Cost and Revenue Paradox of Electricity Sector in Indian Agriculture

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Abstract

Indian government plays vital role in agriculture sector development. The Government's role is diverse and varied. The main reason for Government's keen interest in agriculture is to provide self-sufficiency, employment creation, and support to small scale producers and improvement of income farm households. In order to influence the cost and availability of farm input a number of strategies are adopted by government like Price Support System, direct payments and input subsidies. Inputs like fertilizers, irrigation and electricity have a significant share in agriculture subsidies in India and electricity subsidy has attracted much attention of policy makers and researchers in the past. The very purpose of this paper ***is to quantify the Emerging Gaps between Revenue and Cost in Energy sector*** *which if are positive may leave some scope for Electricity companies or SEB's to invest in plants and infrastructure.*

Electricity or Power subsidy in Indian agriculture is part of state budget. Power is subsidized for agriculture sector through two sources

- *State support to State Electricity Boards in the form of write-off of loan or interest.*
- *Cross-subsidization by charging higher price from industrial and commercial consumers than agriculture.*

But whatever may be the source, electricity subsidies enable agriculture users to access electricity at price below the marginal cost of supply or cost of production. The welfare effect of this electricity subsidy is that agriculture users respond to electricity subsidy by increasing ground water extraction and agriculture output especially for water incentive crops.

In agriculture sector many system of pricing prevail-in some cases, a fixed tariff for connection and in some cases metered tariff is charged. The meter tariff rate may be constant or may vary according to slabs of consumption. A fixed tariff rate is based on capacity of pump sets. In states like Punjab and Tamil Naidu free or near free electricity is provided to farmers.

So the lack of revenue generated from agriculture consumer has caused SEB's to operate at an annual loss. This negative profit is largely fueled by increased expenditure on agriculture electricity subsidy and decline in cross subsidy provided by commercial and industrial sector. Though these electricity subsidies helped to improve Agriculture productivity and food production but we have yet to explore efficiency cost of these subsidies.

In order to quantify the deadweight loss generated by agriculture electricity subsidy:-

*We must first be clear about definition of electricity subsidy which many state-****Subsidy for power supply to agriculture is calculated on the basis of Average unit cost of power less the rate*** charged in each state multiplied by consumption of electricity in Agriculture sector.

Research Methodology

The research is basically descriptive in nature. Researcher to analyze the problem has collected the secondary data, from published articles, journals, books and different web sites. Tabulated data and the graphs drawn are the major inputs for analysis, interpretation and predictions about the contribution and performance of Electricity sector in Indian economy.

Objectives of the research paper

- Introduction of fertilizer sector in India
- Consumption of Electricity for Agricultural Purposes
- Cost and Unit Cost of Power Supply
- Average Rates of Power Supply
- Consumer Category-wise tariff for Electricity Sourceacross states
- State-wise Consumer Category-wise TariffElectricity
- Subsidy in Agriculture as per WTO rule
- Commercial Profit Loss of State Electricity Boards(SEB's)
- Total Electricity Subsidy and State-wise Electricity subsidy for Agriculture
- Conclusion and Policy Implications

Introduction

Agriculture has been a way of life and continues to be the single most important livelihood of the Indian masses . In agrarian economy like India, government plays vital role in the development of agriculture sector in the form of input subsidies like fertilizers, seeds, electricity, irrigation, credit etc. At the time of independence, expenditure on agriculture was low due to low demand and low production but with passage of time amount of subsidy started surging. Inputs like fertilizers, irrigation and electricity have a significant share in agriculture subsidies in India and electricity subsidy has attracted much attention of policy makers and researchers in the past. In India electricity is provided to agriculture sector at very low rates so that irrigation facilities can be enhanced. Farmers are charged a lump sum amount for electricity based on the capacity of water motor installed for irrigation purpose i.e. Horse Powers utilized. These charges are quite low as compared to charges of other sectors. The difference between cost of supply and revenue realization is the subsidy given by the government.

Table-1 shows consumption of electricity during 1990-91 to 2009-10.Agriculture consumption as well as total consumption has increased during this time period. Agricultural Electricity Consumption (absolute) has increased during 1990-91 to 2009-10.Agriculture consumption was 50321 GWh in 1990-91 which increased to 119492 GWh in 2009-10.Total consumption has also increased from 190357 GWhin 1990-91 to 569618 GWh 2009-10. But the share of agriculture consumption to total consumption which was 26.44% in 1990-91 increased to 30.95 GWh in 1995-96 and reduced to 20.98% in 2009-10.

Table-1 Consumption of Electricity for Agricultural Purposes

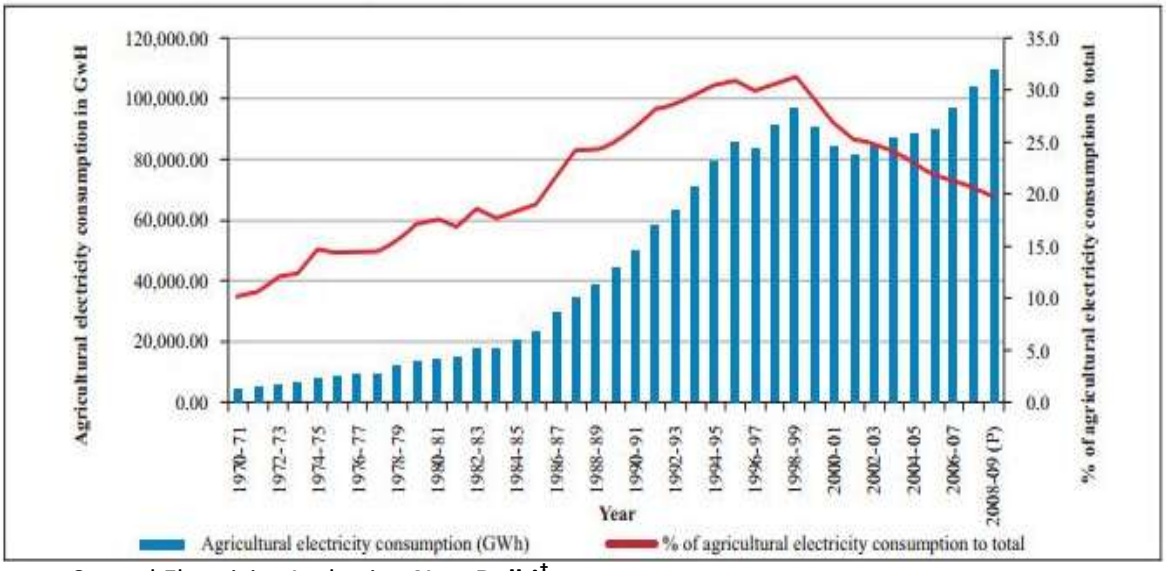
S.No.	Year	Agriculture Consumption (GWh)	Total Consumption (GWh)	Share of Agriculture Consumption in Total
1	1990-91	50321	190357	26.44
2	1995-96	85732	277029	30.95
3	2000-01	84729	316600	26.76
4	2001-02	81673	322459	25.33
5	2002-03	84486	339598	24.88
6	2003-04	87089	360937	24.13
7	2004-05	88555	386134	22.93
8	2005-06	90292	411887	21.92
9	2006-07	99023	455748	21.73
10	2007-08	104182	501977	20.75
11	2008-09	107776	527564	20.43
12	2009-10	119492	569618	20.98

Source: Central Electricity Authority,New Delhi*

Graph-1 shows agricultural consumption during 1970-71 to 2008-09 published in GOI 2007-10 which also shows an uptrend in consumption.Agriculture consumption has increased during 1970-71 till 1998-99 and graph shows an uptrend and after 1998-99 it shows a downtrend.The %age of electricity consumption to total consumption has also increased till 1998-99, then shows a downtrend and has increased afterwards. Thus we conclude that agriculture consumption as well as share of agriculture consumption to total consumption have increased for the last many years.

* www.cea.nic.in/contact.html

Graph-1 Growth of Agricultural Consumption during 1970-71 to 2008-09



Source: Central Electricity Authority, **New Delhi**[†]

Graph-2 shows cost of power supply during 2009-10 to 2013-14. The cost of power supply which includes –operation and maintenance charges, establishment and administrative cost, interest payment, liabilities, depreciation, fuel cost and expenditure on power purchase has also increased for the last many years.

Graph-2 Cost of Power Supply

Source: Central Electricity Authority**,New Delhi**[‡]

The cost of power supply has also increased from 471.09 paise/kWH in year 2009-10 to 592.75 paise/kWH in 2012-13 to further to 593.13 paise/kWH in 2013-14.

[†] www.cea.nic.in/contact.html
[‡] www.cea.nic.in/contact.html

Table-2 shows unit cost of power supply across different states during 2009-10 to 2013-14.State-wise unit cost of power supply also shows an upward trend in almost all states.

Table-2Unit Cost of Power Supply (Paise/kWH)

S.No.	States	2009-10	2010-11	2011-12	2012-13	2013-14
1	Andhra Pradesh	402.05	427.29	478.70	526.87	563.15
2	Assam	546.86	641.91	673.06	685.09	629.15
3	Bihar	713.07	861.10	1171.00	864.42	784.59
4	Chhattisgarh	339.97	373.60	443.61	417.75	410.76
5	Gujarat	381.04	418.43	454.87	484.54	495.54
6	Haryana	578.75	557.51	798.91	679.58	646.06
7	Himachal Pradesh	451.03	485.17	523.22	543.63	526.01
8	Jammu and Kashmir	644.42	699.48	865.14	755.57	674.30
9	Jharkhand	500.10	513.62	626.56	748.22	942.44
10	Karnataka	408.78	456.60	472.69	500.46	504.79
11	Kerala	439.26	455.39	484.17	658.97	596.71
12	Madhya Pradesh	539.33	538.31	612.81	601.38	538.61
13	Maharashtra	468.73	498.87	525.21	549.80	584.19
14	Punjab	422.05	473.31	479.85	544.72	578.47
15	Rajasthan	699.71	654.68	688.72	720.89	697.54
16	Tamil Nadu	504.34	590.64	611.69	714.01	645.72
17	Uttar Pradesh	500.55	559.20	668.44	672.04	706.23

Source:Central Electricity Authority, New Delhi[§]

In Haryana unit cost of power supply was 578.75 paise/kWH in 2009-10 changed to 798.91 paise/kWH in 2011-12 and was 646.06 paise/kWH in 2013-14.Unit cost of power supply was highest in Jharkhand 942.44 paise/kWH followed by Bihar 784.59 paise/kWH during 2013-14.Chattisgarh shows lowest unit cost of power supply during this time.

Table-3 depicts average rate of power supply for different consumers like agriculture, industry, commercial and domestic. Average rate of power supply is highest for commercial users and lowest for

[§] www.cea.nic.in/contact.html

agriculture users. Average rates of power supply have increased for all consumers during 2007-08 to 2011-12.

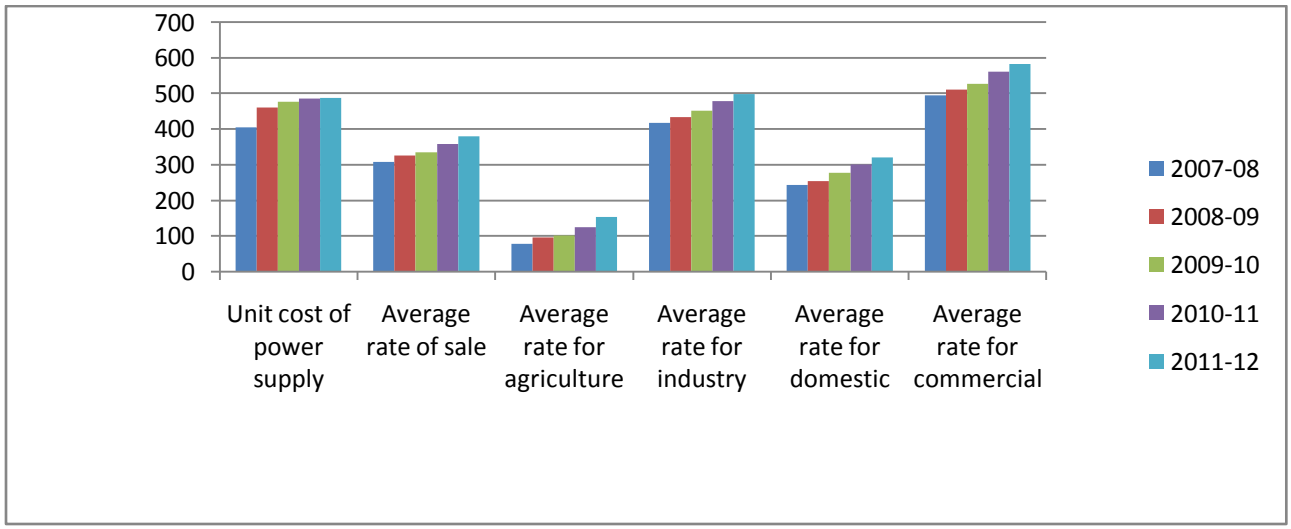
Table-3 Average Rates of Power Supply(USD/kWH)

	2007-08	2008-09	2009-10	2010-11	2011-12
Unit cost of power supply	404.42	459.58	476.04	483.87	487.15
Average rate of sale	306.46	325.76	333.44	357.33	379.56
Average rate for agriculture	77.57	94.73	100.97	123.49	153.13
Average rate for industry	416.41	432.74	449.99	477.88	497.11
Average rate for domestic	242.23	252.96	275.82	300.49	320.03
Average rate for commercial	494.34	509.88	525.76	560.23	581.04

Source:Annual Report (2011-12) on working of state utilities and electricity departments,Planning Commission,GOI,Oct.-Nov.

Average Rate of Power supply during 2007-08 was 306.46 USD/kWH which increased to 487.15 USD/kWH during 2011-12. Average Rate of Power supplyfor industry and commercial usage were very high i.e. 416.41 USD/kWH and 494.34 USD/kWH during 2007-08 respectively and changed to 497.11 USD/kWH and 581.01 USD/kWH during 2011-12. Average Rate of Power supply for agriculture sector is minimum and was 77.57 USD/kWH during 2007-08 though increased to 153.13 USD/kWH during 2011-12 which was still far less than the unit cost of power supply or average rate of sale for the other subsidized sector i.e domestic.

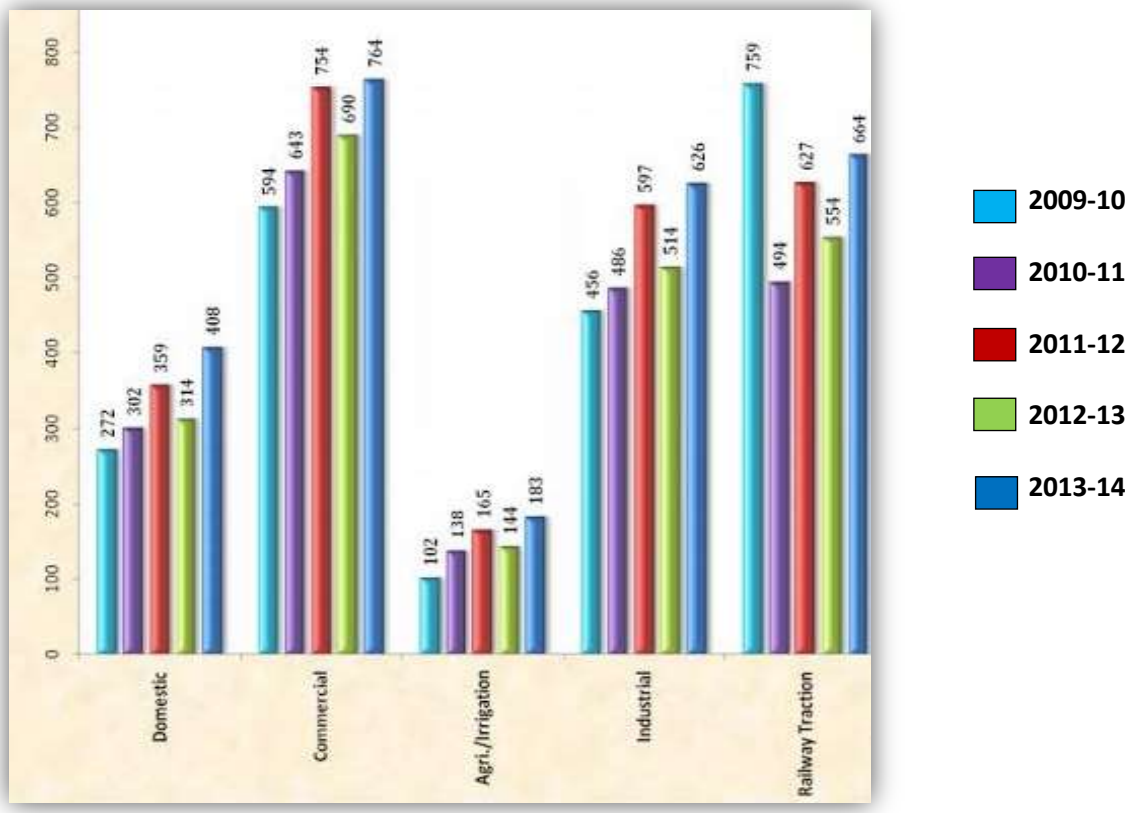
Graph-3 Average Rate For Sale vs Average Rate For Agriculture



Graph-4 depicts Consumer Category-wise tariff for electricity for Domestic,Commercial,Industry,Agriculture and Railway during 2009-10 to 2013-14 .Consumer Tariff has increased in all catogories during this time period . In case of Agriculture sector it has increased from

102 paise/kWH in 2009-10 to 183 paise/kWH in 2013-14.For commercial consumers it has increased from 594 paise/kWH in 2009-10 to 764 paise/kWH. For railwayconsumers it was 759 paise/kWH in 2009-10changed to 664 paise/kWH in 2013-14. Tariff was maximum in case of commercial use followed by Raiway and industry during this time period.

Graph-4 Consumer Category-wise tariff for Electricity Source (paise/kWH)



Source:Annual Report (2011-12) on working of state utilities and electricity departments,Planning Commission,GOI,Oct.-Nov.[**]

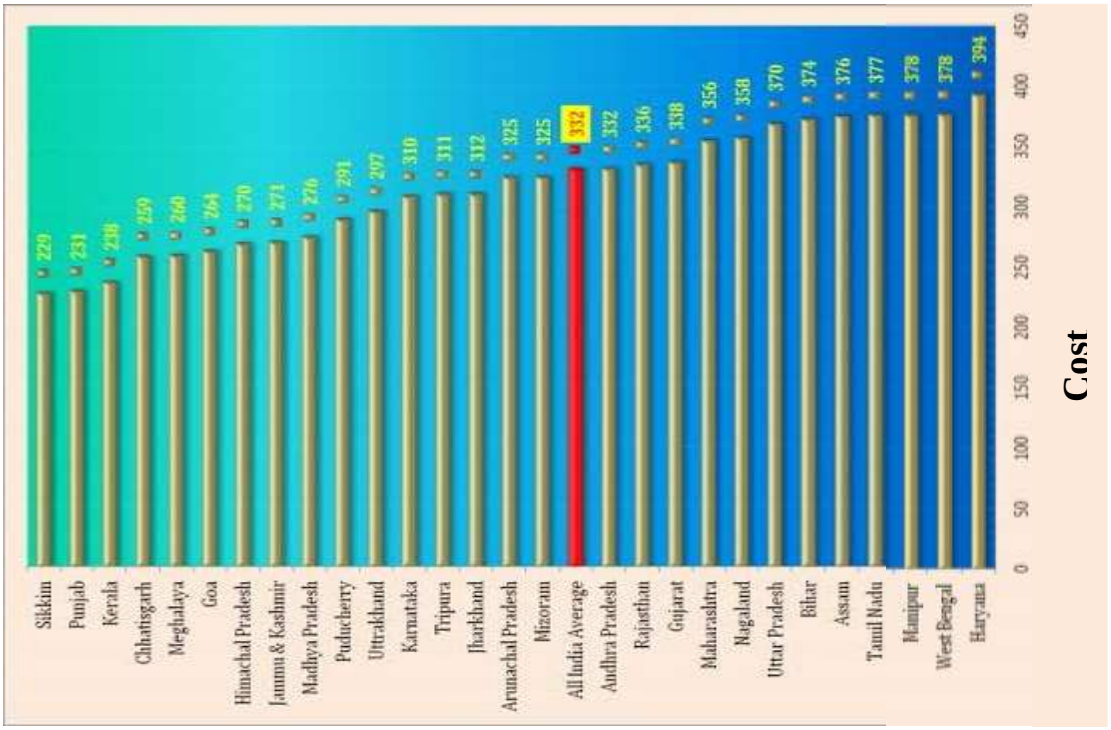
The Tariff is minimum in case of agriculture users as compared to other electricity users as depicted in the above graph during 2009-10 to 2013-14.Cross-subsidization is an important aspect of electricity subsidy in India.

Graph-5 shows cost of power supply during 2011-12 across states. All India cost of power supply during 2011-12 was 332 Paise/kWH .When we compare all India cost of power supply with individual states we find that in some states cost is higher than all India cost and in some states it is lower.In Haryana cost of power supply during 2011-12 was 394 Paise/kWH followed by West Bengal 378 Paise/kWH and Tamil

[**] www.planningcommission.nic.in/reports/genrep/index.php?repts=b_repgen

Nadu 377 Paise/kWH. In states like Punjab, Karnataka and Andhra Pradesh it is 231 paise/kWh, 310 paise/kWh and 325 paise/kWH respectively.

Graph-5 Cost of Power Supply during 2011-12 across states.



Source:Annual Report (2011-12) on working of state utilities and electricity departments,Planning Commission,GOI,Oct.-Nov.[††]

Table-4 shows State-wise consumer category-wise Tariff during 2011-12.All India Consumer Tariff of SEB's during 2011-12 was 1.53 Rs./kWH for Agriculture users during 2011-12 which is minimum as compared to other categories. Tariff for commercial use was 5.83 paise/ kWH and for industrial was 4.99 paise/kWH. Tariff was high for railways also during this time period and it was 539 paise/kWH .State wise comparison also depicts that agriculture tariff is minimum in all states as compared to other users. In case of Haryana it was 0.38 Rs./kWH for agriculture users and was highest for Commercial users i.e. 4.67 Rs./kWH .

[††]www.planningcommission.nic.in/reports/genrep/index.php?repts=b_repgen

Table-4 State-wise Consumer Category-wise Tariff (Rs./kWH)2011-12

S. No.	States	Domestic	Commercial	Agriculture	Industrial	Railway	Outside	Overall
1	Andhra Pradesh	2.83	6.16	0.32	4.18	4.45	16.16	2.92
2	Assam	3.93	6.74	4.79	5.73	0.00	6.00	5.13
3	Bihar	2.30	6.12	0.81	5.45	6.19	3.84	3.74
4	Chhattisgarh	1.91	4.05	1.07	3.71	4.25	4.00	3.08
5	Gujarat	3.73	5.72	1.76	5.32	5.69	3.36	3.98
6	Haryana	3.81	4.67	0.38	4.61	4.60	0.00	3.47
7	Himachal Pradesh	3.07	5.46	0.00	4.19	0.00	7.50	4.79
8	J & K	1.61	2.69	1.42	2.78	0.00	0.00	2.70
9	Jharkhand	1.03	5.16	0.59	4.82	10.0	4.54	3.44
10	Karnataka	3.60	3.12	2.06	6.13	0.00	0.00	4.15
11	Kerala	2.00	7.67	1.10	4.27	3.98	0.00	3.49
12	Madhya Pradesh	3.84	6.89	3.02	4.98	5.26	0.00	3.66
13	Maharashtra	4.39	7.36	2.15	5.15	5.92	0.00	4.66
14	Punjab	3.77	5.19	3.20	4.55	5.41	0.00	3.93
15	Rajasthan	3.78	5.42	1.22	4.65	3.86	2.81	3.05
16	Tamil Nadu	1.81	6.95	0.00	5.30	0.00	3.08	3.53
17	Uttar Pradesh	3.48	5.32	2.42	6.37	4.64	0.00	
Average of SEB's		3.22	5.83	1.53	4.99	5.39	4.69	3.80

Source:Annual Report (2011-12) on working of state utilities and electricity departments[‡‡]

[‡‡] www.planningcommission.nic.in/reports/genrep/index.php?repts=b_repgen

Table-5 depicts Electricity Subsidy in agriculture as per WTO rule. According to WTO rule Net Subsidy is estimated by deducting depreciation from agriculture subsidy and then estimating actual Electricity subsidy. Government of India has submitted that at least 30% of power consumption in agriculture sector is used for domestic supply of electricity to the farmers-so we reduce the net subsidy by a factor of (.7) to get the proportion of subsidies that should be attributed to agriculture operation.

Table-5 Electricity Subsidy in Agriculture as per WTO rule (billion USDollar)

S.No	Year	Subsidy for agricultural consumers	Depreciation	Net subsidy	Adjusted to actual electricity subsidy on agricultural operations (coefficient0.7)i.e.Net subsidy *0.7
1	2007-08	8.30	0.40	7.90	5.54
2	2008-09	8.57	0.39	8.18	5.72
3	2009-10	9.42	0.42	9.00	6.30
4	2010-11	9.79	0.48	9.31	6.52

Source: Calculated using Annual Report 2011-12 on The Working on State Power Utilities and Electricity departments.

During 2007-08 subsidy adjusted to actual electricity subsidy was 5.54 Billion US Dollar which increased to 6.52 Billion US Dollar during 2010-11.

Table-6 shows Commercial Profit Loss of SPU's during 2007-08 to 2011-12. In this table we has studied Gross subsidy of agriculture sector and domestic less subventions by state governments and surplus from other users. Uncovered subsidy leads to losses of state electricity boards.

Table-6 Commercial Profit Loss of SPU's (Billion US Dollar)

S.No.	Consumer Category	2007-08	2008-09	2009-10	2010-11	2011-12
1	Subsidy to Agriculture	8.32	8.61	9.49	9.83	9.54
2	Subsidy to Domestic Users	4.05	4.94	5.16	5.20	5.13
3	Gross Subsidy	12.10	13.24	14.92	15.10	14.71
4	Subvention from State Governments	4.22	5.00	5.14	3.99	3.69
5	Surplus from other Users	1.12	-0.78	-0.57	0.03	0.10
6	Uncovered Subsidy	6.73	9.02	10.33	11.06	10.04
7	Commercial Profit/loss	-8.37	-11.41	-12.63	-13.08	-11.58

Source:Annual Report(2011-12) on working of state utilities and electricity departments[§§]

[§§] www.planningcommission.nic.in/reports/genrep/index.php?repts=b_repgen

The commercial losses of SEB's are closely related to subsidy for agricultural consumers. This might be expected to result in benefits to farmers but in reality –inefficiency in the operation of SEB's to outweigh these benefits. Commercial losses were -8.37Billion US Dollar during 2007-08 which increased to -11.58 Billion US Dollar during 2011-12.

In Table-7 the total electricity subsidy in India is discussed during 2007-08 to 2011-12.While studying data during this time period we find that electricity subsidy has increased during 2007-08 to 2011-12. Electricity Subsidy increased fromRs. 31633 crores in 2007-08 to Rs. 43017 crores in 2009-19 and further to Rs. 44154 crores in 2011-12.The compound annual growth rate during this time was 8.29%.

Table-7 Electricity Subsidy in India (Rs. Crore)

S.No.	Year	Electricity Subsidy	Simple GR (%)
1	2007-08	31633	-
2	2008-09	37965	20.02
3	2009-10	43017	13.31
4	2010-11	43215	0.46
5	2011-12	44154	2.17
CAGR(%)		8.29	

Source: GOI, Union Budget, Various Years[***]

Table-8 State-wise Electricity subsidy for Agriculture (Rs.crore)

S.No.	States	2007-08	2008-09	2009-10	2010-11	2011-12	CAGR(%)
1	Andhra Pradesh	4247	6128	6428	6332	6963	10.76
2	Gujarat	3049	3128	3390	3451	3637	4.61
3	Haryana	3032	3627	4850	4097	4660	10.31
4	Himachal Pradesh	6	5	12	14	16	34.87
5	Jammu&Kashmir	95	108	152	186	189	21.16
6	Kerala	62	72	94	88	101	12.49
7	Bihar	397	488	521	627	700	14.85
8	Karnataka	3280	3869	3134	3141	3300	-1.94
9	Madhya Pradesh	2190	1803	1889	2247	1964	0.02
10	Punjab	3571	3323	3873	4735	2499	-3.53
11	Rajasthan	3024	4934	6729	6926	7741	24.85
12	Tamil Nadu	3867	4888	5515	5345	5563	8.51
13	Maharashtra	2928	3259	3749	3654	4632	10.87
14	Jharkhand	39	42	40	45	49	5.40
15	West Bengal	258	271	400	322	356	8.51
16	Uttrakhand	62	64	70	65	83	6.17
17	Uttar Pradesh	1526	1956	2171	1940	1701	2.11

Source: GOI, Union Budget, Various Years[†††]

Table-8 shows the State-wise Electricity subsidy for agriculture.While comparing Electricity subsidy State-wise we find that electricity subsidy has increased in almost all states during 2007-08 to 2011-12.

[***,10] http://indiabudget.nic.in/budget.asp

The above table indicates that some of the states be ranked as good performer like Rajasthan while Punjab and Karnataka be termed as bad performer in term of CAGR % of Electricity subsidy. But the proponents of subsidy Reform have their own stake stating that if government spends more on energy subsidies than on Education and Health, then subsidies are not economically feasible.

Conclusion and Policy Implications

No doubt electricity subsidies are effective in transferring money from government to agriculture users but these may cause distortions in agriculture production, ground water consumption and electricity consumption. Over the years power subsidies have resulted in drawing out ground water in excess of utilizable recharge so that water table has fallen causing environmental degradation.

According to Organization for Economic cooperation and Development 2011, Economic Survey of India, the increasing subsidy percentage or the negative gap between Revenue and Cost in The Energy sector which was nearly 6 Billion in 2008-09,so such annual losses leave little of incentive for electricity companies or SEB's to invest in new plants, agriculture research, irrigation, rural roads and infrastructure. Lower public investment due to more emphasis on subsidy will only further deteriorate quality of public services like uninterrupted power supply. So the only way out is to subsidize the potential beneficiaries as directly as possible. Given that power subsidy should be administered explicitly by making the farmer pay the regular tariff and only the potential beneficiaries be allowed to claim the subsidy from state's department of agriculture. A change of such type in Kerala has reduced not only the state's subsidy bill but also wastage of power.

References

Rajwinder Kaur,Manisha Sharma"Agricultural Subsidies in India-Boon or Curse" published in www.iosrjournals.org ISSN No.-2279-0837, ISBN-2279-0845, Volume-2, Issue-4, and Page 43-46

B**.Swaminathan,Chinnadurai,balan(2013)** "What has been sown has not been harvested: the curious case of farm subsidies in India" published in International Journal of Research in Commerce, Economics & Management Volume no. 3 (2013), Issue no. 02 (February) ISSN 2231-4245

HarshalSalunke,Deshmukh(2013)'The overview of Govt. Subsidies to Agriculture Sector in India' published in IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) ISSN: 2319-2380, ISBN: 2319-2372. Volume 1, Issue 5 (Nov. - Dec. 2012), PP 43-47 www.iosrjournals.org

Vijay Paul Sharma (2012)"Dismantling Fertilizer Subsidies in India: Some Issues and Concerns for Farm Sector Growth" published in Research and Publications W.P. No. 2012-09-01 September 2012

Dubash, N K and S C Rajan(2001), "Power Politics: Process of Power Sector Reforms in India", Economic and Political Weekly, Vol.36, No. 35, PP 3367-3390, Sep. 1

Grossman, Nick and Dylan Carlson(2011), "Agriculture Policy in India: The Role of Input Subsidies", USITC Executive Briefings on Trade, PP 45-50, Jan 23

Gupta, Anjali(1984), "Impact of agricultural subsidies", Economic and Political Weekly, Vol. 39, No. 4, PP 48-53, May 18 **REDDY (1992**)" Who Benefit from Agricultural Subsidies? The Case Study of Andhra Pradesh" Margin, Vol.26, No.1,Oct.-Nov.,pp. 64-77

KHATAR et.al (1992)"Extent of Input Subsidies and their Beneficiaries in Indian Agriculture" Indian Journal of Agriculture Economics, Vol.47 , No.3,July-Sept

REDDY AND DESHPANDE(1992)"Whither the Direction of Policy Changes", Indian Journal of Agriculture Economics, Vol.47 ,No.3,July-Sept.,pp.349-356

PARIKH,SURYA NARAYAN(1990) Food and Agriculture Subsidies :Incidence and Welfare Under Alternative Schemes , Indira Gandhi Institute of Development research ,Bombay, Discussion paper No.22,Revised ,January