the market for energy efficient pump-sets

#### Benefits ?

1. An Internationally and nationally acceptable M&V
2. Minimized investor risk as project energy savings (thus cash flows) calculated upfront
3. Reduced M&V costs and timelines
4. Carbon offset revenue in addition to increased revenue from sales of energy saved





## WAY AHEAD 12<sup>TH</sup> FIVE YEAR PLAN

## Way Ahead in 12<sup>th</sup> five year Plan



- I. **Regulatory mechanism to mandate the use of BEE star labeled pump sets for new connections through SDAs .**
  - Facilitate SDAs/State governments to mandate the use of star labelled pump sets.
  - Integration of Ag-DSM Scheme with existing State/Central government schemes in agriculture sector to promote the adoption of energy efficient star rated pump sets.
- II. **Implementation of DPRs and Monitoring & verification protocol under Ag-DSM scheme.**
  - Implementation of DPRs prepared for 8 states in 11th five year plan.
  - Placing M&V protocol for capturing real energy savings. `
  - Identifying new areas for wide scale replication.

## Way Ahead in 12<sup>th</sup> five year Plan



- III. **Technical assistance and capacity development of all stakeholders.**
  - Capacity building of SDAs, SERCs and DISCOMs utilities in the states where Ag DSM scheme is active.
  - Capacity building for pump set manufacturers
  - Open house session for farmers to increase awareness and encourage their participation in Ag DSM scheme
- IV. **Pumping efficiency in Rural Public Health & Drinking water system**
  - The focus is on efficiency up-gradation of rural drinking water pumping systems.
  - Demonstration projects for improving energy efficiency of water pumping system in rural public drinking water systems has been proposed in 12th plan period

Thank You!



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