Agriculture Sector and the Threat of Climate Change
Need for Irrigation Pump Sets that are Energy Efficient and/or run on Renewable Energy Sources

Use of energy efficient pump sets in agriculture provides immense scope for energy conservation. A survey conducted by CUTS in West Bengal and Gujarat revealed that there existed a huge gap between awareness and use of energy efficient pump sets in agriculture. This case study is an attempt to initiate a discussion among stakeholders on what could be done to promote use of energy efficient pump sets.

Background

The global average temperature is increasing steadily.[1] One of the major contributors to this phenomenon had been increase in concentration of Green House Gases (GHG) in earth's atmosphere. Report of the Fourth Intergovernmental Panel on Climate Change (IPCC) also indicates an increase in the global concentration of GHG to the tune of 70 percent in 2004 compared to the levels in 1970. The report further points to a greater increase in carbon dioxide (CO_2) emission compared to that of methane (CH_4) and nitrous oxide (N_2O) emissions. Continuous increase in GHG emission is likely to have the following adverse effects – increase in average arctic temperature, melting of snow capped glaciers and icebergs, increase in average temperature of oceans, increase in sea level and likely increase in the areas affected by draught globally.

CO_2 is one of the principal components of GHG which is directly linked to anthropogenic activities that involve burning fossil fuel. Examples of such activities are – use of coal in generation of electricity, use of diesel for running agriculture pump sets, use of diesel for transport etc. The net GHG emissions from India, that is, emission with Land Use Land Use Change & Forestry (LULUCF), in 2007 was 1727.71 million tonnes of CO_2 equivalent.[2] Energy sector emitted 1100.06 million tonnes of CO_2 equivalent of which 719.31 million tonnes of CO_2 equivalent (i.e. 65.4 percent) were emitted from electricity generation where coal constituted about 90 percent of the total fuel mix used.[3] Agriculture/fishery activities together emitted 33.66 million tonnes of CO_2 equivalent due to energy use in the sector other than grid electricity.[4]

Major problems faced by farmers in West Bengal and Gujarat

Focussed Group Discussion with farmers in West Bengal and Gujarat pointed to the following problems faced by farmers:

[1] Intergovernmental Panel on Climate Change, 2007, "Climate Change 2007: Synthesis Report."

[2] INCCA Indian Network for Climate Change Assessment, May 2010, "India: Greenhouse Gas Emissions 2007", Ministry of Environment and Forests Government of India.

[3] *Ibid*

[4] *Ibid*

- Rising price of fossil fuel and a corresponding increase in the electricity tariff are leading to a substantial increase in cost of production and adversely affecting profitability from farm produce.

- Erratic behaviour in monsoon coupled with falling farm productivity is adding to the problem and seriously affecting our food security.

- Coupled with the problems mentioned above, farmers are faced with the issue of ground water depletion (Table 1). Salinity is also a major concern in parts of Gujarat and West Bengal (Table 2).

Table 1: Status of Ground Water in West Bengal and Gujarat

Status of ground water	West Bengal	Gujarat
Over exploited	NIL	31 talukas
Critical	1 block	12 talukas
Semi-critical	37 blocks	69 talukas
Ground water user maps	18 districts	25 districts
Source: Central Ground Water Board *(www.cgwb.gov.in/gw_profiles/st_gujarat.html)*		

Table 2: Status of Groundwater Salinity in West Bengal and Gujarat

Contaminants	Districts affected (in part)	
	West Bengal	Gujarat
Salinity (EC > 3000 µS/cm at 25°C)	Howrah, Medinipur, S-24 Parganas	Ahmadabad, Amreli, Anand, Bharuch, Bhavnagar, Banaskantha, Dohad, Porbandar, Jamnagar, Junagadh, Kachchh, Mehsana, Navsari, Patan, Panchmahals, Rajkot, Sabarkantha, Surendranagar, Surat, Vadodara
Source: Central Ground Water Board *(www.cgwb.gov.in/gw_profiles/st_gujarat.html)*		

Need for using pump sets that are energy efficient (EE) and/or uses renewable energy (RE) sources?

In view of the growing threat of climate change and increasing electricity tariff (for West Bengal), there is a need for adopting appropriate strategies for efficient use of electricity from conventional sources. This also needs to be complemented with use of renewable energy technologies wherever possible. Together these are expected to bring about a reduction in CO_2 emission and also a considerable reduction in the cost of farm produce. To this end, the project entitled, 'Demand Side Management & Renewable Energy In India: Capacity Building of CSOs' (DREC) aims at building capacity of various stakeholders by generating awareness about the available RE and EE technologies. This, in turn, is expected to create a demand pull for EE and RE technologies.

Findings from the baseline survey in West Bengal and Gujarat (conducted under the DREC project)

- There exists a potential for significant energy saving in agriculture pumping (27.79 billion kWh on all India basis[5]) but the survey revealed that there is lack of awareness about Bureau of Energy Efficiency (BEE)-labelled EE irrigation pump sets (IPS) for agriculture.

- In West Bengal, 55 percent of the farmers (who were using electrical pump sets) interviewed run IPS during normal hours (between 8 a.m. and 5 p.m.) instead of off-peak hours (i.e., in the night).

- Predominance of diesel run pump sets especially in areas where either grid connection has not yet reached or where the government is not allowing setting up of electrical pump sets (to stop ground water depletion).

What needs to be done to address these issues (recommendations)?

- There is a need to generate awareness among the farmers about the need and benefits of using RE and EE pump sets.

- Appropriate resources (involving financial assistance) needs to be provided to the distribution licensees so that they can undertake large scale demand side management (DSM) measures in agriculture aimed at replacing inefficient pump sets with the BEE-labelled energy efficient ones.

- Appropriate financial assistance needs to be provided to the farmers in remote villages so that they can move away from diesel/kerosene pump sets and adopt solar pump sets.

The Way forward

The DREC project aims at bringing a practice change and a facilitating policy change required to promote RE and EE. To this end, the project has adopted two crucial steps. There will be a series of consumer interface meetings (CIMs) followed by two policy advocacy meetings – one at state level and the other at national level. The CIMs are aimed at initiating discussion among the consumers on what should be done so that consumers can adopt RE and EE (practice change). The suggestions that will come up in course of consolidated CIMs and will provide the basis of discussions at the state and national level policy advocacy meetings and are expected to provide policy makers with pointers for necessary policy changes. This document, prepared on the basis of findings from the baseline survey, is crucial for initiating discussion among the consumers about the probable solution to the problems they face while using (or intended to use) RE and EE technologies.

[5]NATIONAL PRODUCTIVITY COUNCIL (NPC), 2009,"State-wise Electricity Consumption & Conservation Potential in India."

Table 3: A snapshot of the DSM initiatives for the agriculture sector undertaken in the various states (based on the Detailed Project Reports)

State		No. of pump s covered in the pilot study	Avg. operating efficiency of existing pump sets	Avg. operating efficiency of proposed energy efficient pump sets	Existing consumption (million kWh)	Saving potential (million kWh)	Percentage of saving potential	Total project cost (Rs., crores)	Annual benefit from savings (Rs., crores)
Maharashtra		3530	28%	45%	25.26	10.16	40	7.06	2.38
Haryana		2124	34.7%	55%	47.34	16.7	35	10.58	5.319
Gujarat	PGVCL	1782	30%	55%	17.0	7.46	44	6.47	2.276
	MGVCL	533	42.64%	58%	9.18	2.615	28	2.56	0.9
Punjab		2186	33%	56%	20.0	7.38	37	5.67	2.467
Rajasthan		1806	31.98%	50%	24.91	11.275	45	8.84	3.012

Source: JitendraSood, Bureau of Energy Efficiency,2010, Demand Side Management in India (forumofregulators.gov.in/Data/Reference/BEE_NPTI_16.11.10.**ppt)**