Electricity Purchase and Sales Performance in Gujarat with reference to Gujarat Urja Vij Nigam Limited

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Abstract

The Gujarat Urja Vikas Nigam Limited (GUVNL) is serving and provide electricity facility in throughout Gujarat state. This research paper contains the performance of GUVNL in Gujarat. The evaluate part cover points like profit of the company, selling of power of company, purchase of power of company, gas and thermal power generation. How GUVNL getting benefits from the various sources and how power generated and sell by the company.

Key words: Energy, Power, Gujarat Urja Vikas Nigam Limited (GUVNL), Gujarat Electricity Industry

1. Introduction

The Gujarat Urja Vikas Nigam Limited (GUVNL) is an electrical services umbrella company in the state of Gujarat, India (Wikipedia, 2014). It was set up in May 1999 and is registered under the Companies Act, 1956. The Company was created by the Gujarat Electricity Board (GEB) as its wholly owned subsidiary in the context of liberalization and as a part of efforts towards restructuring of the power sector with the aim of improving efficiency in management and delivery of services to consumers. As a part of Power Reform Process, the Electricity Act, 2003, was passed by the Central Government and Gujarat Electricity Industry (Re-organization & Regulation) Act, 2003, was passed by the Government of Gujarat to restructure the Electricity Industry with an aim to improve efficiency in management and delivery of services to consumers. Under the provisions of the said Acts Govt. of Gujarat framed the Gujarat Electricity Industry Re-organization & Comprehensive Transfer Scheme, 2003, (the Transfer Scheme) vide Government Notification dated 24-10-2003 for transfer of assets/liabilities etc. of erstwhile GEB to the successor entities. Accordingly erstwhile Gujarat Electricity Board (GEB) was reorganized effective from 1 April 2005 into Seven Companies with functional responsibilities of Trading, Generation, Transmission and Distribution etc.

Subsidiary Companies of GUVNL are (Wikipedia, 2014) Gujarat State Electricity Corp. Ltd. (GSECL) for generation, Gujarat Energy Transmission Corp. Ltd. (GETCO) for transmission, Uttar Gujarat Vij Company Ltd. (UGVCL) for distribution, Dakshin Gujarat Vij Company Ltd. (DGVCL) for distribution, Madhya Gujarat Vij Company Ltd. (MGVCL) for distribution, and Paschim Gujarat Vij Company Ltd. (PGVCL) for distribution.

The Gujarat Urja Vikas Nigam Limited was incorporated as a Govt. of Gujarat Company. Since 100% shares in the other six companies are held by GUVNL w.e.f. 1 April 2005, they have become subsidiary companies of GUVNL as per the provisions of the Companies Act, 2013. The GUVNL is engaged in the business of bulk purchase and sale of electricity, and supervision,

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co-ordination and facilitation of the activities of its six subsidiary companies. The GSECL is engaged in the business of generation of electricity. The GETCO is engaged in the business of transmission of electricity. The UGVCL, DGVCL, MGVCL and PGVCL are engaged in the business of distribution of electricity in the Northern, Southern, Central and Western areas of Gujarat respectively.

With the advent of the Electricity Act 2003 and various policy initiatives thereof, it has now become mandatory to reduce the cross subsidy and move the tariffs in the State towards the "Cost of Service". Traditionally, in the Indian context, tariffs for domestic and agricultural consumers have been heavily subsidized either by the state through subsidies and subventions or through cross subsidization by other consumer categories, primarily the consumers using electricity at high voltages. The tariffs for reduction of cross subsidy were measured as a percentage of cost of supply. However, the focus has to shift to cost-reflective tariffs, therefore, it has now become imperative to compute the cost to serve to individual consumer categories and the gradual reduction of the cross subsidies. A basic principle that has been widely accepted in electricity sector regulation is that the tariffs for various categories of customers should be, as far as practicable, equal to the costs imposed by that category of customers on the system. As per Section 61 (g) of Electricity Act, 2003: "That the tariff progressively reflects the cost of supply of electricity and also, reduces and eliminates cross-subsidies within the period to be specified by the Appropriate Commission." The Electricity Act, 2003 envisages non-discriminatory open access to transmission and distribution networks of the licensees.

As per the Act, open access may be allowed before the cross subsidies are eliminated on payment of a surcharge in addition to the charges for wheeling as may be determined by the State Commission. The act also envisages progressive reduction of cross subsidies in a manner as may be specified by the State Commission. Also, the GERC in its last Tariff Order has directed all the four Discom's that the data of cost of service to be updated to the current year so as to evaluate the amount of cross-subsidy prevailing in the tariff. In relation to this, Gujarat Urja Vikas Nigam Limited (GUVNL) has mandated CRISIL Risk and Infrastructure Solutions Limited to conduct and update the cost of service study for each distribution company namely – DGVCL, MGVCL, PGVCL and UGVCL and also consolidated report of all four Discom's.

Functions of GUVNL: (Wikipedia, 2014) The company was incorporated to take over the assets, liabilities and personnel of the GEB in accordance with Schedule GEB of the Main Transfer Scheme Notification dated 24 October 2003. The Company has to carry out the residual functions (including power trading) of the defunct GEB. One of the functions of the Company includes coordination of the activities of its subsidiaries, business, and works to determine their economic and financial objectives and targets and to review, control, guide and directs their performance with a view to secure optimum utilization of all resources placed at their disposal.

1.2 Objectives of the Study

- To know the performance of purchase of power through various sources in last few years.
- To know the performance of selling of power to its subsidiaries and others in last few years.
- To check the correlation between Selling and Purchases of GUVNL in last few years.

2. Review Literature

Power Investment in Gujarat, India (Hansen, 2008)

India is facing a confluence of forces in the power sector; high demand for electricity, ageing power infrastructure, a new regulatory climate and newly discovered, large supplies of natural gas. With annual GDP recently growing between seven and nine percent, and inter-fuel substitution away from traditional sources to electricity (Ghosh 2002), electricity demand growth has been rapid. Historically, power demand grows between 1.5 to 2.0 times faster than GDP during the period 1980-2000. Therefore, with annual GDP growth expectations of more than seven percent for the next several years, peak and total power demand is likely to increase by more than 10 percent per year (MoP 2007). To meet this demand, a broad range of technologies and fuels are available. The long lifetimes of power sector capital investment means that decisions now will have long-term implications for the Indian economy and the development of a sustainable and reliable energy portfolio. This paper sets out a pragmatic strategy that could help overcome the structural and political problems hindering more power sector investment in India. The case of Gujarat is examined in detail because the high existing penetration of captive power in industry makes it an ideal candidate for "bottom up reform" to take hold most quickly.

The Indian electricity supply industry (ESI) will need to grow to help sustain a path of seven percent GDP growth, and the government will be under pressure to deliver better results. However, past performance suggests that a government-only solution will not be adequate and increased private participation in the ESI is needed. The India Planning Commission has responsibility for laying out the total capacity addition targets for the country in its five year plans. In the 9th Plan (1997-2002) the Commission set a target of 40,000MW, but achieved only 19,000MW. In the 10th Plan (2002-2007) an expanded target of 43,000MW was set. Industry observers agree that the targets have historically been overly optimistic and will likely continue to be missed by approximately 50 percent in each plan. The most obvious causes are limited resources for investment by the government and the highly indebted position of the SEBs, and have been well described in the literature. Both plan periods include a heavy reliance on private sector investment to achieve "adequate" capacity. However, they rely on the state sector as the primary buyer of generation output. Unfortunately, this centrally planned model depends on the already exposed financial position of the SEB's. IPP investment during the 9th and 10th plans has been sparse, principally because the state-owned utilities have not been reliable buyers for merchant plant power.

Distribution Reforms in Gujarat Using Private Sector Franchising (Hansen, 2008)

The GEB has begun to take action to address transmission problems by applying APDRP funds to reduce losses and increase metering. In addition, the GEB has put out tenders for private sector participation in selected distribution circles, but many unresolved issues about how capital expenditures, manpower and revenue sharing will be handled have yet to be negotiated and implementation will be slow. In the words of the GEB Member for Finance:"[franchisee distribution companies] are being explored [as an idea] so that we know who is in our backyard" (Joshi 2004). Private sector involvement in distribution is anticipated in Gujarat and the SEB is trying to control the process through a programme of tenders and thus show the GERC that it is open to private investment. However, even if the franchisee model comes to fruition, all power purchases will be from the GEB and no direct bi-lateral supply contracts between generation and consumers will be allowed. This ensures captive customers for the GEB and reduces

competition. A more proactive approach is needed to encourage real competition and the enabling legislation has now been passed by the national government in the form of the 2003 Electricity Act, which is discussed in the next section.

Independent Power Producers (Bayliss & Hall, 2000)

Increasingly governments are turning to the private sector for power generation. Some developing countries started allowing private firms to enter electricity generation at the beginning of the 1990s. Investment by Independent Power Producers (IPPs) grew rapidly – particularly in Asia. While expansion faltered following the financial crisis in the region, IPPs have been gaining ground in other parts of the world. Africa, South and Central America as well as Eastern Europe have all opened the door to IPPs in some way or another. IPPs are presented as an attractive option because they are supposed to facilitate investment where a bankrupt public sector can barely afford to make ends meet; and because they allow the private sector to operate without the need for lengthy regulations to be in place beforehand, the conditions of operating can be specified in the terms of the IPP contract. IPPs are heralded as the start of further liberalization and subsequent privatization of electricity. However, more and more governments are running into difficulties with IPPs. In the countries where they have been established for some time, such as Pakistan and Indonesia, IPPs have been the subject of protracted legal, political and economic battles. Other countries have seen electricity utilities crippled by payments due to IPPs, for example, the Philippines and Dominican Republic. Others have questioned the generous terms offered to power producers by previous governments and have attempted to limit the damage such arrangements might cause for example, Croatia and Hungary. Despite these difficulties, more IPPs are still being planned in various countries.

3. Research Methodology

This researcher has taken GUVNL's purchases, sales and power generation data of last four years as per availability (2008-09, 2009-10, 2010-11 & 2011-12). For this research paper, secondary data has been taken from GUVNL's annual reports. Data is related with Gujarat State Electricity Department base. For hypotheses testing, statistical tool of ANOVA (Analysis of Variance) has been used because various kinds of subsidiaries and other companies are associated with it and performance has fluctuated every year. As it was of interest to investigate two factors at a time, hence two way ANOVA test has been used to check the year-wise and company-wise performance. By testing the significance of difference between more than two sample means (we make use of table value of 'F') and analyzing the significance of difference (if any) we test our hypothesis. ANOVA test calculation results have been explained at 5% level of significance. The answer of ANOVA calculation and the statistic table value is compared and on that basis if, F calculation is less than F-table value then H_0 hypothesis may be accepted. If F calculation is greater than F-table value then H_0 hypothesis may be rejected. To evaluate the correlation between sales and purchases of GUVNL, statistical formula for the same has been used. All tests were carried out manually.

List of Hypotheses

1) H_0=There is no significant difference in year-wise purchase of power.
H_1= There is significant difference in year-wise purchase of power.

2) H_0=There is no significant difference in supplier-wise purchase of power.

H_1= There is significant difference in supplier-wise purchase of power.

3) H_0=There is no significant difference in year-wise sale of power.
H_1= There is significant difference in year-wise sale of power.

4) H_0=There is no significant difference in Subsidiary-wise sale of power.
H_1= There is significant difference in Subsidiary-wise sale of power.

5) H_0=There is no negative correlation between purchases and sale of GUVNL in last few years.
H_1= There is negative correlation between purchases and sale of GUVNL in last few years.

Hypotheses Testing:

For hypotheses testing ANOVA statistical test is used as indicated below and its result shows GUVNL's performance. All the hypotheses have been tested number-wise.

Test of hypotheses No. 1 and 2

1) H_0=There is no significant difference in year-wise purchase of power.
H_1= There is significant difference in year-wise purchase of power.

2) H_0=There is no significant difference in supplier-wise purchase of power.
H_1= There is significant difference in supplier-wise purchase of power.

Table No.1 Purchase of Power (in Thousand MUs)

Years	Name of Suppliers				Total
	Central Sector	State Sector	IPPs	Others	
2008-09	16.372	30.519	5.653	3.227	55.771
2009-10	18.072	31.095	6.857	3.722	59.746
2010-11	16.872	30.268	11.244	2.088	60.472
2011-12	18.172	30.728	13.881	3.046	65.827
	69.488	122.61	37.635	12.083	241.816

(Sources: Annual Reports of the GUVNL)

Table No. 2.Two Way ANOVA Test

Variation	d. f.	SS	MSS	F
Year Wise	3	12.827	4.275	F1= 4.275/3.887 =1.099
Subsidiary Wise	3	1701.25	567.08	F2 = 567.08/3.887 =145.89
Deviation	9	34.983	3.887	
Total	15	--		

Result of Hypotheses Testing 1 and 2

1) F1cal < F1tab, (9, 3) Degree of Freedom at Significance Level of 5%
1.099 < 3.86 Calculation value is lesser than table value hence H_0 Hypothesis is accepted, therefore, H_0=There is no significant difference in year-wise purchase of power.

2) F2cal > F2tab, (9, 3) Degree of Freedom at Significance Level of 5%
145.89> 3.86 Calculation value is greater than table value hence, H_0 Hypothesis is rejected, therefore, H_1= There is significant difference in supplier-wise purchase of power.

Interpretation:
From the first Hypothesis, result shows that there is no significant difference year-wise purchase of power by GUVNL, which is maintained and managed is specific manner by the company. And the result of the second Hypothesis shows that there is significant difference in supplier-wise purchase of power made by GUVNL. This should be maintain and managed by the company at an equitable level. So, in crucial times the company can easily get all available power from the available sources and try more number of suppliers for purchasing of power.

Test of hypotheses No.3 and 4

3) H_0= There is no significant difference in year-wise sale of power.
H_1= There is significant difference in year-wise sale of power.

4) H_0= There is no significant difference in Subsidiary-wise sale of power.
H_1= There is significance difference in Subsidiary-wise sale of power.

Years	Name of Subsidiary				Total
	DGVCL	UGVCL	PGVCL	MGVCL	
2009-10	11	16	21	07	55
2010-11	12	17	23	09	61
2011-12	13	18	25	09	65
	36	51	69	25	181

Table No. 3. Sale of Power (in Thousand MUs)

(Sources: Annual Report of the GUVNL)

Table No. 4. Two Way ANOVA Test

Variation	d. f.	SS	MSS	F
Year Wise	2	12.67	6.335	F1= 6.335/0.33 =19.19
Subsidiary Wise	3	364.25	121.41	F2= 121.41/0.33 =367.90
Deviation	6	2	0.33	
Total	11	378.92		

Result of Hypothesis Testing 3 and 4

3) F1cal < F1tab, (6, 2) Degree of Freedom at Significant Level of 5%
19.19 < 19.31 Calculated value is lesser than table value hence H_0 Hypothesis is accepted, therefore, H_0=There is no significant difference in year-wise sale of power.

4) F2cal > F2tab, (6, 3) Degree of Freedom at Significant Level of 5%
367.90> 8.94 Calculated value is greater than table value hence H_0 Hypothesis is rejected, therefore, H_1= There is significance difference in Subsidiary-wise sale of power.

Interpretation:
From the third Hypothesis, result shows that there is no significant difference in year-wise sale of power by GUVNL, which is maintained and managed is specific manner by the company. And the result of fourth Hypothesis shows that there is significant difference in GUVNL's subsidiary-wise sale of power. For its betterment, the Company should increase its year-wise growth rate of sale of power and try to strike a balance between sales of power by its subsidiaries. It should also try to increase the number of subsidiaries for the betterment of the company.

Test of hypotheses No. 5

5) H_0=There is no negative correlation between purchases and sale by GUVNL in last few years.
H_1= There is negative correlation between purchases and sale by GUVNL in last few years.

Table No. 5 Correlation between Purchases of GUVNL and Sales of GUVNL (in MUs)

	Particulars	**2007-08**	**2008-09**	**2009-10**	**2010-11**
X	Purchases of GUVNL	53889	55771	59746	64654
Y	Sales of GUVNL	53610	55586	59601	64645

(Source: Annual Reports of the GUVNL)

Table No.6. Rank Correlation

X	Y	R_x	R_y	D (R_x-R_y)	D^2
53889	53610	4	4	0	0
55771	55586	3	3	0	0
59746	59601	2	2	0	0
64654	64645	1	1	0	0

$Ed^2 = 0$

Formula of Rank Correlation **(R)** $= 1 - \frac{6Ed^2}{n(n^2-1)}$

$$= 1 - \frac{6 \times 0}{4(4^2-1)} = 1 - \frac{0}{4(16-1)} = 1 - \frac{0}{4(15)} = 1 - \frac{0}{60}$$

$= 1 - 0$

R= + 1.00 shows positive relationship between sale and purchasing of GUVNL

Result of testing of Hypothesis no. 5
Hence, here H_0 Hypothesis is accepted, therefore, there is no negative correlation between purchases and sale of power by GUVNL in last few years.

Interpretation:
From the ninth Hypothesis test result shows that GUVNL does not have any negative correlation between purchases and sale of power by GUVNL in last few years. Company should maintain and manage this positive relation for smooth operation.

4. Conclusion

In Gujarat, the erstwhile Gujarat Electricity Board (GEB) was recast into a company called GUVNL in May, 1999. It has seven subsidiaries. This Company mainly performs the functions of purchasing and selling the electrical power. The main focus of this study is on the performance of the company in last few years. It has been found that in the case of purchase of power, year-wise performance is good but supplier-wise performance is not satisfactorily. So, it is recommended from the study that company should find out new suppliers and try to increase purchase of power from more number of suppliers. In the case of selling also the situation is very similar to the case of purchasing. The year-wise performance is good but its subsidiary-wise performance is not satisfactory. So, it can be recommended from my study that company should try to increase the number of subsidiaries for selling of power. An evaluation of the correlation between purchasing and selling of the company shows that there is positive correlation and the company should try to maintain the same in future.

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Abbreviations:

DGVCL : Dakshin Gujarat Vij Company Limited
Discom : Distribution Company
EA 2003 : Electricity Act, 2003
ESI: Electricity Supply Industry
GERC : Gujarat Electricity Regulatory Commission
GoG : Government of Gujarat
GUVNL : Gujarat Urja Vij Nigam Limited
MGVCL : Madhya Gujarat Vij Company Limited
MU : Million Unit
MW : Mega Watt
O&M : Operation & Maintenance
PGVCL : Paschim Gujarat Vij Company Limited
UGVCL : Uttar Gujarat Vij Company Limited
IIP: Independent Power Producers