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Economic Analysis of Hydro Power Generation in the State of Jammu and Kashmir, India

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Abstract:

The state of Jammu and Kashmir, although bestowed with substantial water resources with the capability to generate about 20,000 MW of hydroelectric power, is experiencing worst power crises. Out of 20,000 MW capacity 16,000 MW have been identified economically and technically feasible. Currently the state is able to harness only about 15 per cent of this potential with a total installed capacity of around 2438.70MW, out of which more than 1500MW are under central ownership and control, leaving only about 5 percent, that is 758.70 MW with the state. In this way the J&K state has been converted into serious energy deficient economy with repercussions on various sectors, especially industrial sector, of the economy. To meet its restricted power demand of 10370 MUs, the state power projects generate only 1692.5 MUs. Consequently, the state is forced to purchase the rest of the electricity, generated from its own water recourses, from the central projects worth about 2000 cr. rupees annually comprising half of State's tax and non tax base. There are problems also associated with transmission and distribution processes. According to the statistics transmission and distribution losses alone account for more than 60 per cent of total power generation which means more than half of the energy generated is actually lost. In this paper an attempt has been made to give an account of hydro power potential of the state along with certain constraints leading to the suboptimal capacity utilization. The paper also draws a picture of the State Power Development Department's financial management affairs. Finally, a modest attempt has been made to show if the power sector is allowed to operate at its full potential, by removing the constraints, how it will help the state economy to come out of backwardness.

Key words: Jammu and Kashmir, State Power Development, Indus Water Treaty, Financial Management, Transmission and Distribution Losses, Economic Potential

1. Introduction

1.1 Background

Importance of energy in the growth and development of an economy hardly requires any elaboration, especially in the context of Indian fast growing economy requiring about 112 million tonnes of hydrocarbon energy (2002), which is projected to rise up to 190 million tonnes in 2025. (Vision Document 2025) which means a share of 45% in India's total energy consumption.[1] But given all the importance of energy derived from fossil fuels, it has also resulted in a major problem that is conflict between economic growth and quality of environment. Greater reliance on fossil fuels to accelerate growth has given rise to environmental depletion largely on two counts i.e. green house effect and ozone layer depletion. Given this trade off between environment and growth, and the fact that fossils fuel resources are non- renewable and hence exhaustible, there is a growing felt need all over the world to search for alternative renewable environment friendly sources of energy.

The energy sector of J&K economy though not rich in fossil fuels, is bestowed with substantial water resources with a capacity of 20,000MW of energy. But due to some political and economic factors, that have got its roots in the conflict between two neighbouring countries India and Pakistan and also conflict within the state of J&K, this sector has received a serious setback. This can be imagined from the fact that although more than 16000 MW have been found technically and economically feasible, the state and the Centre have jointly been able to harness only about 2438.70MW, which constitutes only 14 per cent of identified capacity. Out of the total utilized capacity of

2438.70MW, more than 1500MW are under central ownership and control, leaving only 4 percent i.e. only 758.70MW with the state. In this way the J&K economy has been reduced to serious energy deficient sector with the repercussions on industrial and agriculture sectors of the economy as well. It is pertinent to note here that if the energy sector in J&K is allowed to operate at its full potential, the state will not only become an energy surplus self sufficient state, but would also export hydro electric power to whole northern states to end the power crises. Some of the major reasons for this very low utilization of water resources are:

i. Indus Water Treaty of 1960 – A macro water sharing arrangement between India & Pakistan over the rivers flowing across the states of Punjab and J&K. Because of this treaty many power projects are caught up in disputes.
ii. Most of the projects are operating at sub optimal potential because of administrative inertia, inefficiency, corruption and bad governance.
iii. Poor economic status of the state of J&K is also one major impediment to the large scale investment in this sector.
iv. Conflict situation between the two neighboring countries India and Pakistan, and within the J&Ks has given a big blow to the suitable investment climate in exploiting the water resources.
v. The state of J&K across both sides of LOC does not possess economic sovereignty over its water resources. There are disputes between the Centre and the State in utilizing the water resources for power generation.

1.2 Indus Water Treaty

The major source of hydroelectricity in the state of J&K is the western Indus river basin comprising Jhelum, Indus, Chenab, and Ravi. The Indus River and its system of upper tributaries

are spread over the whole North-West Indian subcontinent. Originating about 17,000 feet (518m) above sea level in a spring near Lake Manasarovar at Mt. Kailash, the Indus river is fed by massive Tibetan glacial waters and becomes a mighty river with further feeds from other glacial catchment areas in Karakorum and Zanaskar]ranges. After traversing a distance of 1800 miles (2900 Km) through India, Tibet, Pakistan occupied Kashmir (PoK), and Pakistan it finally culminates into the Arabian Sea south of Karachi. On its way, it is further enriched by the waters of several tributaries, the most important are Beas, Sutlej, Ravi, Chenab, and Jhelum rivers. [2]

Immediately after independence in 1947 that lead to formation of two independent countries India and Pakistan, Pakistan had a fear that since the source of Indus water system was in India, it could potentially harm their interests. Several rounds of negotiations between the two countries, however, finally culminated into what is famously called the "Indus Water Treaty"- a water-sharing treaty between the Government of India and the Government of Pakistan, brokered by the World Bank. The treaty was signed in Karachi on September 19, 1960 by Indian Prime Minister Jawaharlal Nehru and President of Pakistan Mohammad Ayub Khan.

According to the provisions of this treaty India has got exclusive rights on the usage of waters, for whatsoever purpose, of three main eastern rivers i.e. Ravi, Beas, and Sutlej flowing through Punjab state of India; while as Pakistan shall have complete rights on the waters of the three major western rivers i.e. Chenab, Jhelum, and Indus flowing through J&K. India is supposed not to obstruct free flow of water to Pakistan especially by way of building dams and reservoirs for electricity generation on its western rivers. However the treaty does allow India to construct water storages for various purposes, including storage for general purpose, floods and power, up to 3.6 MAF only. The treaty does not disallow generation of electricity from the running waters of these rivers. Also

according to the provisions of the treaty while India is under obligation to let the flow of the waters of these western rivers to Pakistan, it could, however, make use of these for the domestic purpose, non-consumptive use, and irrigation of agriculture[3] (Tables 1,2 & 3)

1.3 Objectives

- To make an assessment of existing and actual hydropower potential of J&K State
- .To analyse financial management efficiency of Power Development Department.
- To capture the impact of hydropower potential on the economy of the state.

2. Power Sector in J&K- An Overview

Hydro power generation in the state of Jammu and Kashmir comprises power projects under the control and possession of the Central and the State governments. The State Power Development Department (J&K PDD) purchases the power from these projects and is responsible for transmission and distribution among the consumers.

Table-4 gives a clear picture of river-wise hydel power potential of different rivers passing through the territory of Jammu and Kashmir. Out of a total potential of 16,243.33 MW, found economically and technically viable, more than 60 per cent i.e, 10,375.33 MW is contributed by Chenab river alone. The other major contributors being Jhelum and Indus with 3576.55 MW and 2066.81 MW respectively. Although, capacity utilization of 484.30 MW from Chenab is largest, yet in relative terms it constitutes only 4.66 per cent of its identified potential. While on the other hand with an installed capacity of 252.60 MW only constituting about 7.0 per cent of the identified potential, it is the river Jhelum standing a significant contributory in relative terms. In case of river Indus less than 1

per cent of the identified potential has only been harnessed so far. Thus total installed capacity of the state sector is 956.20 MW including 195.74 MW thermal power (Table 5). Availability of hydro power is to the extent of about 700 MW in summer but decreases to 240 MW in winter because of depleting river discharge.[4]

In the Central sector, during the first year of 11th five year plan i.e. 2007-08, Dulhusti Power Project, Kishtwar with the capacity of 390 MW and 120 MW Sewa II were commissioned which increased the power generation in central sector from 1170 MW to 1680 MW(Table 6). Out of this State has a firm allocation of around 1249 MW including 12% free power from NHPC's power houses of Salal, Uri and Dulhusti, besides a share of 105.3 MW as Non-Firm share from unallocated quota which varies from time to time. But the effective availability depends upon the de-rating of machines and river discharge. Power is also received by the state through what is known as banking arrangements. (Table 7). During the summer when there are abundant water flows in the rivers, the state government banks power with NVVN, Punjab, Haryana and Chhattisgarh and receives back during winters. In addition the state receives some power from the unallocated quota during peak requirement [5]

3. Demand and Supply Analysis

The figures in table 8 clearly highlight that the total availability of power generated from own sources is meagre and the free power also accounts very little. Both these contribute just around one-third of the total restricted electricity requirement and the rest two-third is purchased from the other sources.

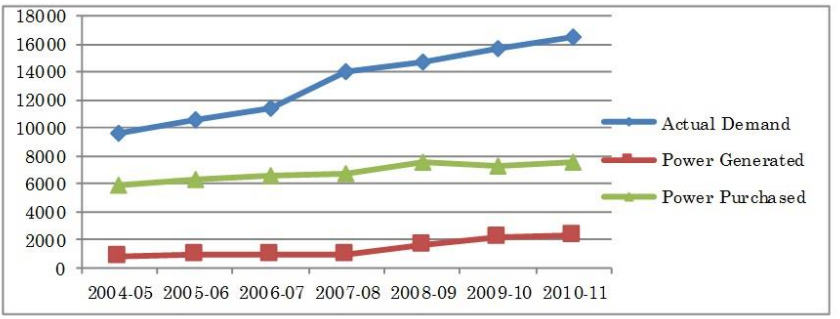

Figure-1: Showing the widening gap between actual demand and State's own supplies.
Source: Table 9

This purchased portion still does not fulfil complete requirements, hence there are frequent power cuts ranging from 8 to 10 hours per day (Economic Survey, 2012). Both purchased as well as self generated power fulfil just around two-third of (65 per cent approximately) of total requirement only, while as self generated power including free power availed from CPSUs is sufficient to feed only 20 per cent of complete requirements.(Tables-7&8)

Despite the fact that the State has huge hydroelectricity potential sufficient not only to satisfy its all requirements but also end the power crises of whole northern states, the State's own generation has lagged far behind to meet its own demand. Over the years gap between supply and demand has widened considerably. In order to fill up this mounting gap the State uses to purchase the power from Centrally owned units which, however, seems to be pretty ordinary to plug the gap. The power deficit is rising at a very rapid pace as can be seen from the table-9. In a span of just 8 years from 2004-05 to 2011-12 the power deficit as a percentage of total supply has increased from about 31 per cent to 54 per cent.

4. Financial Management Efficiency

Financial management of any organization determines its

health and soundness. From the examination of statistical facts and figures the financial mess of the department is quite clear. The Power Development Department (PDD) is continuously showing the losses of increasing magnitude.

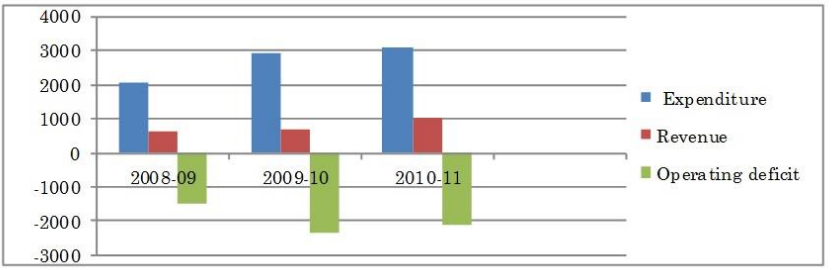

Figure-2: Showing Accumulating Operational Deficits
Source: Table 10

4.1 Operations and Maintenance

Due to heavy transmission and distribution losses owing to outdated technology, commercial losses due to unaccounted and uncontrolled consumption of power beyond agreement load, unregistered consumers, lesser agreement loads etc.(Economic Survey J&K,2012) the operating deficits have shown a rising trend (Table 10). These operating deficits constitute about half of the tax and non tax base of the state budget and a main reason for the under development of power sector. The figure above reveals the departmental financial affairs for the years 2008-10.

4.2 Revenue realization

Figures given in table-12 reveal a poor picture of revenue realization. Over a period from 2003 to 2009,on an average, the concerned department has shown a revenue deficit of Rs.274 crore amounting to 38 per cent in relative terms. In other words the department is able to realize only about 60 per cent of the revenues.

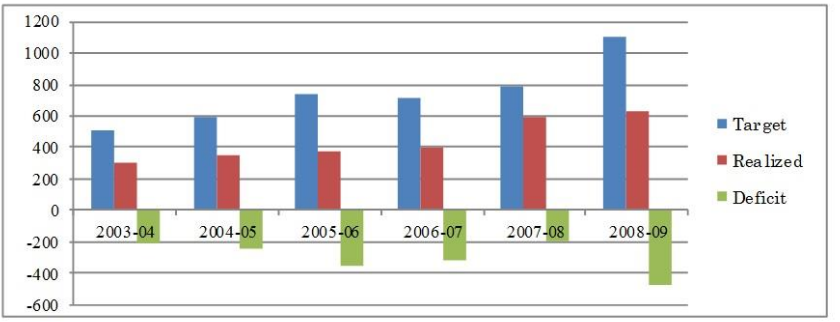

Figure-3: Showing Accumulating Revenue Deficits
Source: Table 12

5. Power Losses

Power which is supplied to various categories of consumers passes through various stages before it finally reaches the premises of the consumers. It involves transformation to higher voltage level, wheeling on high voltage line, transformation at various stages. The entire process itself involves energy losses known as Transmission and Distribution losses. The Transmission and Distribution losses in the State are very high of the order of 62 percent. The main reasons for such high losses are technical as well as commercial. To minimize such losses, the system needs up-gradation and improvements. Commercial losses, include theft, unaccounted and uncontrolled consumption of power beyond agreement load, unregistered consumers, lesser agreement loads etc. Electricity lost collectively through transmission and distribution, and commercial losses is accounted as Aggregate Transmission and Commercial (AT&C) Losses. Table-13 shows T&D losses on the rise in the State's Power Departments. These T&D Losses currently hover in the vicinity of 60 per cent and as a consequence of it only about 40 per cent power remains available for sale.

An attempt is made to present an overall scenario of T&D Losses, AT&C Losses and Collection Efficiency from 2005-06 to 2011-12 as shown in tables- 13, 14 & 15. Collection

efficiency is the ratio of energy realised to the energy billed. Energy realised means the amount of money actually collected from the sale of energy or energy billed. High commercial losses on account of the reasons cited above lead to low collection efficiency. The figures given in the table-13 reveal that the collection efficiency has varied between 65 to 75 per cent during the period from 2006 to 2010. Due to all these factors AT&C Losses account for about 75 per cent, which, in other words, implies that only 25 percent of the energy is effectively utilized.(table-14)

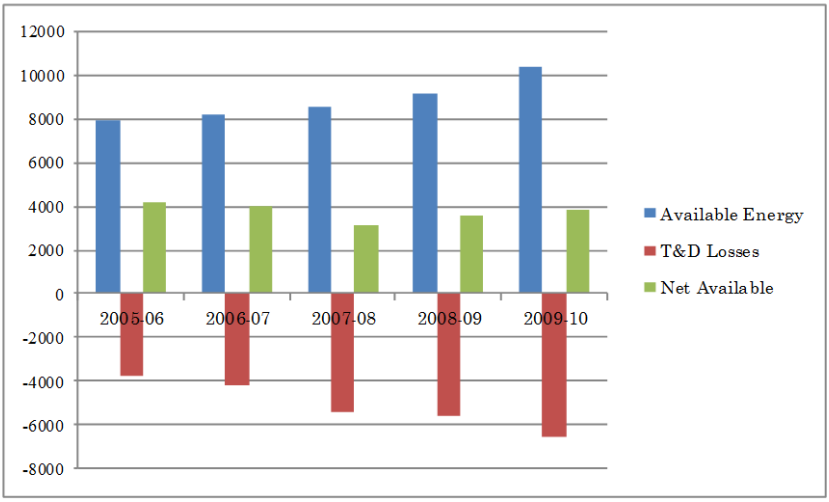

Figure-4: Showing Increasing T&D Losses/Falling Net Energy Available
Source: Table 13

6. Hidden Economic Potential

Given the estimated hydro power potential of 20,000 MW of which 16,480 MW have been found technically and economically feasible, in consonance with the provisions of Indus Water Treaty, the full capacity utilization of this sector is likely to give boost to the state economy directly and indirectly in a variety of ways. Following are some of the crude estimates.[6]

6.1 Revenue

These calculations assume the cost of a unit of energy to be Rs.2.56 at which the state government used to purchase electricity previously from the central power projects.

- 20,000 MW for 12 hours per day round the year, @ Rs. 2.56 per Unit
  = Rs. 22,425.6cr.
- 20,000 MW for 8 hours per day round the year, @ Rs. 2.56 per Unit
  = Rs. 14,950.0 cr.

Calculations

- 1KW load used for 1 hour consumes = 1Unit of energy
- 1000KW load(1MW) used for 1 hour = 1000 Units
- 1000 MW load used for 1 hour consumes = 1000×1000 = 10,00000 Units=1MUs
- 20,000 MW load used for 1 hour consumes = 20 MUs
- 20,000 MW load used for 12 hours consumes = 20×12 = 240 MUs
- 20,000 MW load used for 12 hours for 365 days consumes = 240×365=87,600 MUs
- 87,600 MUs @ Rs. 2.56 per unit = 87,600×2.56 = Rs..2,24,256 million
  =Rs.22,425 cr.

6.2 Employment

- Employment generation from 20,000 MW @ 8 skilled/unskilled persons per one MW =1,60,000 persons

Based on national average, with emphasis towards optimal efficiency on the minimum requirement basis.

6.3 Income

After adding the revenue of Rs.22, 425cr.

- NSDP expected to rise from Rs.27,099 cr. to Rs. 46,639

cr.

- Per capita income expected to rise from Rs.26,715 to Rs. 45,978

Calculations

- Total Population of the State (2001) =1,01,43,700
- Actual NSDP at current prices (2007-08 =Rs.27,099 cr.
- Actual Per capita income (2007-08) = Rs.26,715

6.4 Investment

On an average infrastructure cost, in J&K, of setting up of hydel project per one MW is Rs. 6.0 cr.

- Investment required to exploit 20,000 MW = Rs. 1,20,000 cr.
- Investment in dollar terms (assuming exchange rate Rs. 50 = $1) = $4 billion
- On an average about 60-70 percent of the project cost is spent locally especially on civil works including compensation for land acquisition and employment. Therefore, spillover effect on local economy at 65% =Rs. 80,000 cr. ($2.5billion) which can generate a stream of perpetual incomes through multiplier effect
- Out of 20,000 MW, 4000 MW capacity utilization can feed the local actual demand for power equal to 17,520 MUs. Rest of 16,000 MW can be exported to northern neighboring states sufficient to end the power crises.

Calculations

- 1000 MW load used for 1 hour can generate energy = 1MUs
- 1000 MW load used per hour per day can generate energy = 12 MUs
- 1000 MW load used per hour per day for 1 year can generate (12×365) = 4380MUs
- 4000MW load used per hour per day for 1 year can generate (4380×4) =17,520MUs.

7. Conclusion

The State of Jammu and Kashmir bestowed with substantial water resources has the potential to generate hydel electricity sufficient to meet its whole power requirement, along with satisfying the needs of northern Indian states. But due to various political, economic, and administrative reasons this important economic resource has received a serious setback. Some of the main reasons being that the State of Jammu and Kashmir does not possess sovereignty over its water resources due to which major power houses are owned by the centre government, forcing the state governments to purchase power generated from its own resources at exorbitant price. Secondly, because of administrative inertia and corruption the power development departments have become complete loss making enterprises and a burden on the state exchequer. Thirdly, due to unhealthy economic position of the State, power generation has remained a very weak area. Outdated machines and technology continue to be in operation. Fourthly, civil disturbances have also contributed to unfavorable investment climate and, last but not the least, Indus Water Treaty between two neighboring countries India and Pakistan have had a significant impact on the exploitation of water resources. However, exploitation of 20,000 MW is possible on the run of the river waters without violating the provisions of the treaty.

Appendix Tables

Initial Estimates	119 MAF	118 MAF
Initial Indian	29 MAF	90 MAF
Initial Pakistan	Plan	102.5 MAF
Revised Indian	100% Eastern Rivers (Ravi, Sutlej, Beas)+ 7% Western Rivers (Chenab, Jhelum, Indus)	93% Western Rivers None of Eastern Rivers
Revised Pakistani	30% Eastern Rivers, None of Western	100% of Western Rivers + 70% of Eastern Rivers
World Bank	100% Eastern only	100% Western only

Table-1: Indus Water Treaty Estimates & Allocations

Source: http://www.bharat-rakshak.com/SRR/Volume13/sridhar.html dated 17/01/2014

Indus	Jhelum	Chenab	Total
70,000 acres	400,000 acres	231,000 acres	701,000 acres

Table-2: India's Irrigation Entitlements on Western Rivers

Source: http://www.bharat-rakshak.com/SRR/Volume13/sridhar.htm

River Name	General Storage (MAF)	Power Storage (MAF)	Flood Storage (MAF)
Indus	0.25	0.15	NIL
Jhelum	0.50	0.25	0.75
Chenab	NIL	0.60	NIL

Table-3 Storage Allocations to India

Source: http://www.bharat-rakshak.com/SRR/Volume13/sridhar.html

SNo	Name of the River	Potential Identified	Installed Capacity	Energy Generated
1	Jhelum	3576.55 MW	252.60 MW	902.78 MUs
2	Indus	2066.81 MW	14.56 MW	26.338 MUs
3	Ravi	225.00 MW	9.00 MW	14.057 MUs
4	Chenab	10,375 MW	484.30 MW	2911.853 MUs
	All	16,243.33 MW	760.46 MW	3854.526 MUs

Table-4: Power Potential in J&K – River Wise Break-Up (2008-09)

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey, 2012

Jhelum River Basin		Chenab River Basin		Indus River Basin		Ravi River Basin	
Name of Power House	Installed capacity MW (2008-09)	Name of Power House	Installed capacity MW (2008-09)	Name of Power House	Installed capacity MW (2008-09)	Name of Power House	Installed capacity MW (2008-09)
LJHP	105.00	Baghliar	450.00	Satakna	4.00	Sewa-iii	9.00
USHP-1	22.60	Chinani-i	23.30	Sumoor	0.10		
USHP-11	105.00	Chinani-ii	2.00	Bazgoo	0.30		
Ganderbal	15.00	Chinani-iii	7.50	Hunder	0.40		
Karnah	2.00	Baderwah	1.50	Iqbal Bridge	3.75		
Pahalgam	3.00			Igoo Marshelong	3.00		
				Haftal	1.00		
				Marpachoo	0.75		
Total	252.60		484.30		14.56		9.00

Table-5: River wise Installed Capacity of State owned Power Houses
Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey,2012

Name of the power House	Installed Capacity (MW)
NHPC-Salal	690.00
NHPC-Uri-I	480.00
NHPC-Dulhusti	390.00
Sewa-II	120.00
Total	1680.00

Table-6: Installed Capacity of Power Houses Under Central Sector (2009-10)
Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey,2012

S. No	Source	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12 Estimate
1	From Own Generation	870.47	971.34	879.35	1658.59	2101.23	2310.81	2810.94
2	Free Power	700.00	746.30	958.35	982.63	953.79	1061.25	1043.58
3	Total (1+ 2)	1570.47	1717.64	1837.38	2641.22	3055.02	3372.06	3854.52
4	CPSUs NTPC &NHPC)	5714.00	5462.06	5859.89	5721.47	5875.14	5769.33	6067.26
5	Other Sources	552.00	868.61	923.86	972.00	1050.05	1448.61	1658.60
6	Unscheduled Interchanges	79.91	163.52	33.12	-314.46	195.82	-25.91	-207.46
7	Short Term Trading		0.864	52.93	9.34	0.72	0.00	1.68
8	Banking		14.03	45.58	117.63	193.90	103.13	-126.25
9	Total 4 to 8	6345.91	6509.09	6915.38	6505.99	7315.63	7295.16	7393.83
10	Grand Total (3+9)	7916.38	8236.53	8753.08	9147.22	10370.6	10667.2	11248.35

Table-7: Total Availability of Power from All Sources (MUs)

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12 (Estimate)
Unrestricted Energy Requirement*	11343.00	14037.00	14750.00	15656.00	16544.00	17323.00
Restricted Energy Requirement**/ Total Energy Available	8236.53	8753.08	9147.22	10370.6	10667.2	11248.35
Energy Available (Own Generation+ Free Power)	1717.64	1837.38	2641.22	3055.02	3372.06	3854.52
Own Generation including Free Power as Percentage of Unrestricted Energy Requirement	15.14	13.09	17.90		20.38	22.25
Own Generation	20.85	21.00	28.87	29.46	31.61	34.27

including Free Power as Percentage of Restricted Energy Requirement						
Ratio of Restricted to Unrestricted Energy Requirement	72.61	62.35	62.01		64.47	64.94

Table-8: Energy Requirement and Availability (MUs)

Source: Compiled from Directorate of Economics and Statistics, Govt. of J&K, Economic Survey, 2012,

* Refers to the actual power demand without any power curtailments.

** Refers to the power demand with 6 hours curtailment in summer and 10 hours curtailment in winter.

Year	Actual Demand	Power Generated State Sector	Power Purchased Central Sector	Free Power	Total power Supply	Power Deficit	Power Deficit as percentage of Supply
2004-05	9640	745.66	5893.85	672.50	7312.01	2328.00	31.84
2005-06	10503	870.47	6345.91	700.00	7916.65	2586.35	32.67
2006-07	11334	971.34	6509.09	746.30	8226.73	3107.28	37.78
2007-08	14037	879.35	6915.38	958.35	8753.08	5283.92	60.37
2008-09	14750	1658.59	6506.00	982.63	9147.22	5602.78	61.25
2009-10	15656	2101.23	7315.63	953.79	10370.65	5285.35	50.96
2010-11	16544	2310.81	7295.16	1061.25	10667.22	5876.78	55.10
2011-12	17323	2810.94	7393.87	1043.58	11248.39	6074.61	54.00

Table-9: Demand and Supply Gap in MUs (2004-2011)

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

	2008-09	2009-10	2010-11
Expenditure	2064.60	2937.80	3084.06
Revenue	629.83	703.64	1053.44
Operating Deficit/Surplus	-1518.00	-2331.86	-2129.70

Table-10: Operating Deficit/Surplus (2008-2010) Rs. Cr.

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

1. Expenditures
(A) Purchase of Power
(a) Central Sector = Rs.1,996.71cr.

(b) State Sector = Rs.546.70 cr.
Total Purchase = Rs. 2,543 cr.
(B) Operating/ Maintenance/Other Expenses = Rs.394.40
Total Expenditures (A+B) = Rs 2937.80 cr.
2. Revenue
Net Power Available for sale after T&D Losses = 3833 MUs
Revenues from the Sale of 3833 MUs = 703.64 cr.
3. Operating Deficit (2-1) = - 2331.86 cr.

Table-11: Operating Deficit Calculations of J&K PDD (2009-10)

Source: Reproduced from Economic Survey, 2011, Directorate of Economics and Statistics, Government of Jammu and Kashmir

Year	Target	Pure Revenue Realized	Percentage Achievement	Revenue Deficit	Percentage Revenue Deficit
2002-03	458.70	283.37	61.77	175.33	38.22
2003-04	506.36	298.30	58.91	208.06	41.08
2004-05	588.12	344.75	58.62	243.37	41.38
2005-06	735.95	374.59	50.90	361.36	49.10
2006-07	711.64	393.41	55.28	318.23	44.72
2007-08	792.64	591.97	74.68	200.67	25.32
2008-09	1105.00	627.70	56.80	477.30	43.20
2009-10	911.84	702.30	77.02	209.54	22.98
Average			61.70	274.56	38.25

Table-12: Revenue Deficits (2003-2010) Rs. Cr.

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

Year	Total Energy Available (Generated+ Acquired) (MUs)	T&D Losses (MUs)	T&D Loss (%age of total Energy Available)	Net Energy Available (Billed Energy) (MUs)
2005-06	7916.65	3727.83	47.09	4189
2006-07	8226.73	4205.69	51.12	4021
2007-08	8753.08	5421.11	61.94	3332
2008-09	9147.22	5608.48	61.31	3539
2009-10	10370.65	6537.65	63.04	3833

Table-13: Transmission and Distribution Losses

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

Year	Amount Billed	Amount Realized	Collection Efficiency

	(Rs. Cr)	(Rs. Cr.)	(%)
2006-07	593.54	395.26	66.6
2007-08	848.84	591.97	69.7
2008-09	886.88	628.00	75.70
2009-10	928.13	702.30	75.67
2010-11	1180.78	802.82	68.00
2011-12(Estimate)	1457.00	1457.00	100.00

Table- 14: Collection Efficiency Estimates

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

Year	Total Energy Input (MUs)	Energy Realized (MUs)	AT&C Losses (MUs)	AT&C Losses (%)
2006-07	8236.53	2676.26	5560.27	67.5
2007-08	8753.08	2416.20	6336.88	72.3
2008-09	9147.22	2633.12	6514.10	71.2
2009-10	10370.65	2902.07	7468.58	72.0
2010-11	10667.22	2749.38	7917.84	74.2
2011-12(E)	11248.39	4699.12	6549.27	58.2

Table-15: Aggregate Transmission and Commercial Losses

Source: Directorate of Economics and Statistics, Govt. of J&K, Economic Survey (Various Issues)

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