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7

Water Policy Research

Highlight

Power Supply to Agriculture

Reassessing the Options

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The groundwater boom in India is fuelled by a power sector in crisis, financially and institutionally. State electricity boards face massive financial hemorrhage resulting in decapitalisation and deelctricfication.

Flat rate regime is held responsible for this state of affairs and a shift to universal metering is being pushed as remedy. However, metering can work only by creating power retailing entrepreneurs as is being tried out in Orissa. Flat tariff regime can also serve the purpose, provided it is tied to effective supply policies. Judicious rationing and reasonable tariff are essential components of a functional flat rate system.

Tariff reforms alone cannot revive the fortunes of power sector. Efficiency improvement at every stage of the supply chain is also important.

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Power Supply to Agriculture: Reassessing the Options[1]

RESEARCH HIGHLIGHT BASED ON A PAPER TITLED:

"ISSUES IN ENERGY-IRRIGATION NEXUS: AN OVERVIEW"

The power sector in India is facing a crisis as evident from huge financial losses, increasing transmission and distribution (T&D) losses, declining operational performance, widening supply-demand gap, and stagnating fresh investments. Agriculture which consumes 31.20 percent of the power sold in the country (Planning Commission estimates, 1996-97) at highly subsidised rates is believed to be one of the most important causes for this crisis. Figure 1 shows tariff as a percentage of fully allocated cost for different sectors in Andhra Pradesh and Haryana. Agriculture pays the lowest tariff while industry and traction cross subsidize it.

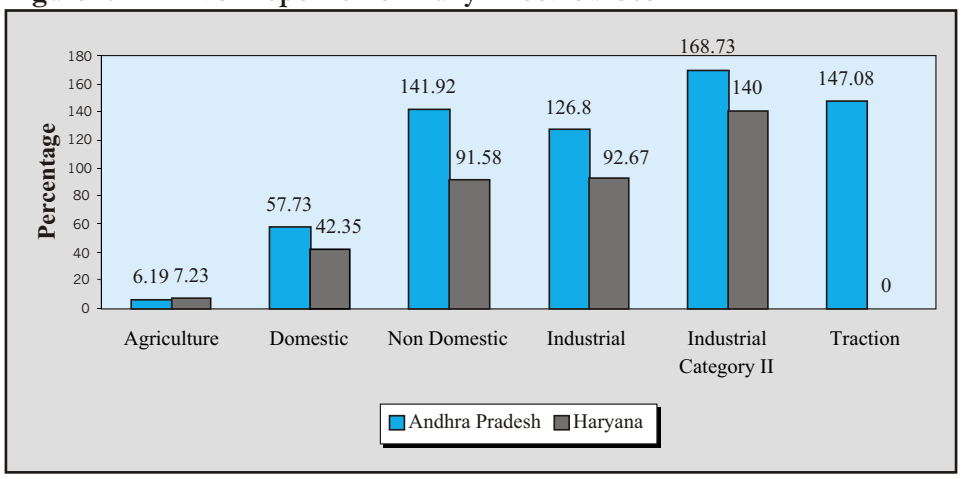
Figure 2 shows how the relative consumption by industries has declined and agricultural consumption has overtaken industrial consumption. Thus, the state electricity boards (SEBs) are losing their remunerative customers and increasingly getting saddled with non-remunerative ones over the years. This has set the SEB finances into a downward spiral of increasing losses and a deteriorating sales-mix.

AGRICULTURAL TARIFF: ROOT OF EVIL!

The agricultural sector uses 30-40 percent of the electricity produced, but provides only 8-10 percent of the revenue. Power supply to agriculture is under a flat rate (FR)[2] regime in most states of India. Owing to this policy, power consumption in agriculture remains unmeasured. Utilities use this to mask their inefficiency and misattribute a significant amount of T&D losses to agricultural consumption.

Political expediency has ensured that, while the cost of power supply has increased steadily (at a

Figure 1: Tariff as Proportion of Fully Allocated Cost



Source: Tariff Order-2001-2002, APERC and ARR for D&RS Business for 2001-2002, HERC

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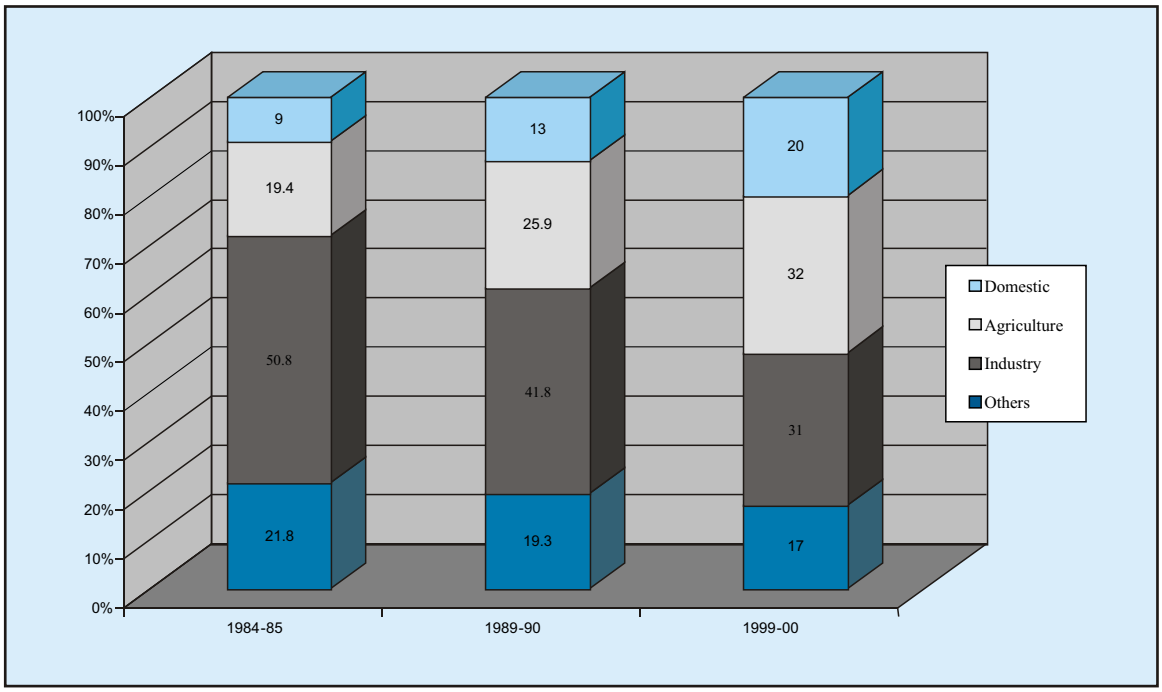
[2]In this system the user is charged a fixed annual rate based on the horsepower (HP) of the pump-set.

Figure 2: Share of Different Sectors in Power Consumption



Source: CMIE, 2002

rate of 7.86 percent over last three years), flat rates have remained virtually the same since the time they were fixed in the mid 80s. This has resulted in a steady decline in the flat rates in real terms.

The last two decades have seen significant increase in groundwater irrigation, a shift fuelled by the use of energized pumpsets. One-third of the power consumed in the electricity sector is used to achieve roughly 50 percent of irrigation needs from groundwater resources. This exponential rise in demand coupled with low realization has raised the amount of gross subsidy to agriculture to unmanageable proportions.

Most of the experts, advocate a shift back to *pro rata* tariff regime by metering power supply to agriculture. It is believed that metering will regularize power supply by ensuring improved management of the distribution and retailing system. T&D losses will be controlled and physical infrastructure will be suitably maintained enabling better quality power supply to farmers for longer hours. With better power supply, farmer's irrigation surplus will significantly increase and so would their marginal willingness to pay for each unit of power consumed. Thus, utilities will be able to progressively reduce subsidy and improve their viability without any major resistance from farmers or loss to society.

Overestimation of Subsidy and Underestimation of Losses

Almost all state utilities overestimate power consumption by agriculture and underestimate T&D losses. A World Bank Study in Haryana showed that the actual consumption of power in agriculture was lower by 33 percent while actual T&D loss was 28 percent higher than the officially reported figure. Energy audits conducted by regulatory commissions in Andhra Pradesh and Gujarat also showed similar pattern. Since power supply to agriculture is subsidized, this mal-attribution leads to siphoning off of subsidies from agriculture to other unintended beneficiaries. The World Bank study estimates that the extent of such mal-attribution of subsidies in Haryana is to the tune of Rs. 550 crores per annum.

Reanalysing the Debate

Metered power supply was a universal practice till the mid 70s and early 80s. SEBs then faced problems of high pilferage rates, poor collection efficiency, and an army of highly corrupt meter readers. It seems implausible that the experience will be any better now. It is also a common knowledge that subsidies in power supply to agriculture would continue even under the unit rate system. This is clear from the fact that the unit rate for metered supply is pegged at Re.0.50 only in most states.

Cost of Metering

According to a recent World Bank estimate, metering all agricultural connections in Haryana would require a capital investment of $30 million and an annual operating cost of $2.1 million. Much larger will be the cost of monitoring the system and controlling the pilferage which has been overlooked in this estimation.

Administering a metered supply system to a large number of small consumers scattered over a vast countryside requires elaborate managerial and infrastructural arrangements which may be costly. In a study carried out by the rural electrification corporation (REC) in U.P. and Maharashtra, metering cost was found to be as high as 26 percent and 16 percent respectively of the total revenue realized per connection. These costs did not include the capital cost of installing meters and even more importantly the cost of controlling and monitoring pilferage which is much higher than all other costs. Apart from all these direct financial costs, there is a substantial transaction cost to be incurred in persuading farmers to agree to shift from the current regime to the *pro rata* regime. Farmers in Saurashtra run their pumps for less than 500 hours. At current tariff rates, they will be better off if they pay at unit rate. Yet they are unwilling to move from FR to metering because they are apprehensive of arbitrariness and high-handedness of meter readers under the changed system. Farmers also fear that once the metered system comes into force, SEBs will start raising tariff every year under different pretexts.

Reassessing the Options

Reverting to metering is being strongly pushed as a solution to the problems of the power and water sectors. However, as we have discussed previously, metering in its traditional form would serve only to increase financial and managerial burden on utilities without delivering the expected results. There is a definite need for technical and institutional innovations in measurement and revenue collection from the agricultural sector to improve its efficiency and effectiveness. Four such innovations of promise are discussed here.

Leasing Out Charge Collection to One Large Private Entity

The experience of privatization in Orissa has shown that private operators are not willing to invest in unremunerative businesses such as distribution of power to rural areas. This is because charge collection is very difficult in large areas and the activity of metering and charge collection does not have synergies with the business of distributing power. A solution to this can be through assigning the responsibility of metering, collecting revenue and reporting malpractice to a private entity. The need for such an initiative in India was articulated by Mr. V. P. Baligar (Chairman and MD, Karnataka Power Transmission Corporation Limited) when he called upon meter manufacturers to not only provide physical meters but metering solutions to utilities through innovative schemes like BOT (build, operate and transfer) or taking the whole task of meter reading, billing, and collection in their hands.

Micro-privatization of Power Retailing

Micro-privatization of retailing power on a pattern similar to PCO revolution in the telecom sector appears to be another viable option. A decentralized network of micro-enterprises

seems to be a more suitable institutional arrangement for retailing power to a large number of consumers scattered over vast remote areas than the present system. Such a network would help in improving the effectiveness of client interface. An initiative of this sort has already been started in Orissa where village electricity committees called *village bidyut sanghas* are being formed in rural areas to improve quality of supply, customer access to utility, grievance redressal, and improved revenue realization.

Hybridizing Metering and Flat Rate

Power supplied at flat rate is an innovation where the substantial costs of metering are eliminated and this has the potential of increasing the societal surplus. However, flat rate is like a tax and in such a scenario consumers try to use as much power as is available in order to minimize the per unit cost of power that is consumed. To achieve the aims of societal welfare maximization, flat rate has to be combined with rationing of power supply. If utilities ration power supply effectively, the dream of costless metering can be achieved since rationing will force consumers to use the socially optimal amount of electricity.

However, consumers often frustrate efforts of rationing power supply by using phase-splitting capacitors and increasing pump capacities. This can be overcome by combining metering at 11 kV transformer level with flat rate electricity supply to the end-users. Metering transformers will allow the utility to keep better records of actual energy consumption in agriculture and map the areas where significant malpractices are happening. This will make monitoring easier and effective at both micro and macro levels.

Prepayment Meters

Prepayment meters offer a technological solution to the problem of metering charge collection. The technology is similar to pre-paid cards for cell phones. Once exhausted, a new card can be purchased through a network of shops which will stock the cards. The system is successfully in place in South Africa where power company Eskom faced a similar challenge of charging a large number of small users scattered over a vast area.

Extent of Agricultural Subsidy

Power is supplied to agriculture mostly in off-peak hours meaning that the cost of power supply to agriculture is much lower than the average cost of power.

While innovations in agricultural power supply will take time in implementation, it is important that the debate on subsidy to agriculture should be broadened. Subsidy to the agricultural sector needs to be looked at from two angles: the first is an estimation of how much subsidy actually goes to the agricultural sector and the second relates to the welfare produced because of that subsidy.

In estimating the extent of subsidy to agricultural power supply, most of the studies ignore the variability in the cost of power supply throughout the day. Figure 3 shows the different rates of power supply at different times of the day in US. It shows that the cost of power supply varies significantly across the day from the average cost of power supply.

Figure 3: Puget Sound Energy's Residential Rates (cents/kWh)

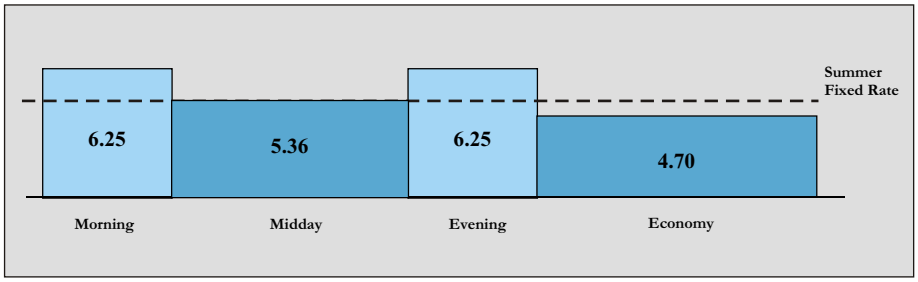


Table 1: Extent of Power Subsidy to Different Sectors in Andhra Pradesh

Category	APERC FAC (paise/unit)	Average Realization (paise/unit)	PerUnit Subsidy (paise)	% to Fully Allocated Cost (FAC)
LT Domestic	496	168	328	34
LT Non-domestic	368	413	-45	112
LT Industrial	324	369	-45	114
LT Agriculture	236	18	218	8
HT Industry	208	439	-231	211
HT Railway Traction	193	428	-235	222

Source: Andhra Pradesh Electricity Regulatory Commission (Tariff Order, 2001-2002)

Agriculture gets power supply mostly during non-peak hours, meaning that the cost of power supplied to agriculture is much lower than the average cost of power, which is used as the basis for calculating the subsidy. The Andhra Pradesh Regulatory Commission has made an estimate of the real cost of power supply to different sectors taking this into account. As shown in Table 1, cost of power supply to agriculture is the lowest among all LT (low tension) consumer categories.

The subsidy on each unit of power supplied is much higher in the domestic sector than in the agricultural sector (Rs.3.28 vs. Rs. 2.18 per unit) in Andhra Pradesh. In fact, per unit subsidy to the domestic sector is one and a half times greater than that to the agricultural sector. In this way power supply to the domestic sector is as much a drain on utilities as the much-blamed agricultural sector.

While the agricultural sector can justify the subsidy support as an infrastructure provided by the government to maintain its contribution to the state GDP and employment to 58.4 percent of main workers, the domestic sector is a purely consumptive sector. Even from a distributive angle, agriculture is the main source of livelihood to 74.27 percent of the Indian people who live in rural areas.

Ways Ahead

Tariff reforms, although necessary are not sufficient for improving the situation. There is a definite need for more broadbased reforms which would lead to improvement in the quality and reliability of power supply and improve the operational efficiency of the power sector. If we take a look at the trends in cost recovered from power sales and the percentage deficit in Andhra Pradesh (Table 2), we find that the deficit has increased by more than 21 percent over last six years in spite of a 100 percent rise in cost recovery because the cost of supplying power has increased at a much faster rate during the same time. This implies that tariff reforms, howsoever radical they may be, cannot solve the financial crisis of the power sector. The growing inefficiency of the power sector is a major contributor to the problem. There is an immediate need to make the system more efficient by reducing the cost of generation, decreasing the T&D losses, and improving the overall quality of power supply to make reforms effective.

The current debate on the nature of energy-irrigation nexus looks at only one side of the canvas: the tariff policy. Even this debate is based largely on sketchy and scanty evidence. For example, studies are not available to prove or

Table 2: Escalating Cost of Power Supply

Year	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Average Unit Cost (Rs/kWh)	1.34	1.51	2.03	2.29	2.78	2.91
Cost recovered from sales (Rs/kWh)	0.98	1.03	1.68	1.82	1.83	1.97
Percentage Realization	72	68	83	79	66	66
Deficit percentage	28	32	17	21	34	34

conclusively that water use efficiency is higher under the *pro rata* regime compared to the flat rate regime. Also the real extent of subsidy to the agricultural sector cannot be calculated in the absence of data on actual electricity consumption in agriculture and the rate of supply of that power. Thus, there is a need to generate more information and better understanding to disentangle clearly, the interdependent relationship between agriculture and the power sector. This paper has tried to highlight some of the areas of concern and lists ways ahead in putting the role of the agriculture sector in a proper perspective in the wider debate on power sector reforms in India. This would help in gaining a better understanding of the nexus and making more informed policy choices. Further research in the following areas is necessary for a proper estimation of the role of agricultural power supply and issues related to its delivery:

- Estimation of the real amount of subsidy going to the agriculture sector
- Contribution of electricity supplied to the agriculture sector to GDP through marginal returns analysis
- Innovations in metering technology – technological, institutional, and financial
- Estimation of power and water use efficiency under different tariff regimes
- Comparing the equity of power subsidies to agriculture under fixed rate and *pro rata* regimes
- Alternative means of reducing the subsidy burden.

IWMI-Tata Water Policy Program

The IWMI-Tata Water Policy Program was launched in 2000 with the support of Sir Ratan Tata Trust, Mumbai. The program presents new perspectives and practical solutions derived from the wealth of research done in India on water resource management. Its objective is to help policy makers at the central, state and local levels address their water challenges – in areas such as sustainable groundwater management, water scarcity, and rural poverty – by translating research findings into practical policy recommendations.

Through this program, IWMI collaborates with a range of partners across India to identify, analyse and document relevant water-management approaches and current practices. These practices are assessed and synthesised for maximum policy impact in the series on Water Policy Research Highlights and IWMI-Tata Comments.

The policy program's website promotes the exchange of knowledge on water-resources management, within the research community and between researchers and policy makers in India.

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