Energy Efficient Irrigation Pumps

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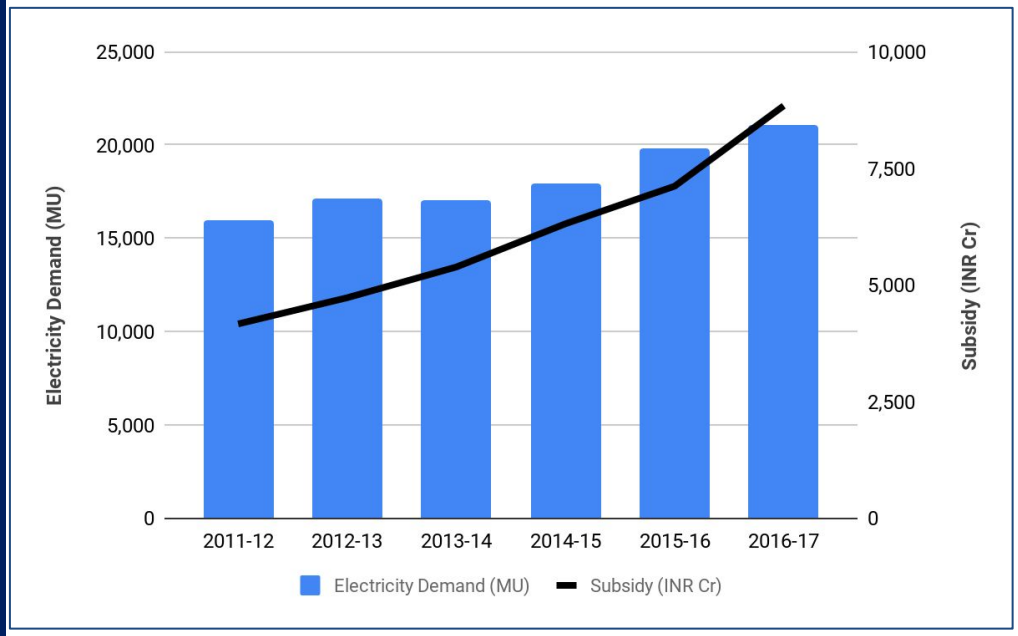
Background & Rationale

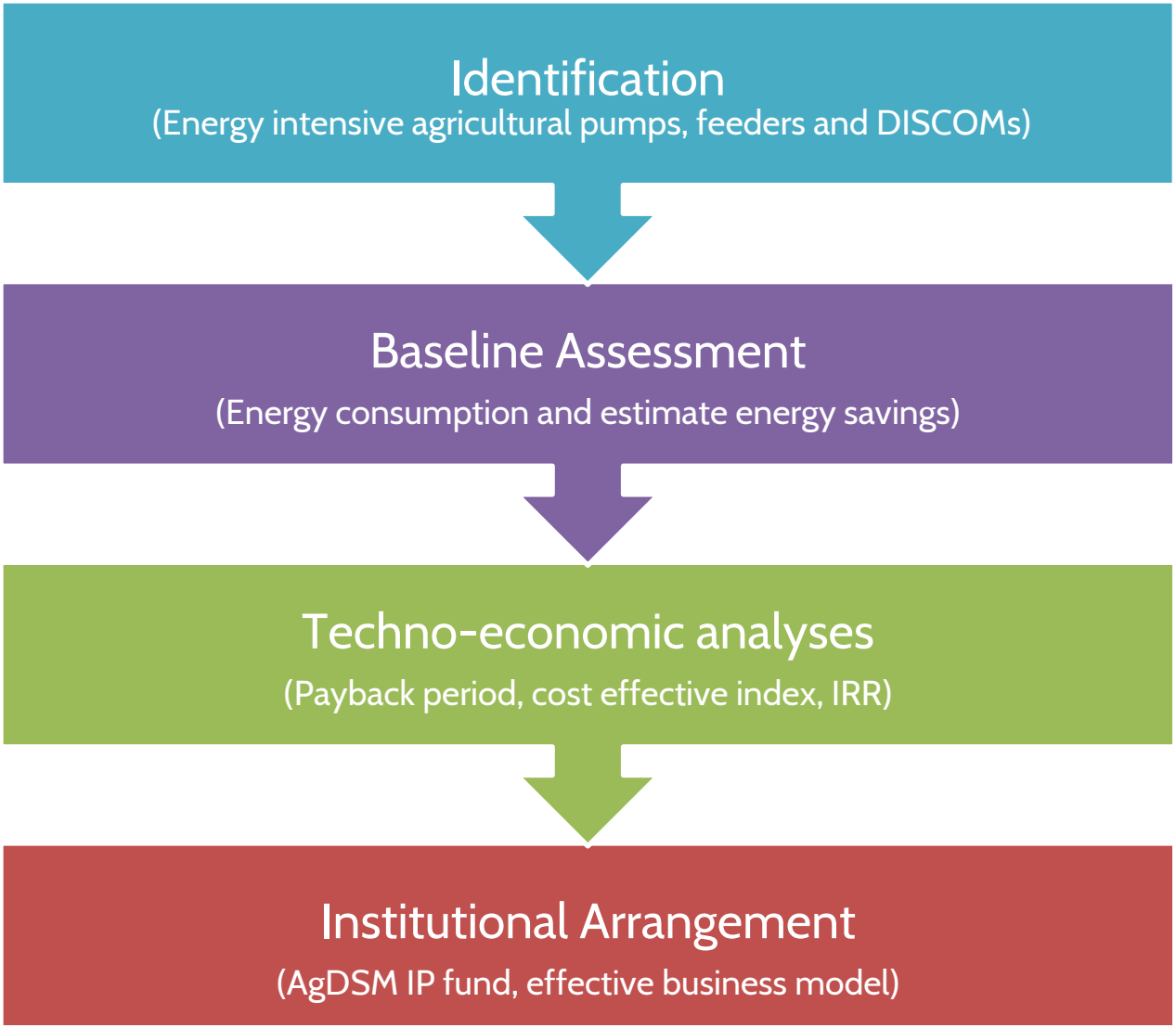


- Low energy performance
  - Low pump efficiency
  - Over/Under size of pump
  - Power quality
- Efficiency of Irrigation Pump (IP) sets
  - Existing : 20-32%
  - BEE star rated : 35-60%

Objective

Assess technical and economic feasibility of replacing 5 lakh inefficient IPs with highly efficient IPs in Karnataka

Methodology



Indicators & Assumptions

Indicators

- Payback Period
- Cost Effective Index
- Internal Rate of Return (IRR)

Assumptions

Parameters	Units	Value
Efficiency of existing pumps	%	20 – 32
Efficiency of EE pumps	%	35 – 60
Capital Cost (5HP) inclusive of 5 year warranty	INR	50,000
O&M Cost	% of Project Cost	2.5
Escalation on O&M Cost	% p.a.	5

Cost Break-Up of Efficient Pump

Parameters	Value
Pump cost (inclusive of 5 year warranty)	21,000 INR
Smart Control Panel	10,000 INR
Repair & Maint. Cost (for 5 years)	7,000 INR
Installation Cost	4,000 INR
Other Services*	8,000 INR
Total Cost	50,000 INR
O&M Cost	2.5% of project cost

* includes administrative charges, consultancy charges, s/w debugging (based on implemented projects in other states)

Primary Data Collection

Issues in Data Collection

- Unknown number of unauthorised IP set connections
- Absence of RR number for IP sets in some cases
- Multiple pumps have the same RR number
- Number of working IP sets in each feeder cannot be validated
- Incomplete GPS enumeration of IP sets across ESCOMs

Data Format for ESCOMs

ESCOM	Name of the feeding substation (220/110/66/33 kV)	Name of the 11 kV feeder	Feeder type (Agricultural/ Non Agricultural)	Length of the feeder (km)	Percentage of feeder loss	No. of IP sets connected to the feeder	Average daily energy sent out on the feeder (in kWh)

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Results

Identification of Feeders

Criteria	CESC	MESCOM	BESCOM	HESCOM	GESCOM	Total
Total IP Sets (all feeders)	3,45,730	2,92,276	6,77,637	6,62,540	3,39,639	**23,17,822**
IP sets (only Agri feeders)	2,44,219	NA	5,68,789	5,08,147	2,08,284	**15,29,439**
IP sets by power rating (5-10 HP)	83,769	25,802	1,98,991	1,53,345	54,196	**5,16,103**
Number of feeders	223	105	574	450	179	**1,531**
Baseline Energy (MU)	1,057	194	2,679	2,190	740	**6,861**

Data for 2016-17

Results

BESCOM

No of pumps to be replaced	1,98,991
Investment	₹ 995 Cr
Annual Savings	₹ 224 Cr
	941 MU
Payback Period	4.4 years

HESCOM

No of pumps to be replaced	1,53,345
Investment	₹ 767 Cr
Annual Savings	₹ 391 Cr
	769 MU
Payback Period	2 years

CESC

No of pumps to be replaced	83,769
Investment	₹ 419 Cr
Annual Savings	₹ 163 Cr
	372 MU
Payback Period	2.6 years

Results

GESCOM

No of pumps to be replaced	54,196
Investment	₹ 271 Cr
Annual Savings	₹ 118 Cr
	260 MU
Payback Period	2.3 years

MESCOM

No of pumps to be replaced	25,802
Investment	₹ 129 Cr
Annual Savings	₹ 31 Cr
	73 MU
Payback Period	4.2 years

Economically viable option for replacing IPsets with Energy Efficient IPsets

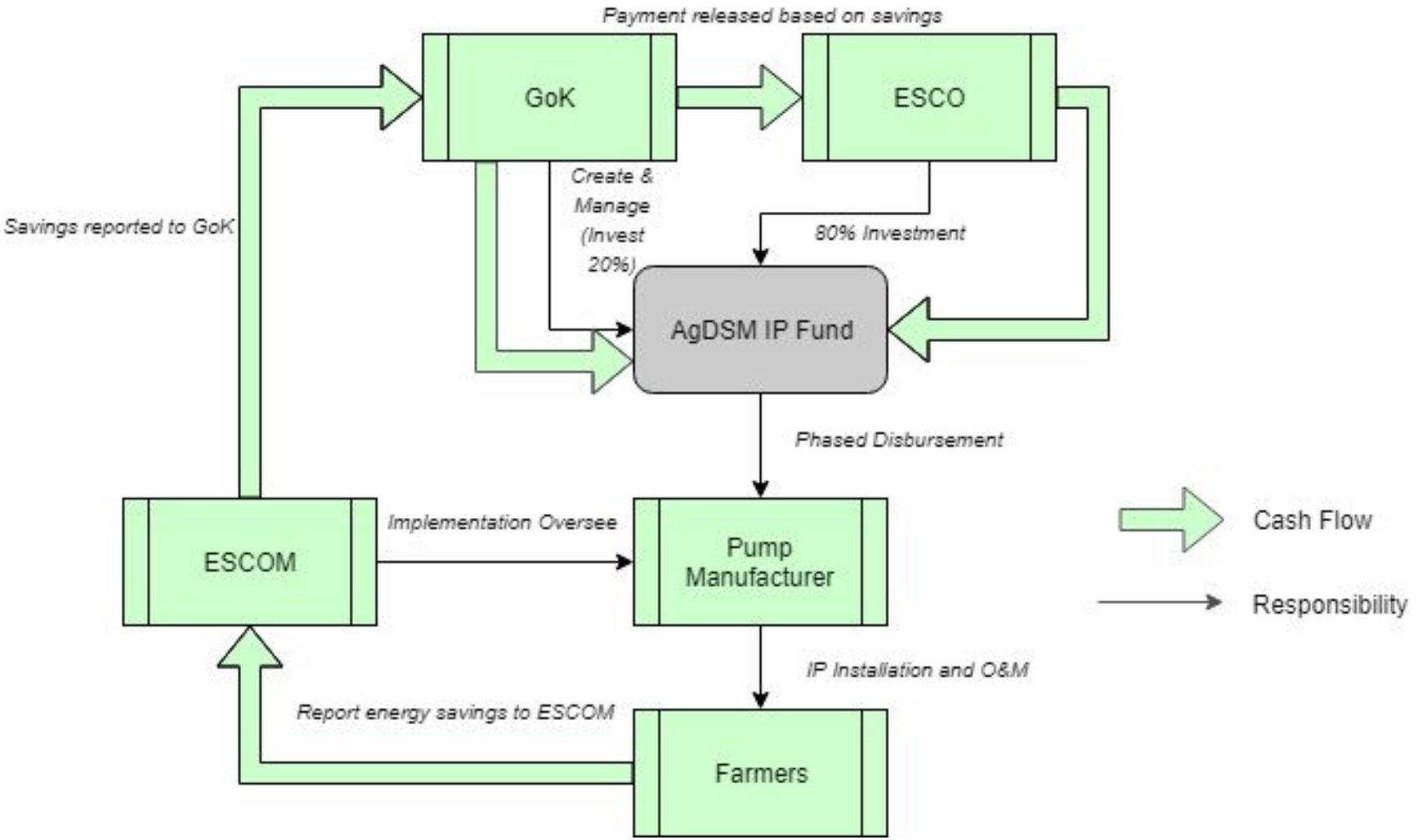
Technical Infrastructure Required

- Survey of existing pumps (by pump capacity)
- Complete GPS enumeration of IP sets and DT tagging
- Establish continuous monitoring of IP running hours
- Embedded SIM cards in IP sets (tracking)

Institutional Framework

- Create **AgDSM IP Fund** (~2600 Cr)
  - **EESL** - *80%* (as loan)
  - **GoK** - *20%*
- **PUMP Manufacturers** to install IP sets and provide *O&M service*
- **ESCOMs**
  - Oversee implementation process
  - Report savings to GoK
- Loan repayment based on the *reported savings*

Institutional Framework



Recommendations

- Viable business case for replacing inefficient IP sets with EE IPsets
- Estimated Savings (annual)
  - Energy - 2,411 MU
  - Monetary - ₹ 918 Cr
- Investment from Government - ₹ 508 Cr (20% of AgDSM IP Fund)
- Average Payback - 2.8 years
- HYBRID model with EESL

Thank You