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**Water-Energy Nexus (WENEXA):**  
An experience in Agricultural Demand Side Management (AgDSM)

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**Why AgDSM?**

Agriculture consumes 23% of power & 38% of water (90% groundwater)


- Financial health of power sector
- Availability of water for irrigation and drinking
- Livelihood of farmers
- Demand supply gap in power sector
- Subsidy of Rs. 40,000 Crores per annum



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**Power Savings Potential**


S.N	Measures	Potential for Savings
1	Efficient Pump sets	25-40%
2	Suction Pipe & Foot Valve	5-15%
3	Efficient Irrigation Methods	15-25%
4	Total Saving Potential	45-80%



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**Financing Models for Implementing AgDSM Project**

- Model 1 – DISCOM as a borrower
- Model 2 - ESCO as a borrower
- Model 3 - Farmer as a borrower
- Model 4 - HT Industry as a borrower



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### ESCO Based Solution Demonstrated

- First Ever ESCO deal in AgDSM on a performance contract basis
- Public Private Partnership with 10 Years Agreement

Project Name	Water Energy Nexus (WENEXA)
Designed by	USAID India
Implemented by	Tetra Tech ES India Limited
DISCOM Partner Company (BESCOM)	Bangalore Electricity Supply Company
ESCO Selected	Enzen Global Solutions, Bangalore
Project Site	Doddaballa pur, 60 KM from Bangalore city
Geographical area	11,000 acres
No. of villages/population	29/17,000
% net sown/irrigated area	75%/16%
Major crops	Mulberry & grapes
Depth to ground water	200-400 Ft.
No. of feeders/pumpsets	47/00
Typical pumpsets capacity	5-10 HP

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### Innovation developed

- Farmers get NHEP after sales services good quality power & required amount of water
- Water energy saving with greater opportunity cost (42%)
- ESCO – profit from saving energy payback in three years
- Project based on commercial principles
- Long term horizon – no snafu back effect
- Project risks shared amongst stakeholders & ESCO
- Rule of public procurement followed
- Active engagement of all stakeholders
- Extensive guidance – studies, information, reduced time period

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### WENEXA Project: Key Features

- BESCOM provided all the preconditions for the project
  - HVDS installed
  - One Distribution Transformer for each pump.
  - Meters on all Distribution transformer
  - NGO working and educating farmers for four years
  - Detailed data available on pumps and pump efficiency
  - BESCOM obtained in principle agreement from KERC & the Government of Karnataka to proceed on a pilot program
- Farmers get a new branded energy efficient pumpsets free with a 18 month warranty.
- ESCO to implement the pumpsets replacement as a part of the Ag DSM program
  - ESCO finances the investment required
  - Provides ongoing O&M support to farmers and establishes a site office
- ESCO recoups investments through sharing of the energy saved

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### Selection: Technical & Financial Criteria

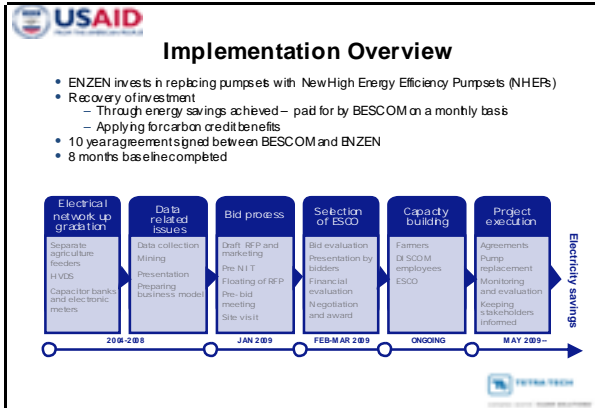
Technical Criteria	Maximum Points
Understanding of the Problem & Technical Approach	30
Proposed Organization, Staffing and prior experience related to the project	50
Innovation & other factors	15
Usage of (BEE) Star rated pumpsets	05

**Applicant with a score of 70 or more shall be declared as technically qualified.**

Financial Criteria	
Energy Saving in the project with reference to the base line (n %)	X (\$a)
Proportion of Energy saving proposed to be shared with BESCOM (in %)	Y (\$a)
Bidding Parameter (n %)	X*Y

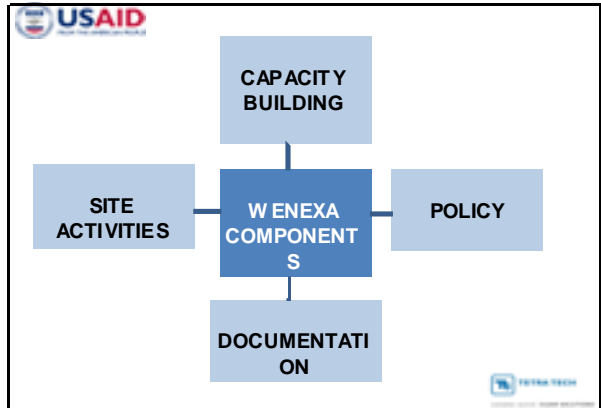
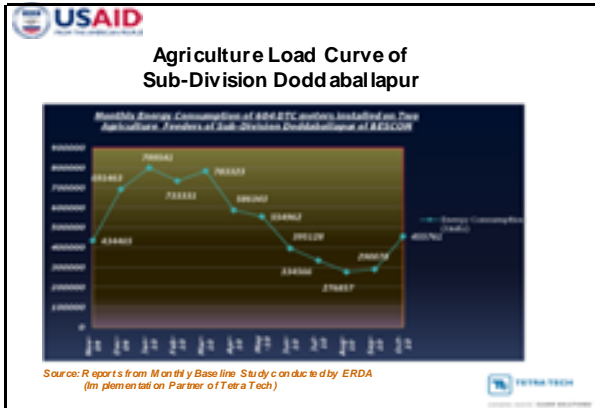
**Applicant proposing the highest value of bidding parameters shall be the finalist ESCO.**

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**Salient Findings of Base Line**

Ø TOTAL CONTRACTED LOAD AS PER UTILITY	= 2602.00 kW
Ø AVERAGE PUMP CAPACITY AS PER UTILITY	= 4.31 Kw
Ø AVERAGE SUPPLY AVAILABILITY MONTH	= 230 HRS
q TOTAL CONTRACTED LOAD AS PER BASELINE	= 5883.00kW
q AVERAGE PUMP CAPACITY AS PER BASELINE	= 10.52kW
q AVERAGE PUMP RUNNING HOURS HRSMONTH	= 162.6





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### Site Activities

**Energy-Side interventions**

- Electrical network upgradation
- Baseline development
- Pump replacement

**Water-Side Interventions**







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**Farmers**

- Street Plays
- Workshops on cultivation practices & irrigation methods
- Group discussions



**BESCOM**

- Importance of AG DSM and business case
- Elements of ideal and project implementation


**Capacity Building Initiatives**

**Other stakeholders**

- Regulators
- State Govt

**ESCO & Pump Manufacturers**

- Pre NIT
- Pre-Bid meeting
- Site Visit
- Workshops



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**Guide to implement AgDSM projects**

**Electrical case studies**

**Financing Ag DSM Projects**

**Course modules for farmers training**

**Documentation Activities**

**Audio-Visual Film on WENEXA**

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### Policy Initiatives

**Policy Issues:**

- Is there any better mechanism to deliver annual Ag DSM subsidy of about \$ 8 Billion ?
- Does converting current revenue subsidy into capital subsidy make a good business case for States ?
- How to enhance the capacity of Pump Manufacturers to meet requirement of the country?
- How to convert manufacturing of inefficient pumps into efficient pumps?
- Building capacity of utilities, State Govt, Regulators, Financers, ESCO, Pump Manufacturers and Farmers

(A study with the help of IIM A to suggest policy initiative with Maharashtra as sample state is under way)

**Facts about Maharashtra:**

- Maharashtra has 3 million pump sets
- Total Annual subsidy is \$ 1 Billion.
- Maharashtra planned to install 100k IP sets in coming one year
- Estimated annual electricity consumption in agriculture is about 13 Billion units

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### Scalability and Possible Impact of WENEXA

§ **WIN-WIN-WIN for all participants and stakeholders**

§ Scalability of the project can be gauged from the fact that:

- There are 15 million energised irrigation pumpsets, consuming 104 Billion units of electricity
- Irrigation pump sets consume about 90% of India's groundwater and 23% of its electricity.
- subsidy to the tune of Rs 40,000 Crores per annum

	India	Gujarat	Karnataka	Haryana	Punjab	Maharashtra
No. of agriculture pumpsets (lacs) 1	150	9.5	17.75	5.2	10.12	28
Units consumed (MU) 2	10409.5	12400	11287	10200	11500	13000
Capital investment (Rs crore)	60000	3450	7099.096	2080	4048	11200
Yearly savings (MU)	31225.5	3720	3386.11	3050	3450	3900
Yearly savings (Rs crore)	9367.8.5	1116	1015.8.3	918	1035	1170
Payback period	6.4	3	7.0	2.3	3.9	9.6
CO2 emission reduction (10,000 t) 3	24355.89	2901.8	2641.1.58	2386.8	2691	3040

Sources:  
 Bureau of Energy Efficiency, 2010 for India data; ARs of utilities for 2010 for Gujarat, Haryana, Punjab and Maharashtra;  
 Annual Report 2008-09 (pg 37) of ERC for Karnataka  
 ARs of utilities for 2010 for Gujarat, Haryana, Punjab and Maharashtra; Annual Report 2008-09 (pg 38) of ERC for Karnataka;  
 Report on the Performance of the State Power Utilities, Power Finance Corporation, 2006-07, 2007-08 for 1;  
 Emission factor of 0.78kg/Wh (Greenhouse Gas Mitigation India-Scenarios and Opportunities through Resources Institute (TERI) and The Centre for Clean Air Policy (CCAP), 2006)

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### Public Recognition



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### Project Partners

NABARD



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# THANKS !!!

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