NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
ISLAMIC REPUBLIC OF PAKISTAN

PERFORMANCE EVALUATION REPORT

OF

PUBLIC SECTOR GENCOs

Based on

PERFORMANCE STANDARDS (GENERATION) RULES (PSGR) 2009

For

FY 2014-15 and 2015-16

Jamshoro Power Company Limited (GENCO-I)

Central Power Generation Company Limited (GENCO-II)

Northern Power Generation Company Limited (GENCO-III)

Lakhra Power Generation Company Limited (GENCO-IV)

Table of Contents

EXECUTIVE SUMMARY

National Electric Power Regulatory Authority (NEPRA) regulates the power sector in Pakistan and protection of consumers' interest is an integral part of NEPRA's regulatory regime. In this regard, apart from monitoring performance of transmission and distribution licensees, NEPRA also monitors the performance of generation licensees.

NEPRA framed Performance Standards Generation Rules (PSGR) back in 2009. Under PSGR, each generation company is required to submit a Quarterly Performance Report to NEPRA as per the format prescribed in the PSGR. The data provided by generation licencees is reviewed and analyzed on regular basis. This Performance Evaluation Report (PER) is based on the quarterly reports submitted by public sector GENCOs for the fiscal years 2014-15 and 2015-16. The report highlights the performance of public sector GENCOs on the basis of parameters namely, Auxiliary Consumption, Standby Mode, Planned/Unplanned Outages, Availability Factor, Net Capacity Factor, Net Output Factor and Energy Availability Factor.

Auxiliary Consumption: The data provided by generation companies reflects that during the years 2014-15 and 2015-16, all GENCOs consumed excess auxiliary power over the allowed limit with an energy loss of around **668 Mln.kWh** during service mode. It is pertinent to mention here that TPS Muzaffargarh (GENCO-III) contributed almost half of this loss.

Standby Mode: The data provided by GENCOs shows that certain gas based power stations such as GTPS Kotri, GTPS Faisalabad and SPS Faisalabad remained on standby mode for most part during the years 2014-15 and 2015-16 thereby squandering the potential to generate significant amount of economically efficient energy. On top of that, the units/machines of GENCO-I, II &III have drawn around **382 Mln.kWh** energy during standby mode under the head of auxiliary power consumption. Almost **82%** of the total energy consumption under standby mode was contributed by GTPS Faisalabad (GENCO-III).

Planned and Unplanned Outages: The data submitted by GENCOs for the period under review indicates that few units/machines of TPS Jamshoro (GENCO-I), TPS Guddu & Guddu 747 CCPP (GENCO-II) and TPS Muzaffargarh, GTPS Faisalabad, SPS Faisalabad & CCPP Nandipur (GENCO-III) have violated the allowed limit of total outages (planned/unplanned) as per their respective Power Purchase Agreements (PPAs) signed with the NTDC. Had this limit not been exceeded by aforementioned machines and had they remained in operation during that period, a huge amount of energy i.e. around **14109 Mln. kWh** could have been produced by them.

Availability Factor (AF): The data submitted by GENCOs shows that, on average, the AF for TPS Guddu (GENCO-II) remained quite low during the period under review i.e. only 43% in 2014-15 and 45% in 2015-16, vis-à-vis, guaranteed availability of 80% as per PPA. Similarly, Combined Cycle Power Plants such as Guddu 747 and Nandipur could not achieve the guaranteed availability as specified in their respective PPAs due to huge number of planned and unplanned outages. The AF for Nandipur power plant remained around 71% in 2015-16 against the guaranteed availability of 82%, whereas, the AF for Guddu 747 remained around 65% against the guaranteed availability of 80%. Lakhra Power Station (GENCO-IV) showed the worst results in this regard as its AF remained at mere 26% in 2014-15 and 25% in 2015-16.

It is also pertinent to mention here that although, the availability factor of GTPS Kotri, GTPS Faisalabad and SPS Faisalabad seems within the acceptable range, but most of the time, these power stations remained on standby mode due to which their potential was not utilized.

Net Capacity Factor (NCF): While reviewing the results of NCF, it has been observed that, on an average, the NCF for TPS Guddu, GTPS Faisalabad, SPS Faisalabad and Lakhra Power Station remained quite low i.e. 2% - 22% during the FY 2014-15 and 2015-16, implying that most of the time, these power stations remained either on standby mode or planned/unplanned outage mode during the subject period.

Net Output Factor (NOF): The data provided by GENCOs shows that, on an average, the NOF for TPS Guddu remained very low i.e. only 36% during the FY 2015-16. The reason of this worst productivity is the non-contribution of energy by Unit # 2, 4, 9 and 13, having a combined net capacity of 460 MW, as these units remained on unplanned outage mode during the entire FY 2015-16. This clearly speaks of poor management and lack of technical expertise on GENCO-II's part.

Energy Availability Factor (EAF): After reviewing the data, it has been noted that the EAF is not equal to the AF in case of TPS Jamshoro, TPS Guddu, TPS Muzaffargarh and SPS Faisalabad, which shows that their net capacity was temporarily reduced due to equivalent planned & unplanned de-ratings during the reported period.

The following table highlights the **unit rate** at which energy was procured by CPPA-G from different power stations of public sector GENCOs during the period under review i.e. 2014-15 and 2015-16.

GENCO	Power Station	Fuel Type	Unit Rate (Rs./kWh)	
			2014-15	2015-16
I	TPS Jamshoro	RFO	13.9	8
	GTPS Kotri	Gas	6.7	7.1
II	TPS Guddu	Gas	6.1	6.8
	Guddu 747	Gas	5.4	5
III	TPS Muzaffargarh	RFO	14.8	8.9
	GTPS Faisalabad	Gas	5.2	6.1
	SPS Faisalabad	RFO/Gas	21.1	9.9
	CCPP Nandipur	RFO	-	7.3
IV	Lakhra PS	Coal	4.6	4.6

It is evident from above table that the per unit rate of RFO-based power plants, such as TPS Jamshoro and TPS Muzaffargarh, considerably reduced in 2015-16 as compared to 2014-15. Despite this significant decline in per unit rate, the average utilization factor of these power plants remained low during 2015-16, i.e. **57**% for TPS Jamshoro and **48**% for TPS Muzaffargarh. Similarly, the per unit rate of gas-based power plants, such as TPS Guddu and GTPS Faisalabad remained in the range of 5 to 7 Rs/kWh but the average utilization factor of these power stations also remained very low during 2015-16, i.e. only **11**% for TPS Guddu and **15**% for GTPS Faisalabad. This indicates that the benefits of reduction in fuel prices were not utilized.

In a nutshell, the data provided by GENCOs presents a poor state of affairs at GENCO's power stations resulting from equipment deterioration, lack of scheduled & preventive maintenance, insufficient technical expertise and poor management. Hence, there is a need to improve the performance of GENCOs since they can contribute a significant share to the total energy requirements of the country.

PERFORMANCE STANDARDS GENERATION RULES (PSGR) 2009

1. Performance Standards (Generation) Rules (PSGR) 2009

In exercise of the Powers conferred by and clause (k) of section 46 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997), read with clause (c) of sub section (2) of section 7 and section 34 thereof, the National Electric Power Regulatory Authority (NEPRA), with the prior approval of the Federal Government, is pleased to make the following Rules to ensure that the electric generation facilities and power plants are efficiently operated to further ensure electrical service reliability and adequacy to the transmission and distribution service provider within prescribed parameters of Performance Standards (Generation) Rules (PSGR) 2009.

Quality of Supply - Rule 3 of PSGR 2009 states that "In order to maintain Performance Standards, the generation facilities are required to ensure that the voltage and frequency of electricity supplied to recipients shall be within normal operation limits contained in the 'applicable documents' as defined in clause (iv) of sub rule 1 of rule 2 NEPRA Licensing (Generation) Rules, 2000, rules 7 & 8 of NEPRA Performance Standards (Transmission) Rules 2005 and NEPRA clauses (d) & (e) of the rule 4 of Performance Standards (Distribution) Rules 2005".

Data Requirement - Rule 4 of PSGR 2009 states that "As part of Generator Performance Data System, the licensee shall calculate the following key indicators and others as indicated in Forms I and II to these rules for its generating facilities and submit on regular basis, a report to the Authority under sub-rule (2) of rule 5, namely:-

(a) Energy Loss Rate (ELR)
(b) Energy Availability Factor (EAF)
(c) Equivalent Planned Outage Factor (EPOF)"

Reporting Requirement - Rule 5 (2) of PSGR 2009 states that "Reports required for the key indicators under rule 4 shall be submitted on quarterly basis and the first report thereof shall be due after the publication of these rules in the official Gazette.

INTRODUCTION

2. INTRODUCTION:

2.1 Jamshoro Power Company Limited (JPCL) - GENCO-I:

The Generation License was issued to Jamshoro Power Company Limited (GENCO-I) by NEPRA on July 01, 2002 for the period of nineteen (19) years bearing Generation License number GL/01/2002. The license was first modified on April 16, 2014 in order to discontinue the operation of Units 1 & 2 of GTPS Kotri and later on August 11, 2014 in order to set up a 1320 MW Coal Fired Power Plant at Jamshoro.

GENCO-I consist of three Thermal Power Plants, located at Jamshoro & Kotri in Sindh Province, with the total installed capacity of 2344 MW.

The details of GENCO-I Power Plants as specified in latest modified license issued on August 11, 2014 are as under;

A. TPS Jamshoro (1-4):

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
ST-1	250	200	14	Furnace Oil	M/s. Mitsui, Japan
ST-2	210	170	14	Gas/Furnace Oil	M/s. CMEC, China
ST-3	210	170	14	Gas/Furnace Oil	M/s. CMEC, China
ST-4	210	170	15	Gas/Furnace Oil	M/s. CMEC, China
Total	**880**	**710**			

Table 1

B. TPS Jamshoro (5-6):

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
5	660	660	30	Imported/Local Coal	M/s Siemens/Harbin China
6	660	660	30	Imported/Local Coal	M/s Siemens/Harbin China
Total	**1320**	**1320**			

Table 2

Since, Unit 5 & 6 of JPCL will be expectedly commissioned on Dec 31, 2018 and Dec 31, 2019 respectively, therefore, the analysis of these units will be carried out after COD.

C. GTPS, Kotri:

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
GT-3	25	22	2	Gas, HSD	M/s. Thom B.V. Holland
GT-4	25	22	2	Gas, HSD	M/s. Thom B.V. Holland
CC-5	25	22	4	Gas, HSD	M/s. Hitachi Japan
GT-6	25	22	4	Gas, HSD	M/s. Hitachi Japan
U-7 CC	44	44	13	Combined Cycle Technology	M/s. HPEEC China & M/s. CockrillMech: Indus Belgium.
Total	**144**	**132**			

Table 3

2.2 Central Power Generation Company Limited (CPGCL) - GENCO-II:

The Generation License was issued to Central Power Generation Company Limited (GENCO-II), Guddu by NEPRA on July 01, 2002 for the period of fifteen (15) years bearing Generation License number GL/02/2002. The license was modified on April 26, 2013 in order to allow the installation of 776.70 MW Combined Cycle Power Plant (CCPP), hence increasing the total installed capacity of GENCO-II from 1655 MW to 2431.70 MW.

Following is the brief overview of the GENCO-II Power Stations as mentioned in latest modified license issued on April 26, 2013.

A. Thermal Power Station Guddu (1-13):

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
1	110	85	5-6	Gas	Czechoslovakia
2	110	85	5-6	Gas	Czechoslovakia
3	210	180	0	Gas +F. Oil	Russia
4	210	180	3	Gas +F. Oil	China
5	100	85	5	No Fuel	U.S.A
6	100	85	5	No Fuel	U.S.A
7	100	95	5	Gas	U.S.A
8	100	95	5	Gas	U.S.A
9	100	95	5	Gas	U.S.A
10	100	95	5	Gas	U.S.A

11	136	130	12	Gas	Germany
12	136	130	12	Gas	Germany
13	143	140	12	No Fuel	Germany
Total	**1655**	**1480**			

Table 4

B. Thermal Power Station Guddu (14-16):

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
1	255.60	243	30	Gas + HSDO	General Electric
2	255.60	243	30	Gas + HSDO	General Electric
3	265.50	261	30	Gas + HSDO	China
Total	**776.70**	**747**			

Table 5

2.3 Northern Power Generation Company Limited (NPGCL) - GENCO-III:

The Generation License was issued to Northern Power Generation Company Limited (NPGCL) GENCO III by NEPRA on July 01, 2002 for the period of fifteen (15) years bearing Generation License number GL/03/2002. The license was first modified on April 18, 2014 in order to discontinue the operation of Units 1, 3 & 4 of NGPS Multan and later on Oct 31, 2014 in order to allow the installation of Combined Cycle Power Plant at Nandipur.

Presently, GENCO-III consists of four power stations (i.e. Thermal Power Station (TPS) Muzaffargarh, Gas Turbine Power Station (GTPS) Faisalabad, Steam Power Station (SPS) Faisalabad and Combined Cycle Power Plant (CCPP) Nandipur with a total installed capacity of 2291.65 MW.

Following is the brief overview of GENCO-III Station's information, as mentioned in the original and latest modified license issued on Oct 31, 2014.

A. Thermal Power Station (TPS) Muzaffargarh:

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
ST-1	210	200	19	Gas, F. Oil	M/s T.P.E. USSR
ST-2	210	200	19		
ST-3	210	200	19		
ST-4	320	300	19		
ST-5	200	200	19		
ST-6	200	200	19		
Total	**1350**	**1300**			

Table 6

B. Gas Turbine Power Station (GTPS) Faisalabad

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
GT-1	25	19	0	Gas, HSD	M/s AEG, KANIS Germany
GT-2	25	19	0		
GT-3	25	19	0		
GT-4	25	19	0		
GT-5	25	19	0		
GT-6	25	19	0		
GT-7	25	19	0		
GT-8	25	19	0		
CC-9	44	38	0		
Total	**244**	**190**			

Table 7

C. Steam Power Station (SPS) Faisalabad

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
ST-1	66	50	0	Gas, F.O	M/s Westing House USA
ST-2	66	50	0		
Total	**132**	**100**			

Table 8

Although, the remaining life of Units of GTPS & SPS Faisalabad has been expired but since these have not yet been de-commissioned, therefore, these power stations are considered in this report.

D. Combined Cycle Power Plant (CCPP) Nandipur:

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
GT-1	122.1	110.6	30	F. Oil, Gas	M/s General Electric
GT-2	122.1	110.6	30		M/s General Electric
GT-3	122.1	110.6	30		M/s General Electric
ST-4	199.35	194.49	30		M/s Dong Fong, China
Total	**565.65**	**526.29**			

Table 9

2.4 Lakhra Power Generation Company Limited (LPGCL) - GENCO-IV:

The Generation License was issued to Lakhra Power Generation Company Limited (GENCO-IV), by NEPRA on February 18, 2005 for the period of fifteen (15) years bearing Generation License number GL/06/2005. The Thermal Power station (TPS) Lakhra, GENCO-IV, has total combined capacity of 150 MW. Lakhra Power Plant consists of three (03) steam turbines. Following is the brief overview of GENCO-IV Power Stations as mentioned in license.

Unit	Installed Capacity (MW)	De-rated Capacity (MW)	Remaining Life (Years)	Fuel Type	Make
1	50	40	15	Lignite Coal	M/s Dongfong Electric Corporation China
2	50	40	15	Lignite Coal	M/s Dongfong Electric Corporation China
3	50	40	15	Lignite Coal	M/s Dongfong Electric Corporation China
Total	**150**	**120**			

Table 10

2.5. REPORTING:

As per **Rule 5(2)** of Performance Standards (Generation) Rules (PSGR)-2009:

> Reports required for the key indicators under **rule 4** shall be submitted on quarterly basis and the first report thereof shall be due after the publication of these rules in the official Gazette.
>
> Rule 4: As part of Generator Performance Data System, the licensee shall calculate the following key indicators and others as indicated in Forms I & II to these rules for its generating facilities and submit on regular basis, a report to the Authority under **sub-rule (2) of rule 5**, namely:-
>
> (a) Energy Loss Rate (ELR):
> (b) Energy Availability Factor (EAF)
> (c) Equivalent Planned Outage Factor (EPOF)

Accordingly, the quarterly reports for the years 2014-15 & 2015-16 were submitted by Jamshoro Power Company Limited (GENCO-I) Central Power Generation Company Limited (GENCO-II), Northern Power Generation Company Limited (GENCO-III) and Lakhra Power Generation Company Limited (GENCO-IV).

The same have been evaluated by the Standards Department as per requirements of the (PSGR) 2009 and a comprehensive analysis has been carried out.

INTER-COMPARISON OF GENCOs

3. Inter Comparison of GENCOs

3.1 w.r.t Availability Factor:

AVAILABILITY FACTOR (%)				
Name of Power Station	2014-15	Guaranteed Availability as per PPA	2015-16	Guaranteed Availability as per PPA
GENCO-I				
TPS Jamshoro	78	72.5	73	69.5
GTPS Kotri	95	83	90	83
GENCO-II				
TPS Guddu (1-13)	43	80	45	83
TPS Guddu (14-16)	65	83	66	77
GENCO-III				
TPS Muzaffargarh	85	83	77	83
GTPS Faisalabad	92	85	81	85
SPS Faisalabad	92	83	66	83
CCPP Nandipur	-	-	71	82
GENCO-IV				
Lakhra FBC PS	26	-	25	-

Table 11

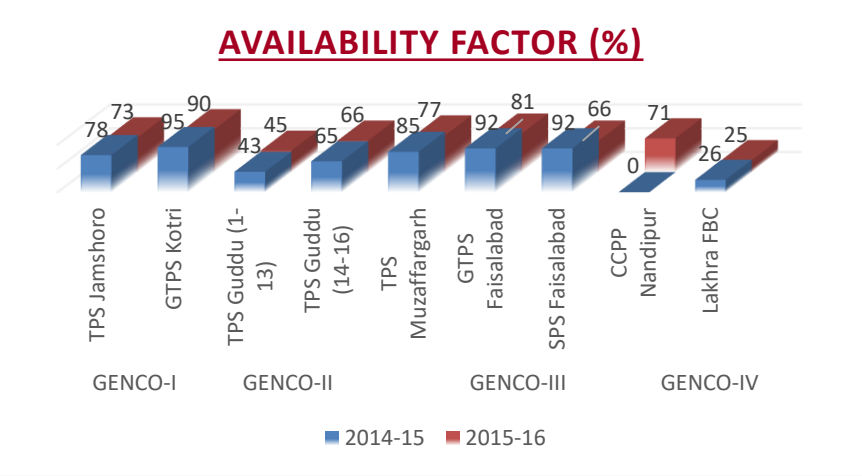

Figure 1

The Availability Factor (AF) for a power generating unit is the ratio of Available hours to the Period hours. It means that the AF indicates the amount of time that a unit/machine remained available for generating power in a given time period.

In our case, the Availability Factor of GENCO-I Power Stations i.e.TPS Jamshoro & GTPS Kotri has decreased in 2015-16 by 5% as compared to 2014-15 due to increase in duration of total outages by 5%. However, the same is well above the guaranteed availability as specified in PPA.

Whereas, the Availability Factor of GENCO-II Power Stations i.e. Guddu (1-13) & Guddu (14-16) has slightly increased in 2015-16 i.e. by 2% & 1% respectively as compared to 2014-15 but the value is still far away from the minimal guaranteed availability as mentioned in PPA.

Moreover, the Availability Factor of GENCO-III Power Stations i.e. TPS Muzaffargarh, GTPS Faisalabad & SPS Faisalabad has also decreased in 2015-16 by 8%, 11% & 26% respectively as compared to 2014-15 due to increase in duration of total outages by the same ratio. Therefore, all the aforesaid power stations of GENCO-III have violated the guaranteed availability as prescribed in PPA for 2015-16. Further, CCPP Nandipur has also remained available for only 71% of the total time in FY 2015-16, which is also a clear violation of the minimum benchmark as specified in PPA.

Furthermore, the Availability Factor of Lakhra Power Station i.e. GENCO-IV is also very low i.e. 26% in 2014-15 and 25% in 2015-16, which is quite alarming keeping in view the current energy crisis in Pakistan.

3.2 w.r.t Net Capacity Factor:

NET CAPACITY FACTOR (%)		
Name of Power Station	**2014-15**	**2015-16**
GENCO-I		
TPS Jamshoro	47	57
GTPS Kotri	33	61
GENCO-II		
TPS Guddu (1-13)	22	11
TPS Guddu (14-16)	47	53
GENCO-III		
TPS Muzaffargarh	47	48
GTPS Faisalabad	2	15
SPS Faisalabad	8	11
CCPP Nandipur	0	34
GENCO-IV		
Lakhra FBC PS	18	16

Table 12

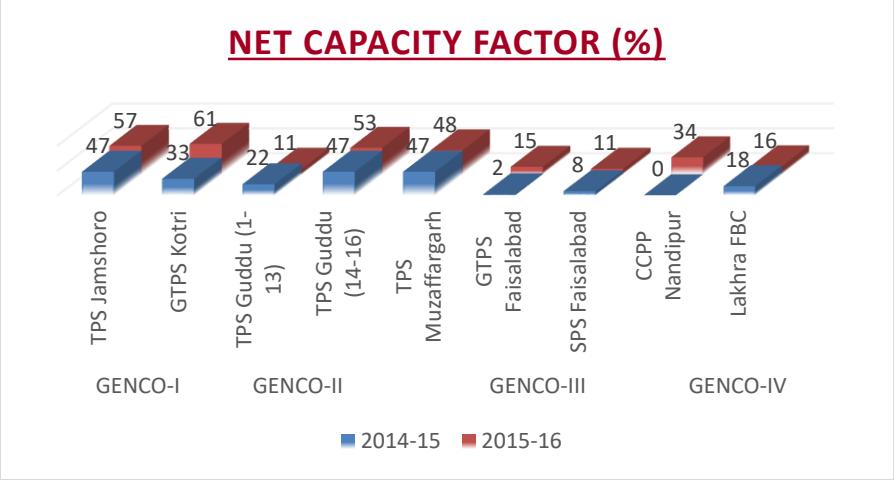

Figure 2

The Net Capacity Factor (NCF) for a unit/machine is the ratio of net actual generation to the product of reference capacity & period hours. It means that NCF basically expresses the actual energy produced by a unit/machine over a specified time period as the % of total energy that could be produced had there been no energy loss due to standby mode, planned/unplanned outage hours i.e. if the machine would have been available for power generation for the entire period of time.

In our case, it is quite evident that the NCF for all the power stations of GENCO-I, GENCO-II, GENCO-III and GENCO-IV is considerably low i.e. ranging from 2% to 61% only, for the FY 2014-15 and 2015-16. The reasons of this low NCF are as follows:

i. Energy loss due to increased auxiliary consumption.
ii. Energy loss due to standby mode.
iii. Energy loss due to excess consumption of planned/unplanned outage hours.

3.3 w.r.t Net Output Factor:

NET OUTPUT FACTOR (%)		
Name of Power Station	**2014-15**	**2015-16**
GENCO-I		
TPS Jamshoro	80	82
GTPS Kotri	88	85
GENCO-II		
TPS Guddu (1-13)	72	36
TPS Guddu (14-16)	74	81
GENCO-III		
TPS Muzaffargarh	77	74
GTPS Faisalabad	77	90

SPS Faisalabad	56	89
CCPP Nandipur	0	74
GENCO-IV		
Lakhra FBC PS	68	64

Table 13

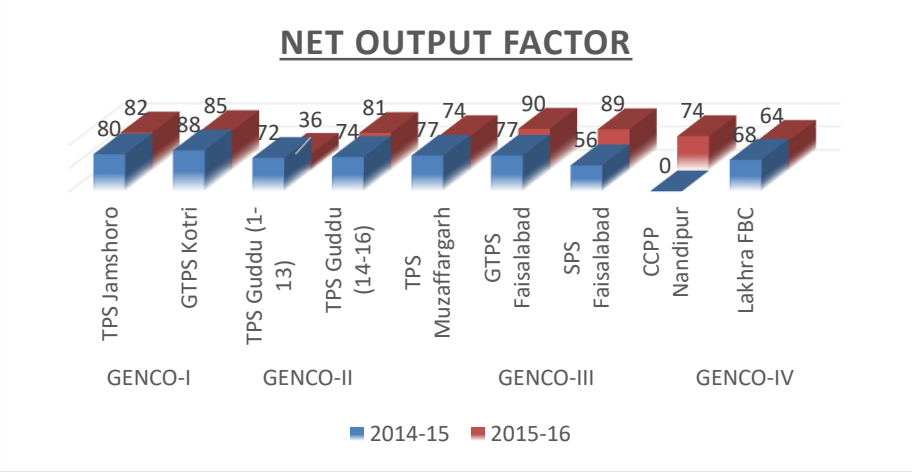

Figure 3

The Net Output Factor (NOF) for a unit/machine is the ratio of net actual generation to the product of reference capacity & service hours. It means that NOF basically expresses the actual energy produced by a power generating unit/machine over a specified time period as the % of total energy that could be produced had there been no energy loss due to increased auxiliary consumption or temporary reduction in capacity due to planned/unplanned de-ratings.

In our case, it can easily be deduced from Table that the NOF for GENCO-I power stations i.e. TPS Jamshoro & GTPS Kotri is good (i.e. above 80%) for the period under observation i.e. 2014-15 & 2015-16. Similarly, NOF for TPS Guddu (14-16) has increased in 2015-16 by 7% as compared to 2014-15. However, for TPS Guddu (1-13), there is a drastic decrease of 36% in NOF, which is mainly attributed to the energy loss contributed by Unit # 1, 5 & 6 collectively, due to excess consumption of auxiliary load i.e. more than the allowed limit specified in license. Had there been no such energy loss, NOF would have been considerably improved.

Moreover, it can also be inferred that NOF for TPS Muzaffargarh has decreased in 2015-16 by 3% as compared to 2014-15, whereas, for GTPS Faisalabad & SPS Faisalabad, NOF has considerably improved in 2015-16 as compared to 2014-15. It is also pertinent to mention here that NOF for SPS Faisalabad in 2014-15 is alarmingly low i.e. only 56%, whereas for CCPP Nandipur, it remained around 71%.

Furthermore, NOF for Lakhra Power Station i.e. GENCO-IV also remained less than 70% during the subject period.

3.4 w.r.t Energy Availability Factor:

ENERGY AVAILABILITY FACTOR (%)		
Name of Power Station	2014-15	2015-16
GENCO-I		
TPS Jamshoro	61	58
GTPS Kotri	95	90
GENCO-II		
TPS Guddu (1-13)	33	28
TPS Guddu (14-16)	65	66
GENCO-III		
TPS Muzaffargarh	71	49
GTPS Faisalabad	91	81
SPS Faisalabad	85	65
CCPP Nandipur	0	71
GENCO-IV		
Lakhra FBC PS	26	25

Table 14

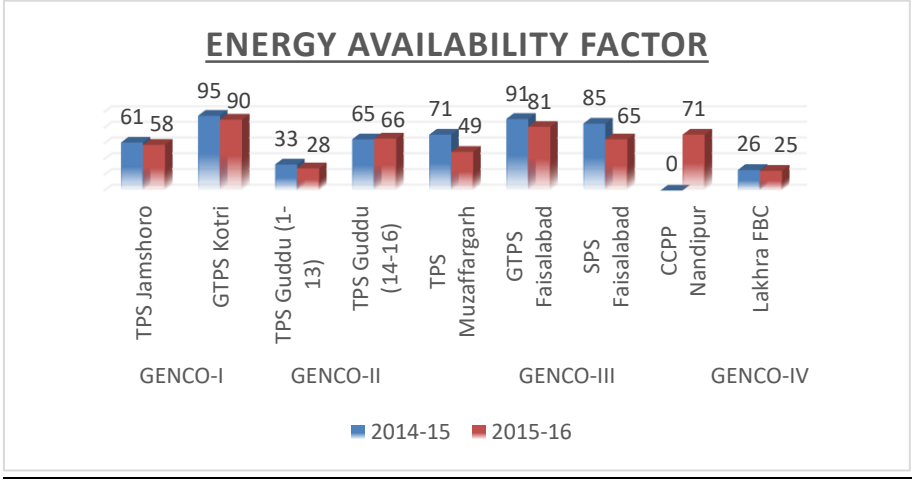

Figure 4

The Energy Availability Factor (EAF) for a unit/machine is the ratio of Available hours less than any equivalent planned and unplanned de-rated hours to the period hours. EAF actually indicates the amount of time in which a unit/machine practically remained available for generating power at full reference capacity (i.e. without any de-ration).

In our case, EAF is same as AF for GTPS Kotri, TPS Guddu (14-16) & Lakhra Power Station for the period under observation i.e. 2014-15 & 2015-16. Moreover, EAF for GTPS Faisalabad & CCPP Nandipur is also same as AF for the FY 2015-16. It means that the net capacity of the units/machines of these power plants did not reduce even for a while during this period.

However, EAF for the remaining power stations is different from AF due to a significant number of equivalent planned & unplanned de-rated hours. In this regard, it is quite evident that EAF for TPS Jamshoro is very low i.e. 61% for 2014-15 and 58% for 2015-16. Similarly, EAF for TPS Guddu (1-13) is only 33% for 2014-15 and mere 28% for 2015-16, which is alarmingly low.

Moreover, EAF for TPS Muzaffargarh and SPS Faisalabad has also reduced up to 49% and 65% respectively in 2015-16 from 71% and 85% correspondingly in 2014-15. This reduction is primarily attributed to less number of available hours for the aforesaid power stations of GENCO-III in 2015-16 as compared to 2014-15.

3.5 w.r.t Planned Outage Hours:

POH (% of PH)				
Name of Power Station	2014-15	Allowed Limit as per PPA	2015-16	Allowed Limit as per PPA
GENCO-I				
TPS Jamshoro	0.5	18.5	17	21.5
GTPS Kotri	4	8	4	8
GENCO-II				
TPS Guddu (1-13)	1	11	4	8
TPS Guddu (14-16)	1	8	29	14
GENCO-III				
TPS Muzaffargarh	9	8	10	8
GTPS Faisalabad	2	6	1	6
SPS Faisalabad	2.5	8	4	8
CCPP Nandipur	-	-	12.5	9
GENCO-IV				
Lakhra FBC PS	26	-	26	-

Table 15

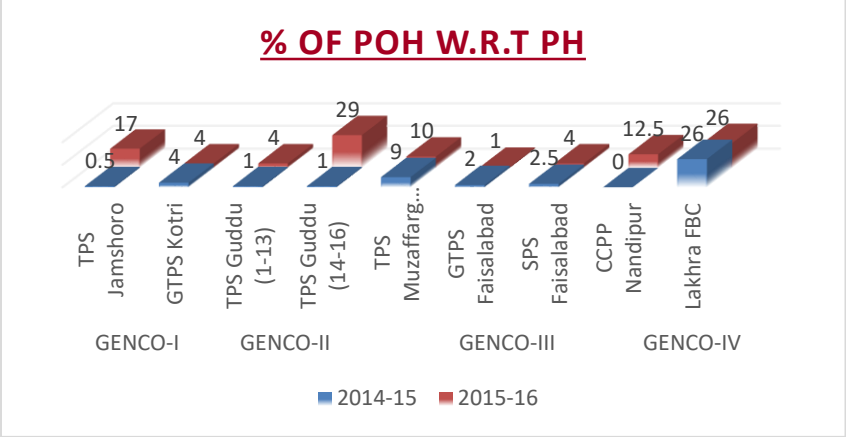

Figure 5

Following power stations have violated the allowed limit of planned outages as specified in PPA:

i. TPS Guddu (14-16)-GENCO-II, in 2015-16 by 15% i.e. 1318 hrs (approx.) consumed extra.
ii. TPS Muzaffargarh-GENCO-III, in 2014-15 by 1% i.e. 88 hrs (approx.) consumed extra and in 2015-16 by 2% i.e. 176 hrs (approx.) consumed extra.
iii. CCPP Nandipur-GENCO-III, in 2015-16 by 3.5% i.e. 307 hrs (approx.) consumed extra.

3.6 w.r.t Unplanned Outage Hours:

UOH (% of PH)				
Name of Power Station	2014-15	Allowed Limit as per PPA	2015-16	Allowed Limit as per PPA
GENCO-I				
TPS Jamshoro	21	9	10	9
GTPS Kotri	1	9	6	9
GENCO-II				
TPS Guddu (1-13)	56	9	51	9
TPS Guddu (14-16)	33	9	5	9
GENCO-III				
TPS Muzaffargarh	6	9	13	9
GTPS Faisalabad	6	9	18	9
SPS Faisalabad	5	9	30	9
CCPP Nandipur	-	9	17	9
GENCO-IV				
Lakhra FBC PS	55	-	34.5	-

Table 16

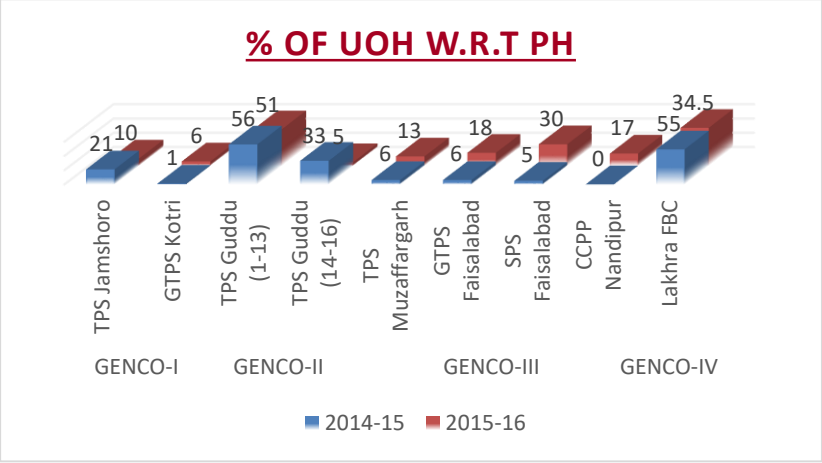

Figure 6

Following power stations have violated the allowed limit of unplanned outages i.e. 9% (800 hrs) as specified in PPA:

i. TPS Jamshoro-GENCO-I, in 2014-15 by 12% i.e. 1051 hrs (approx.) consumed extra and in 2015-16 by 1% i.e. 88 hrs (approx.) consumed extra.
ii. TPS Guddu (1-13)-GENCO-II, in 2014-15 by 47% i.e. 4117 hrs (approx.) consumed extra and in 2015-16 by 42% i.e. 3689 hrs (approx.) consumed extra.
iii. TPS Guddu (14-16)-GENCO-II, in 2014-15 by 24% i.e. 2102 hrs (approx.) consumed extra.
iv. TPS Muzaffargarh-GENCO-III, in 2015-16 by 4% i.e. 351 hrs (approx.) consumed extra.
v. GTPS Faisalabad-GENCO-III, in 2015-16 by 9% i.e. 790 hrs (approx.) consumed extra.
vi. SPS Faisalabad-GENCO-III, in 2015-16 by 21% i.e. 1845 hrs (approx.) consumed extra.
vii. CCPP Nandipur-GENCO-III, in 2015-16 by 8% i.e. 703 hrs (approx.) consumed extra.

ANALYSIS

4. Analysis of Jamshoro Power Company Limited (JPCL) - GENCO-I:

JAMSHORO POWER STATION (GENCO-I)

4.1 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-I	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
1	2014-15	250	200	182.45	8.77% (17.55 MW)	12.8% (25.6 MW)	25.09	7.54	6900.4	52.03	0.51	732.17	0.37
	2015-16	250	200	182.45	8.77% (17.55 MW)	10.8% (21.6 MW)	21.17	3.62	4191.4	15.17	0.43	1286.74	0.55
2	2014-15	210	170	154.73	8.98% (15.27 MW)	13.24% (22.5 MW)	22.05	6.78	4486.5	30.42	0.45	2960.61	1.33
	2015-16	210	170	154.73	8.98% (15.27 MW)	9.42% (16 MW)	15.68	0.41	7897.1	3.24	0.32	21.52	0.01
3	2014-15	210	170	155.36	8.61% (14.64 MW)	9.37% (15.9 MW)	15.58	0.94	6279.8	5.90	0.32	2011.03	0.64
	2015-16	210	170	155.36	8.61% (14.64 MW)	9.54% (16.2 MW)	15.88	1.24	7584.8	9.41	0.32	117.22	0.04
4	2014-15	210	170	156.48	7.95% (13.52 MW)	10.14% (17.2 MW)	16.86	3.34	2845.3	9.50	0.34	1119.5	0.38
	2015-16	210	170	156.48	7.95% (13.52 MW)	10.15% (17.2 MW)	16.86	3.34	4662.3	15.57	0.34	0	0
Overall		**880**	**710**	**649**	**60.98 MW**			**27.21**		**141.24**	**3.03**		**3.33**

Table 17

NOTE
* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-I
** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-I

KOTRI POWER STATION (GENCO-I)

4.2 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-I	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
3	2014-15	25	22	18	18.2% (4 MW)	0.14% (0.031 MW)	0.031	0	3726	0	0	4776.2	0.00
	2015-16	25	22	18	18.2% (4 MW)	0.09% (0.02 MW)	0.02	0	6691.7	0	0	1438.3	0.00
4	2014-15	25	22	18	18.2% (4 MW)	0.09% (0.02 MW)	0.02	0	2786.4	0	0	5919.9	0.00
	2015-16	25	22	18	18.2% (4 MW)	0.07% (0.015 MW)	0.015	0	6467.7	0	0	2080.8	0.00
5	2014-15	25	22	18	18.2% (4 MW)	0.83% (0.18 MW)	0.18	0	3550.6	0	0	3736	0.00
	2015-16	25	22	18	18.2% (4 MW)	0.8% (0.18 MW)	0.18	0	5445.9	0	0	1254	0.00
6	2014-15	25	22	18	18.2% (4 MW)	0.99% (0.22 MW)	0.22	0	2973.1	0	0	5767.2	0.00
	2015-16	25	22	18	18.2% (4 MW)	0.95% (0.21 MW)	0.21	0	6268.4	0	0	1769.8	0.00
7	2014-15	44	44	35	20.4% (9 MW)	10.72% (4.72 MW)	4.60	0	3514.5	0	0.125	4981.4	0.62
	2015-16	44	44	35	20.4% (9 MW)	11.27% (4.96 MW)	4.83	0	6852.7	0	0.13	1227.8	0.16
Overall		**144**	**132**	**107**	**25 MW**			**0**		**0**	**0.255**		**0.78**

Table 18

NOTE
* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-I
** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-I

Reasons of Increase in Auxiliary Consumption as provided by GENCO-I (Jamshoro & Kotri Power Plants):

i) Major overhauling of some units/machines was not carried out timely.

ii) Units remained in operation with deteriorated load.

iii) Some of the essential auxiliaries remained in operation even during standby mode, which caused an increase in auxiliary consumption without any production.

4.3 Unit wise Service Hours & Standby Hours w.r.t Period Hours

Period Hours: The actual calendar hours of month/quarter/year are called Period Hours. The sum of Available Hours and Unavailable Hours (total outage hours) must equal to period hours.

Service Hours: The Hours the unit was synchronized to the system. OR The Hours the unit was remained active in the service are called Service Hours.

Standby Hours: The Hours the unit was available to the system but not synchronized for some reasons are called Standby Hours.

4.3.1 Jamshoro Power Station

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby Hours due to Fuel Constraints	Standby Hours as per NPCC's instructions
1	2	3	4	5=4/3	6	7	8=6/3	9	10
1	2014-15	8760	6900.39	79%	732	1.02	8%	-	732
	2015-16	8784	4191.36	48%	1286	1.79	15%	-	1286
2	2014-15	8760	4486.5	51%	2960	4.11	34%	978	1982
	2015-16	8784	7897.12	90%	22	0.03	0%	-	22
3	2014-15	8760	6279.82	72%	2011	2.79	23%	392	1619
	2015-16	8784	7584.77	86%	117	0.16	1%	-	117
4	2014-15	8760	2845.31	32%	1120	1.55	13%	153	967
	2015-16	8784	4662.33	53%	0	0.00	0%	-	-

Table 19

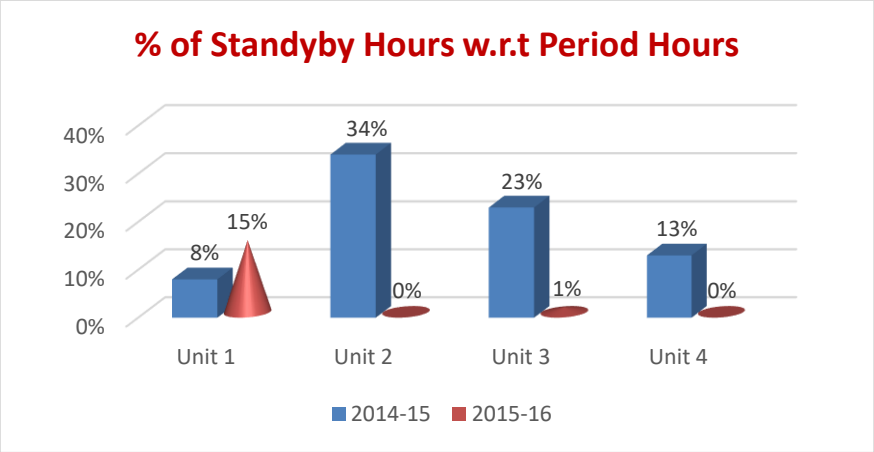

Figure 7

4.3.2 Kotri Power Station

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby Hours due to Fuel Constraints	Standby Hours as per NPCC's instructions
1	2	3	4	5=4/3	6	7	8=6/3	9	10
3	2014-15	8760	3726	43%	4776	6.63	55%	4776	-
	2015-16	8784	6691.7	76%	1438	2.00	16%	1438	-
4	2014-15	8760	2786.4	32%	5920	8.22	68%	5920	-
	2015-16	8784	6467.7	73%	2081	2.89	24%	2081	-
5	2014-15	8760	3550.6	41%	3736	5.19	43%	3736	-
	2015-16	8784	5445.9	62%	1254	1.74	14%	1254	-
6	2014-15	8760	2973.1	34%	5767	8.01	66%	5767	-
	2015-16	8784	6268.4	71%	1770	2	20%	1770	-
7	2014-15	8760	3514.5	40%	4981	7	57%	4981	-
	2015-16	8784	6852.7	78%	1228	2	14%	1228	-

Table 20

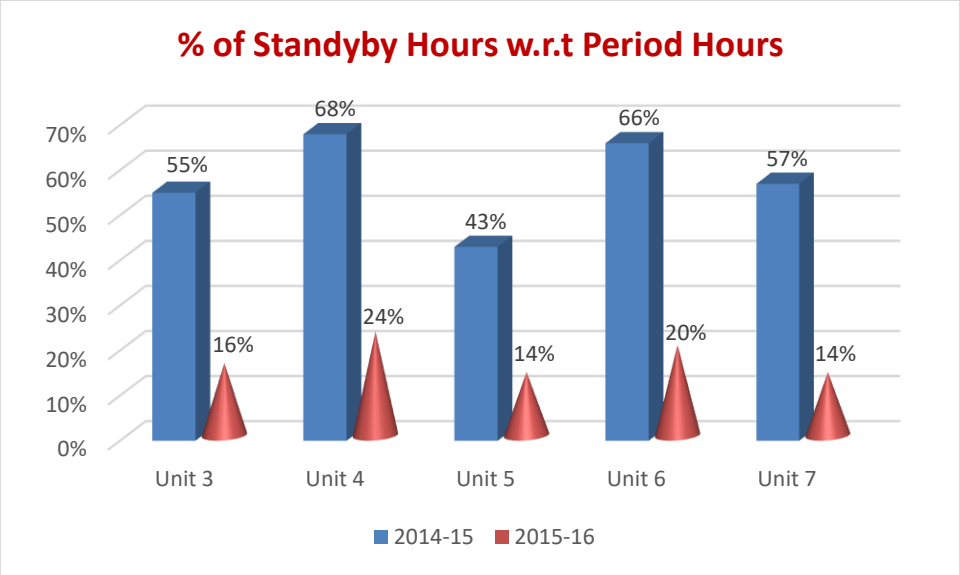

Figure 8

Reasons of Standby as provided by GENCO-I (Jamshoro & Kotri Power Plants):

i. NPCC's instructions

ii. Non-availability of Fuel

4.4 Unit wise Planned & Unplanned Outage Hours w.r.t to Period Hours, Consumption of Extra Outage Hours, Subsequent Energy Loss and Financial Impact

4.4.1 Jamshoro Power Station

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
1	2014-15	182.45	8760	127	1.4	1000.44	11.4	12.9	29	0	0	0
	2015-16	182.45	8784	2605.5	29.7	700.41	8	37.6	34	3.6	319.4	58.27
2	2014-15	154.73	8760	0	0	1312.88	15	15	27	0	0	0
	2015-16	154.73	8784	0	0	865.36	9.9	9.9	27	0	0	0
3	2014-15	155.36	8760	120	1.4	349.15	4	5.4	27	0	0	0
	2015-16	155.36	8784	662.52	7.5	419.49	4.8	12.3	27	0	0	0
4	2014-15	156.48	8760	0	0	4795.19	54.7	54.7	27	27.7	2430	380.24
	2015-16	156.48	8784	2564.5	29.2	1557.13	17.7	46.9	34	12.9	1135.1	177.62
Overall		649.02									971	616.13

Table 21

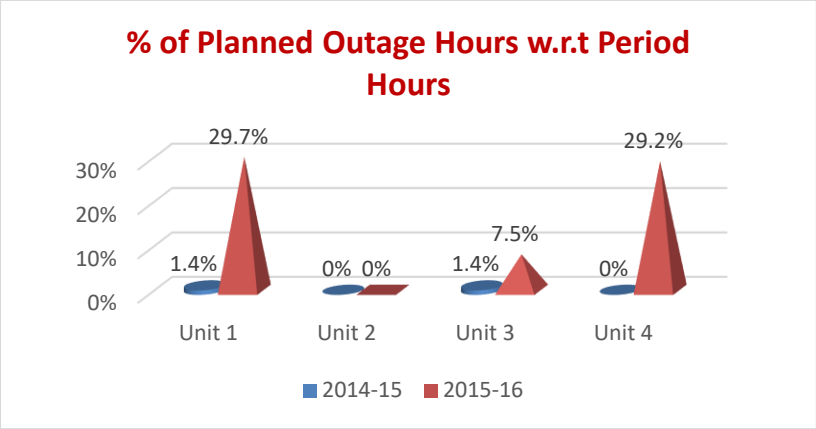

Figure 9

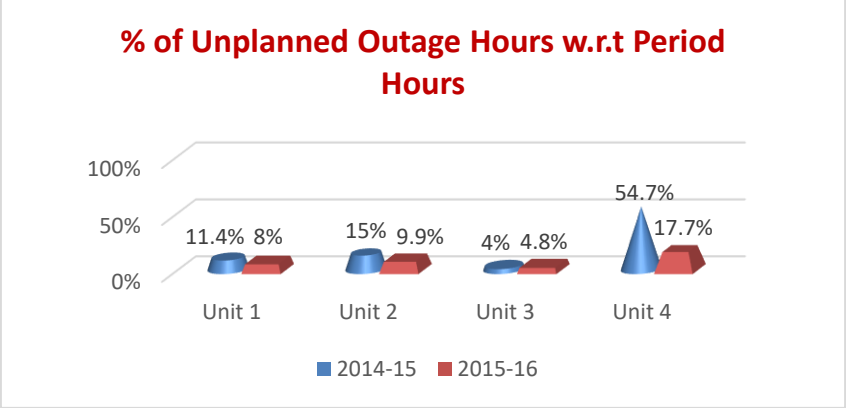

Figure 10

4.4.2 Kotri Power Station

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
3	2014-15	18	8760	238	3	20.2	0	3	17	0	0	0
	2015-16	18	8784	0	0	654.4	7	7	17	0	0	0
4	2014-15	18	8760	0	0	53.7	1	1	17	0	0	0
	2015-16	18	8784	221	3	125	1	4	17	0	0	0
5	2014-15	18	8760	1320	15	153.6	2	17	17	0	0	0
	2015-16	18	8784	236.1	2.7	1848	21	23.7	17	6.7	590.8	10.6
6	2014-15	18	8760	1.6	0	18.1	0	0	17	0	0	0
	2015-16	18	8784	730.9	8	12.8	0	8	17	0	0	0
7	2014-15	35	8760	0	0	264.1	3	3	17	0	0	0
	2015-16	35	8784	485.7	6	217.5	2	8	17	0	0	0
Overall		107									148	10.6

Table 22

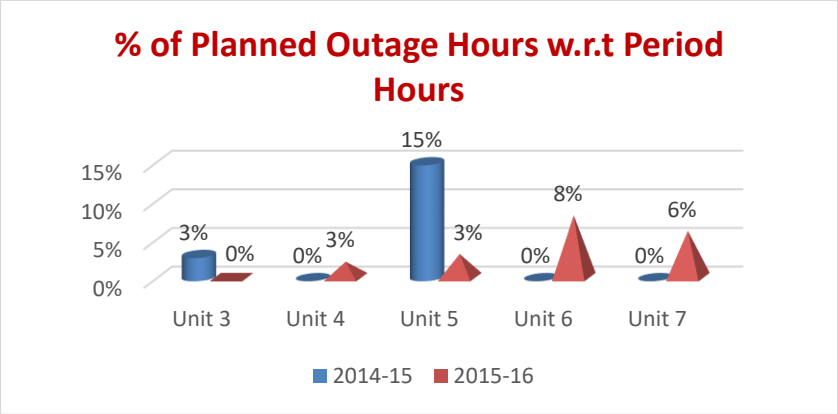

Figure 11

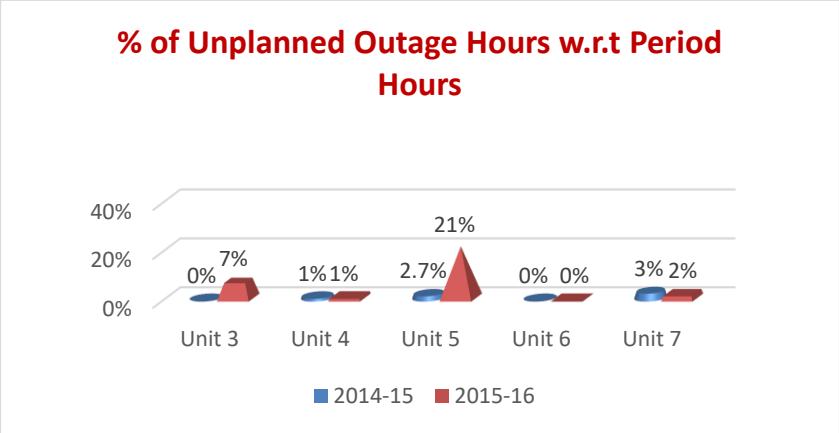

Figure 12

4.5 Unit wise Availability Factor

4.5.1 Jamshoro Power Station

Units	Year	Availability Factor	Allowed Limit as per PPA
1	2014-15	87%	71%
	2015-16	62%	66%
2	2014-15	85%	73%
	2015-16	90%	73%
3	2014-15	95%	73%
	2015-16	88%	73%
4	2014-15	45%	73%
	2015-16	53%	66%

Table 23

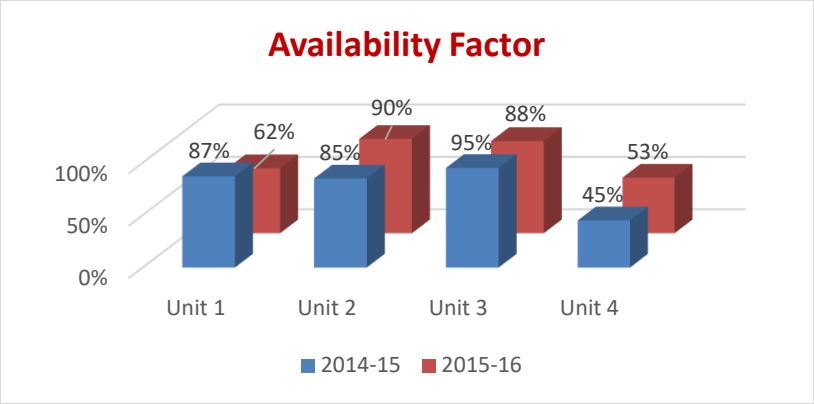

Figure 13

4.5.2 Kotri Power Station

Units	Year	Availability Factor	Allowed Limit as per PPA
3	2014-15	97%	83%
	2015-16	93%	83%
4	2014-15	99%	83%
	2015-16	96%	83%
5	2014-15	83%	83%
	2015-16	76%	83%
6	2014-15	10%	83%
	2015-16	92%	83%
7	2014-15	97%	83%
	2015-16	92%	83%

Table 24

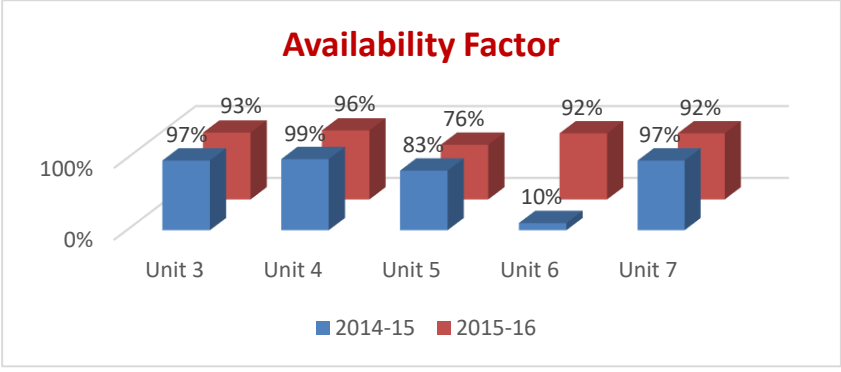

Figure 14

Note: Allowed Limit of Availability Factor for each Unit has been calculated by subtracting the allowed limit of total outages from 100%.

4.6 Unit wise Net Capacity Factor

4.6.1 Jamshoro Power Station

Units	Year	Net Capacity Factor
1	2014-15	50%
	2015-16	34%
2	2014-15	42%
	2015-16	80%
3	2014-15	66%
	2015-16	73%
4	2014-15	27%
	2015-16	46%

Table 25

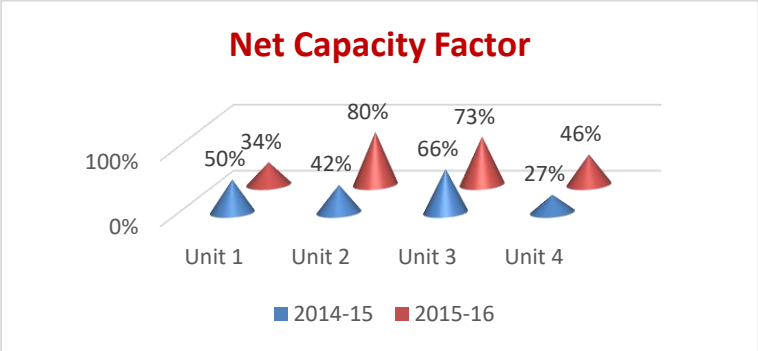

Figure 15

4.6.2 Kotri Power Station

Units	Year	Net Capacity Factor
3	2014-15	46%
	2015-16	82%
4	2014-15	27%
	2015-16	64%
5	2014-15	43%
	2015-16	63%
6	2014-15	32%
	2015-16	63%
7	2014-15	26%
	2015-16	48%

Table 26

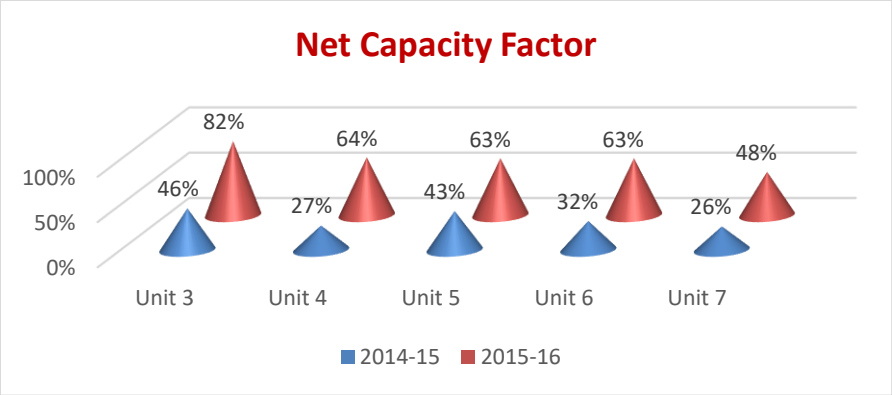

Figure 16

4.7 Unit wise Net Output Factor

4.7.1 Jamshoro Power Station

Units	Year	Net Output Factor
1	2014-15	64%
	2015-16	71%
2	2014-15	83%
	2015-16	89%
3	2014-15	92%
	2015-16	84%
4	2014-15	85%
	2015-16	87%

Table 27

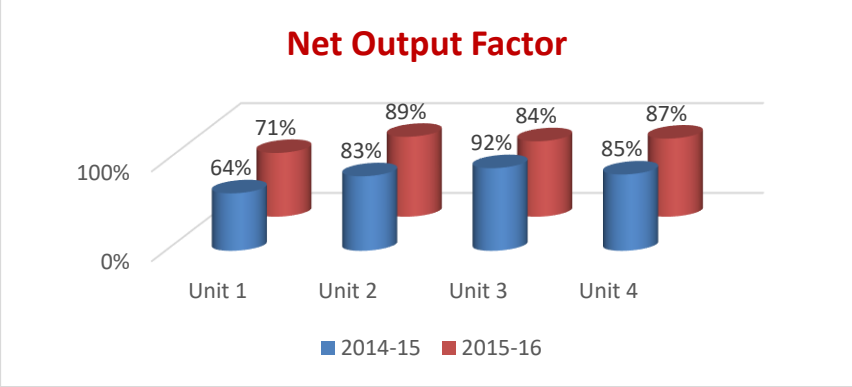

Figure 17

4.7.2 Kotri Power Station

Units	Year	Net Output Factor
3	2014-15	109%
	2015-16	108%
4	2014-15	86%
	2015-16	88%
5	2014-15	106%
	2015-16	102%
6	2014-15	93%
	2015-16	88%
7	2014-15	64%
	2015-16	62%

Table 28

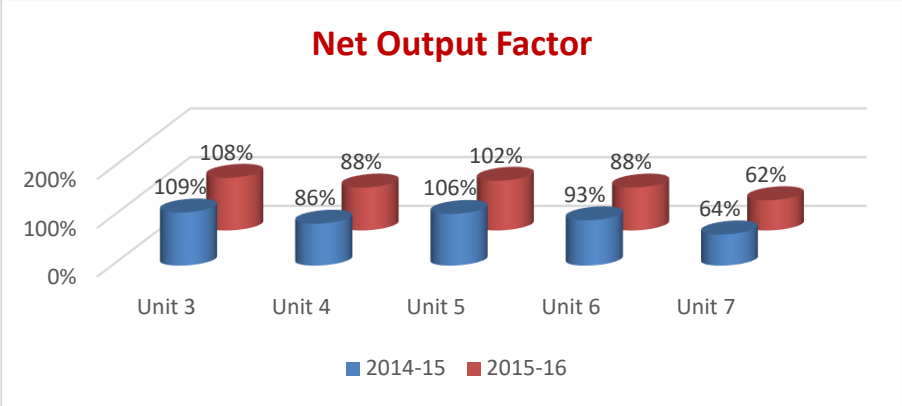

Figure 18

4.8 Unit wise Energy Availability Factor

4.8.1 Jamshoro Power Station

Units	Year	Energy Availability Factor
1	2014-15	61%
	2015-16	49%
2	2014-15	58%
	2015-16	63%
3	2014-15	85%
	2015-16	73%
4	2014-15	41%
	2015-16	47%

Table 29

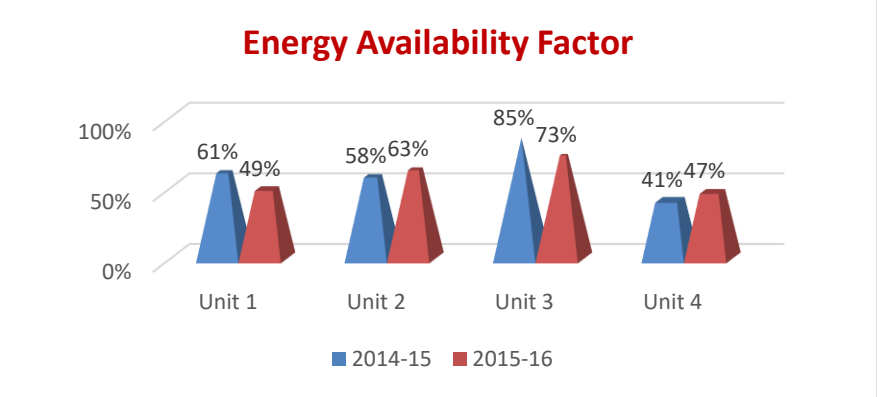

Figure 19

4.8.2 Kotri Power Station

Units	Year	Energy Availability Factor
3	2014-15	97%
	2015-16	93%
4	2014-15	99%
	2015-16	96%
5	2014-15	83%
	2015-16	76%
6	2014-15	100%
	2015-16	92%
7	2014-15	97%
	2015-16	92%

Table 30

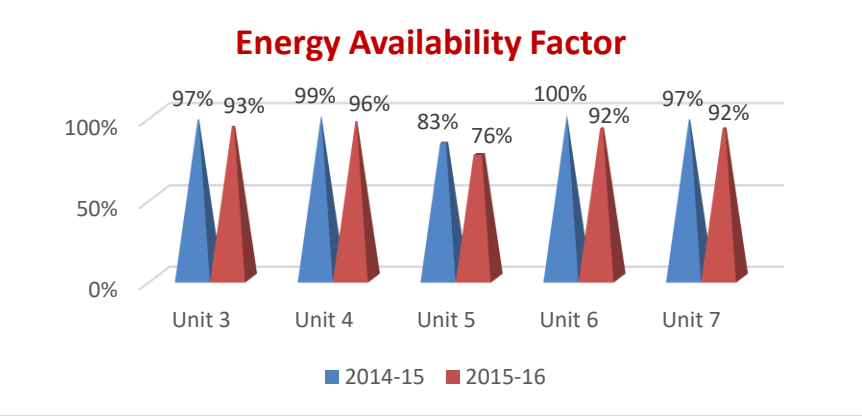

Figure 20

5. Analysis of Central Power Generation Company Limited (CPGCL)-GENCO-II:

THERMAL POWER STATION GUDDU (GENCO-II)

5.1 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-II	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
1	2014-15	110	85	70	17.65% (15 MW)	8.95% (7.6 MW)	7.3	0	4162	0	0.3	3530	1.06
	2015-16	110	85	70	17.65% (15 MW)	34.36% (29.2 MW)	9.51	0	10	0	19.69	1310	25.79
2	2014-15	110	85	70	17.65% (15 MW)	0	0	0	0	0	0	0	0
	2015-16	110	85	70	17.65% (15 MW)	0	0	0	0	0	0	0	0
3	2014-15	210	180	170	5.55% (10 MW)	9.32% (16.8 MW)	16.1	6.10	2418	14.75	0.7	4575	3.20
	2015-16	210	180	170	5.55% (10 MW)	8.33% (15 MW)	14.09	4.09	704	2.88	0.91	4761	4.33
4	2014-15	210	180	170	5.55% (10 MW)	0	0	0	0	0	0	0	0
	2015-16	210	180	170	5.55% (10 MW)	0	0	0	0	0	0	0	0
5	2014-15	100	85	85	0	6.17% (5.2 MW)	4.93	4.93	7019	34.60	0.27	988	0.27
	2015-16	100	85	85	0	7.04% (6 MW)	5.99	5.99	8217	49.22	0.01	30	0.0003
6	2014-15	100	85	85	0	7.01% (6 MW)	5.06	5.06	3392	17.16	0.94	798	0.75
	2015-16	100	85	85	0	10.48% (8.9 MW)	5.03	5.03	4250	21.38	3.87	3822	14.79
7	2014-15	100	95	90	5.26% (5 MW)	0.47% (0.4 MW)	0.36	0	7203	0	0.04	1172.45	0.05
	2015-16	100	95	90	5.26% (5 MW)	0.58% (0.6 MW)	0.57	0	7640	0	0.03	882.99	0.03
8	2014-15	100	95	90	5.26% (5 MW)	0.44% (0.4 MW)	0.37	0	7482	0	0.03	1101.87	0.03
	2015-16	100	95	90	5.26% (5 MW)	0.62% (0.6 MW)	0.59	0	6560	0	0.01	346.4	0.003
9	2014-15	100	95	90	5.26% (5 MW)	0	0	0	0	0	0	0	0
	2015-16	100	95	90	5.26% (5 MW)	0	0	0	0	0	0	0	0
10	2014-15	100	95	90	5.26% (5 MW)	0.59% (0.6 MW)	0.53	0	3977	0	0.07	1030.5	0.07
	2015-16	100	95	90	5.26% (5 MW)	0.65% (0.6 MW)	0.42	0	4566	0	0.18	2849.82	0.51
11	2014-15	136	130	130	0	0	0	0	0	0	0	0	0
	2015-16	136	130	130	0	0.36% (0.5 MW)	0.48	0.48	2750	1.32	0.02	616	0.01
12	2014-15	136	130	130	0	0	0	0	0	0	0	0	0
	2015-16	136	130	130	0	0.19% (0.2 MW)	0.03	0.03	70.45	0.002	0.21	1869	0.39
13	2014-15	143	140	130	7.14% (10 MW)	0	0	0	0	0	0	0	0
	2015-16	143	140	130	7.14% (10 MW)	0	0	0	0	0	0	0	0
Overall		**1655**	**1480**	**1400**				**31.71**		**141.32**	**27.28**		**51.30**

Table 31

NOTE

*** Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-II**

**** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-II**

GUDDU 747 CCPP (GENCO-II)

5.2 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-II	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
14	2014-15	255.6	243	241.72	0.53% (1.28 MW)	3.56% (8.65 MW)	8.41	7.13	3789	27.02	0.24	101	0.02
	2015-16	255.6	243	241.72	0.53% (1.28 MW)	0	0	0	4890	0	0	0	0
15	2014-15	255.6	243	241.72	0.53% (1.28 MW)	2.74% (6.66 MW)	6.64	5.36	4956	26.54	0.024	14	0.0003
	2015-16	255.6	243	241.72	0.53% (1.28 MW)	0	0	0	6493	0	0	0	0
16	2014-15	265.5	261	237.35	9.06% (23.65 MW)	0	0	0	3825	0	0	111	0
	2015-16	265.5	261	237.35	9.06% (23.65 MW)	0	0	0	5884	0	0	0	0
Overall		**776.7**	**747**	**720.8**				**12.486**		**53.56**	**0.264**		**0.02**

Table 32

NOTE
* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-II
** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-II

Reasons of Increase in Auxiliary Consumption as provided by GENCO-II:

i. Unit # 1-4 mostly remained standby/shutdown due to fuel constraints.

ii. Partial loading of Unit # 7-9.

iii. Non-Calibrated Auxiliary supply meters of Unit # 6 & Unit # 10.

5.3 Unit wise Service Hours & Standby Hours w.r.t Period Hours

5.3.1 Thermal Power Station Guddu (1-13)

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby Hours due to Fuel Constraints	Standby Hours as per NPCC Demand
1	2	3	4	5=4/3	6	7	8=6/3	9	10
1	2014-15	8760	4162	48%	3530	4.90	40%	3530	-
	2015-16	8784	10	0%	1310	1.82	15%	1310	-
2	2014-15	8760	0	0%	0	0.00	0%	-	-
	2015-16	8484	0	0%	0	0.00	0%	-	-
3	2014-15	8760	2418	28%	4575	6.35	52%	4575	-
	2015-16	8784	704	8%	4761	6.61	54%	4761	-
4	2014-15	8760	0	0%	0	0.00	0%	-	-
	2015-16	8784	0	0%	0	0	0%	-	-
5	2014-15	8760	7019	80%	988	1	11%	988	-
	2015-16	8784	8217	94%	30	0	0%	30	-

6	2014-15	8760	3392	39%	798	1.11	9%	725	72
	2015-16	8784	4250	48%	3822	5.31	44%	2170	1652
7	2014-15	8760	7203	82%	1172.45	1.63	13%	1172	-
	2015-16	8784	7640	87%	882.99	1.23	10%	883	-
8	2014-15	8760	7482	85%	1101.87	1.53	13%	1102	-
	2015-16	8784	6560	75%	346.4	0.48	4%	346	-
9	2014-15	8760	0	0%	0	0.00	0%	-	-
	2015-16	8784	0	0%	0	0.00	0%	-	-
10	2014-15	8760	3977	45%	1030.5	1.43	12%	960	70
	2015-16	8784	4566	52%	2849.82	3.96	32%	910	1939
11	2014-15	8760	0	0%	0	0.00	0%	-	-
	2015-16	8784	2750	32%	616	0.86	7%	616	-
12	2014-15	8760	0	0%	0	0.00	0%	-	-
	2015-16	8784	70.45	1%	1869	2.60	21%	1869	-
13	2014-15	8760	0	0%	0	0.00	0%	-	-
	2015-16	8784	0	0%	0	0.00	0%	-	-

Table 33

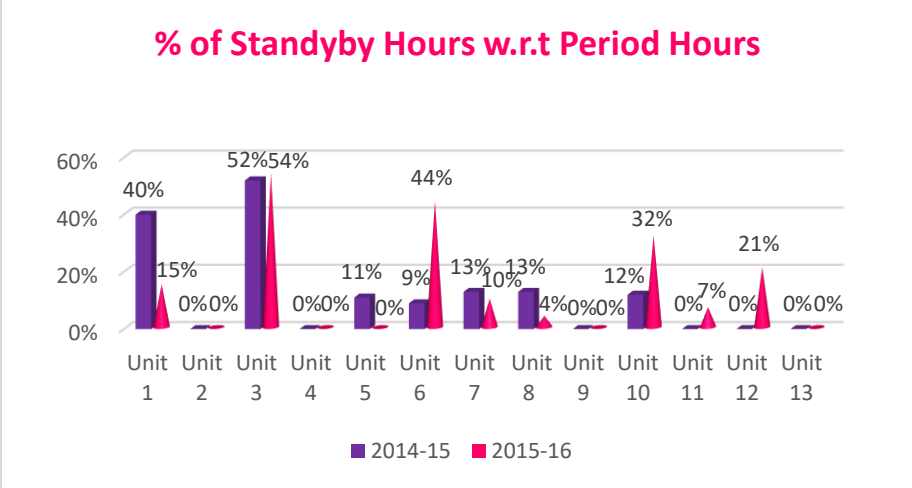

Figure 21

5.3.2 Thermal Power Station Guddu (14-16)

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby Hours due to Fuel Constraints	Standby Hours as per NPCC Demand
1	2	3	4	5=4/3	6	7	8=6/3	9	10
14	2014-15	6552	3789	58%	101	0.14	2%	101	-
	2015-16	8784	4890	56%	0	0.00	0%	-	-
15	2014-15	6552	4956	76%	14	0.02	0%	14	-
	2015-16	8784	6493	74%	0	0.00	0%	-	-
16	2014-15	6552	3825	58%	111	0.15	2%	111	-
	2015-16	8784	5884	67%	0	0.00	0%	-	-

Table 34

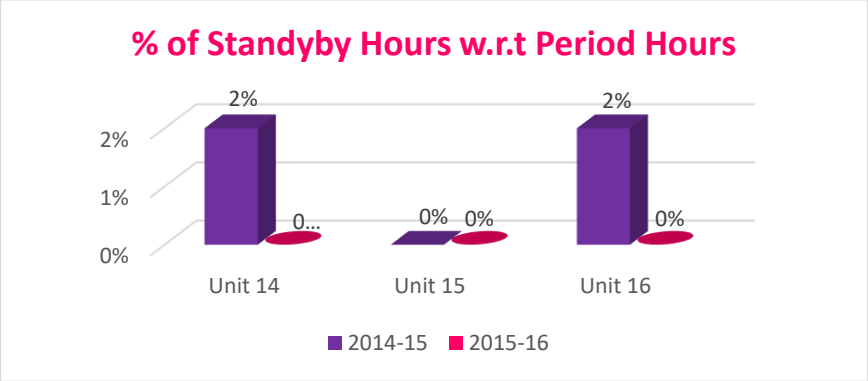

Figure 22

5.4 Unit wise Planned & Unplanned Outage Hours w.r.t to Period Hours, Consumption of Extra Outage Hours, Subsequent Energy Loss and Financial Impact

5.4.1 Thermal Power Station Guddu (1-13)

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
1	2014-15	70	8760	268.07	3.1	799	9.1	12.2	17	0	0	0
	2015-16	70	8784	0	0	7464	85	85	17	68	5970.7	418
2	2014-15	70	8760	0	0	8760	100	100	17	83	7270.8	509
	2015-16	70	8784	0	0	8484	96.6	96.6	17	79.6	6990.7	489.4
3	2014-15	170	8760	0	0	1766	20.2	20.2	17	3.2	276.8	47.1
	2015-16	170	8784	3264	37.2	55	0.6	37.8	34	3.8	332.4	56.5
4	2014-15	170	8760	0	0	8760	100	100	17	83	7270.8	1236
	2015-16	170	8784	0	0	8784	100	100	17	83	7290.7	1239.4
5	2014-15	85	8760	383.24	4.4	370	4.2	8.6	13	0	0	0
	2015-16	85	8784	0	0	536	6.1	6.1	13	0	0	0
6	2014-15	85	8760	282.09	3.2	4289	49	52.2	13	39.2	3432.3	291.7
	2015-16	85	8784	0	0	713	8.1	8.1	13	0	0	0
7	2014-15	90	8760	104	1.2	280	3.2	4.4	17	0	0	0
	2015-16	90	8784	0	0	260	3	3	17	0	0	0
8	2014-15	90	8760	91	1	85	1	2	17	0	0	0
	2015-16	90	8784	0	0	1877	21.4	21.4	17	4.4	383.7	34.5
9	2014-15	90	8760	0	0	8760	100	100	17	83	7270.8	654.4
	2015-16	90	8784	0	0	8784	100	100	17	83	7290.7	656.2
10	2014-15	90	8760	214.08	2.4	3538	40.4	42.8	17	25.8	2262.9	203.7
	2015-16	90	8784	230	2.6	1139	13	15.6	17	0	0	0
11	2014-15	130	8760	0	0	8760	100	100	34	66	5781.6	751.6
	2015-16	130	8784	0	0	5418	61.7	61.7	15	46.7	4100.4	533.1
12	2014-15	130	8760	0	0	8760	100	100	34	66	5781.6	751.6
	2015-16	130	8784	1031	11.7	5814	66.2	77.9	15	62.9	5527.4	718.6
13	2014-15	130	8760	0	0	8760	100	100	34	66	5781.6	751.6
	2015-16	130	8784	0	0	8784	100	100	15	85	7466.4	970.6
Overall		**1400**									**6960**	**10312.8**

Table 35

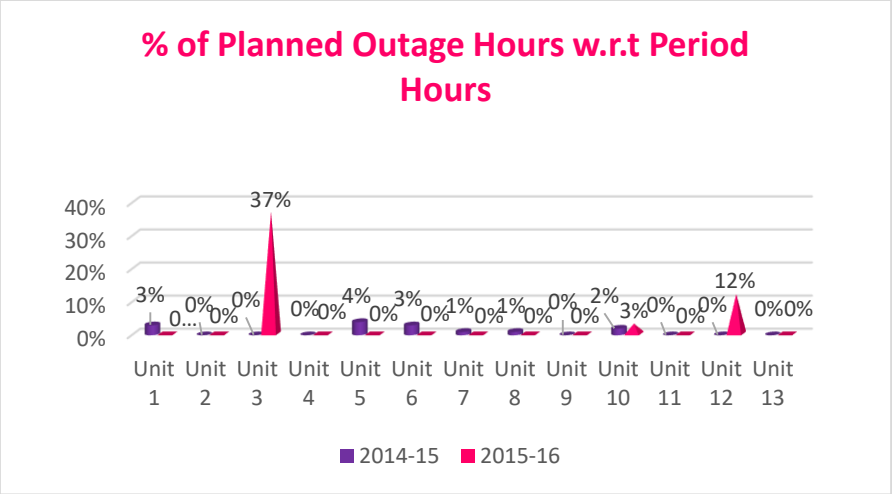

Figure 23

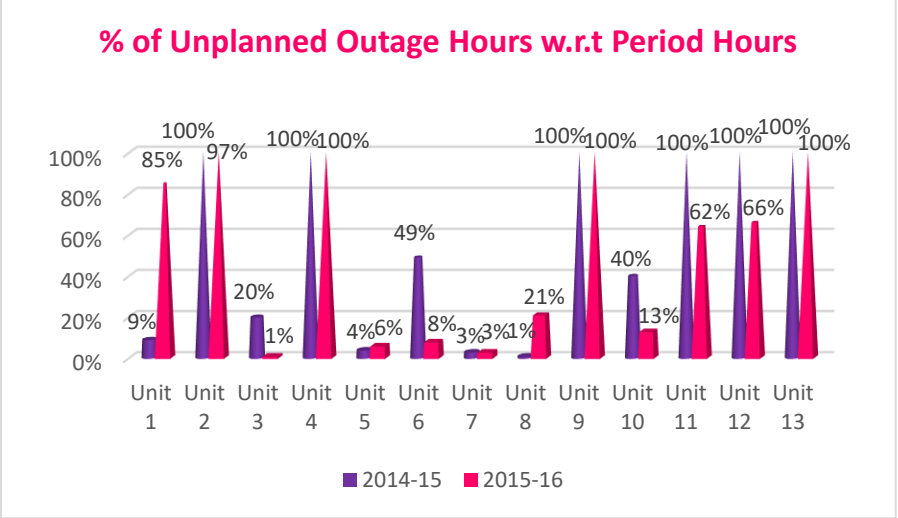

Figure 24

5.4.2 Guddu 747 MW Combined Cycle Power Plant

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
14	2014-15	241.72	6552	0	0	2661	40.6	40.6	17	23.6	1547.2	374
	2015-16	241.72	8784	3586	40.8	308	3.5	44.3	34	10.3	907.4	219.3
15	2014-15	241.72	6552	177.75	2.7	1405	21.4	24.2	17	7.2	468.9	113.3
	2015-16	241.72	8784	2144	24.4	146.72	1.7	26.1	17	9.1	797.4	192.8
16	2014-15	237.35	6552	114.4	1.7	2502	38.2	39.9	17	22.9	1502.6	356.6
	2015-16	237.35	8784	2017	23	882	10	33	17	16	1405.7	333.6
Overall		**720.79**									**2210**	**1589.71**

Table 36

Assumptions: The estimated duration of scheduled outages for Guddu 747 is not mentioned in PPA, therefore, it is assumed to be same as that for Unit 1-4 because the said units were replaced by Guddu 747 owing to their deteriorated capacity and increased fuel consumption.

The analysis of Guddu 747 CCPP for the FY 2014-15 is based on the data provided by GENCO-II for the period from Oct, 2014 to June, 2015 (09 months), since the plant was not operational during the first quarter of 2014-15 (i.e. Jul-Sep, 2014).

Secondly, while considering the allowed limit for outages, it has been assumed that Unit 14 was under major overhauling because the unit remained on planned outage mode during the entire 1st quarter of 2016 (i.e. Jan-Mar, 2016).

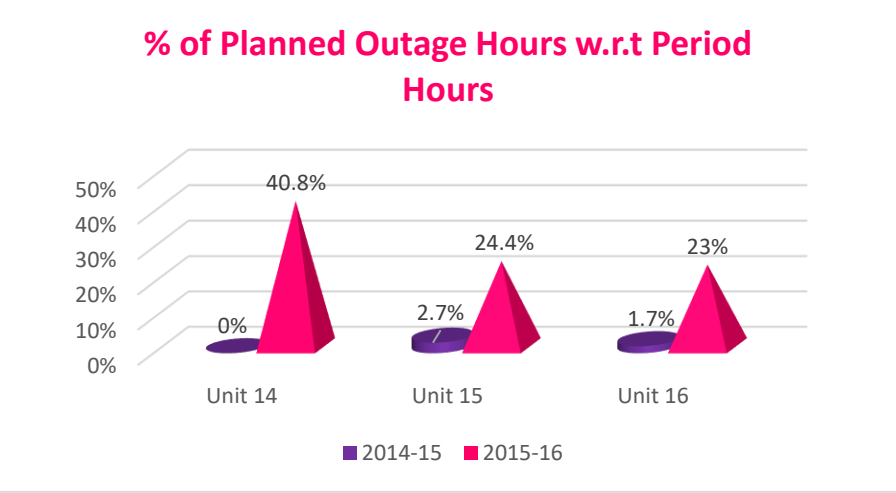

Figure 25

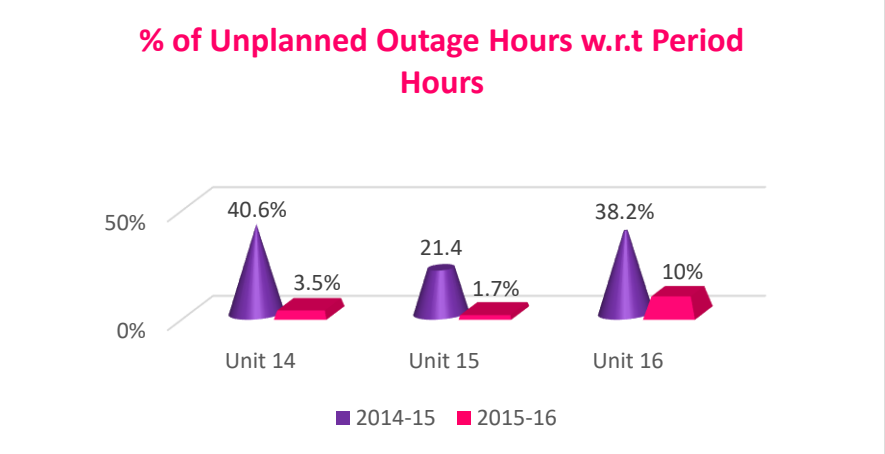

Figure 26

5.5 Unit wise Availability Factor

5.5.1 Thermal Power Station Guddu (1-13)

Units	Year	Availability Factor	Allowed Limit as per PPA
1	2014-15	88%	83%
	2015-16	15%	83%
2	2014-15	0%	83%
	2015-16	0%	83%
3	2014-15	80%	83%
	2015-16	62%	66%
4	2014-15	0%	83%
	2015-16	0%	83%
5	2014-15	91%	87%
	2015-16	94%	87%
6	2014-15	48%	87%
	2015-16	92%	87%
7	2014-15	96%	83%
	2015-16	97%	83%
8	2014-15	98%	83%
	2015-16	79%	83%
9	2014-15	0%	83%
	2015-16	0%	83%
10	2014-15	57%	83%
	2015-16	84%	83%

11	2014-15	0%	66%
	2015-16	40%	85%
12	2014-15	0%	66%
	2015-16	22%	85%
13	2014-15	0%	66%
	2015-16	0%	85%

Table 37

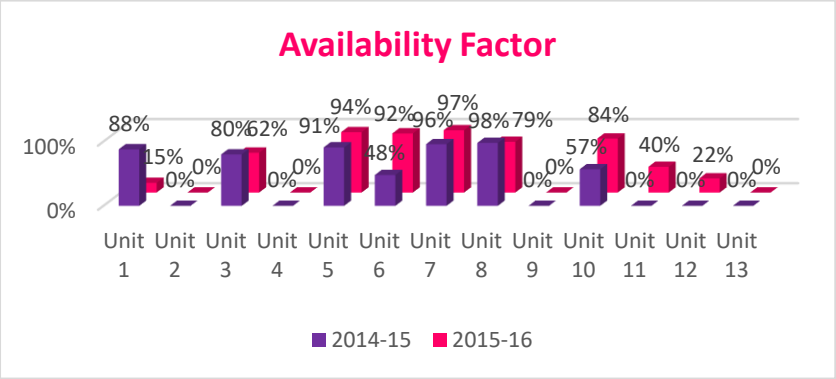

Figure 27

5.5.2 Thermal Power Station Guddu (14-16)

Units	Year	Availability Factor	Allowed Limit as per PPA
14	2014-15	59%	83%
	2015-16	56%	66%
15	2014-15	76%	83%
	2015-16	74%	83%
16	2014-15	60%	83%
	2015-16	67%	83%

Table 38

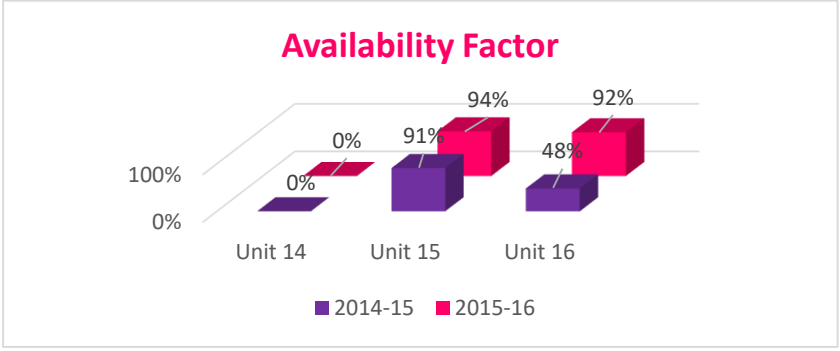

Figure 28

Note: Allowed Limit of Availability Factor for each Unit has been calculated by subtracting the allowed limit of total outages from 100%.

5.6 Unit wise Net Capacity Factor

5.6.1 Thermal Power Station Guddu (1-13)

Units	Year	Net Capacity Factor
1	2014-15	34%
	2015-16	0%
2	2014-15	0%
	2015-16	0%
3	2014-15	21%
	2015-16	2%
4	2014-15	0%
	2015-16	0%
5	2014-15	55%
	2015-16	30%
6	2014-15	13%
	2015-16	8%
7	2014-15	86%
	2015-16	42%
8	2014-15	93%
	2015-16	45%
9	2014-15	0%
	2015-16	0%
10	2014-15	41%
	2015-16	25%
11	2014-15	0%
	2015-16	13%
12	2014-15	0%
	2015-16	1%
13	2014-15	0%
	2015-16	0%

Table 39

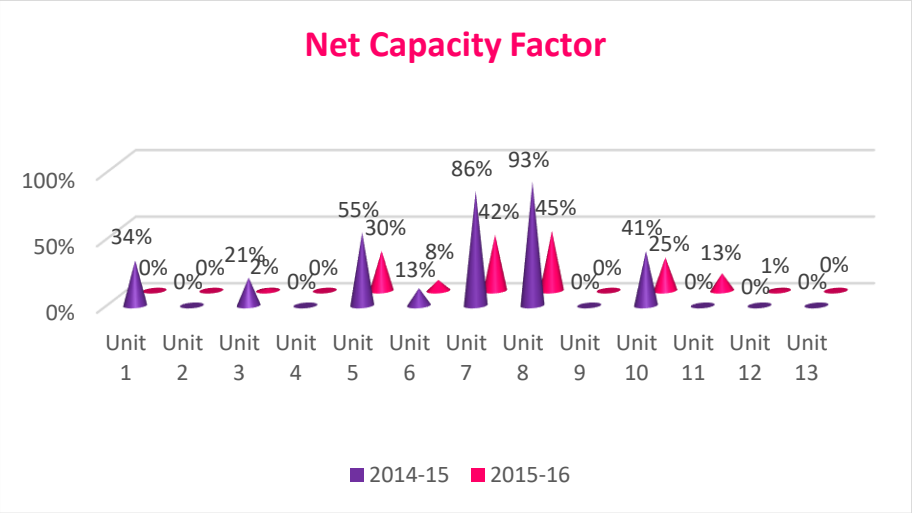

Figure 29

5.6.2 Thermal Power Station Guddu (14-16)

Units	Year	Net Capacity Factor
14	2014-15	42%
	2015-16	49%
15	2014-15	61%
	2015-16	64%
16	2014-15	39%
	2015-16	46%

Table 40

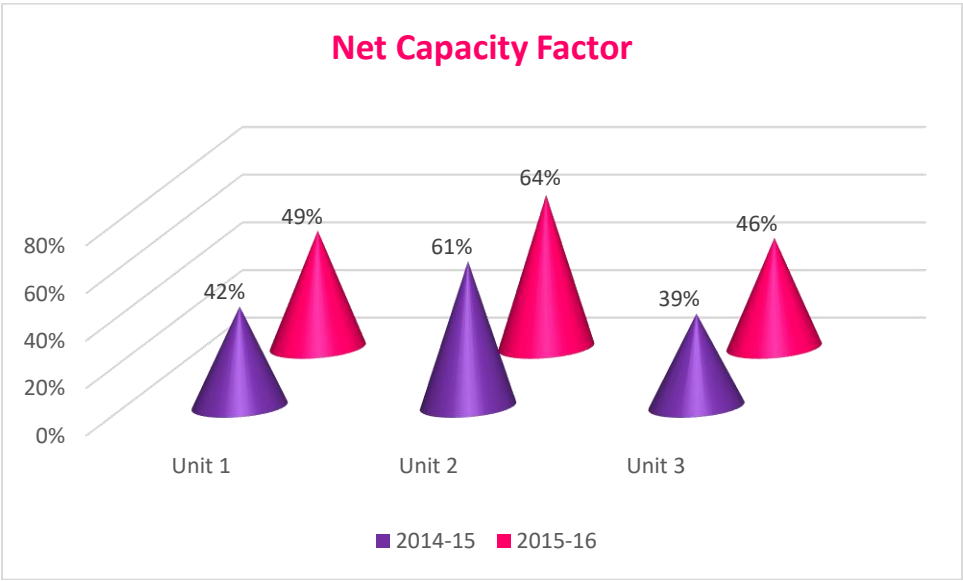

Figure 30

5.7 Unit wise Net Output Factor

5.7.1 Thermal Power Station Guddu (1-13)

Units	Year	Net Output Factor
1	2014-15	71%
	2015-16	59%
2	2014-15	0%
	2015-16	0%
3	2014-15	77%
	2015-16	24%
4	2014-15	0%
	2015-16	0%
5	2014-15	68%
	2015-16	32%
6	2014-15	32%
	2015-16	17%
7	2014-15	105%
	2015-16	49%
8	2014-15	109%
	2015-16	60%
9	2014-15	0%
	2015-16	0%
10	2014-15	89%
	2015-16	48%
11	2014-15	0%
	2015-16	39%
12	2014-15	0%
	2015-16	63%
13	2014-15	0%
	2015-16	0%

Table 41

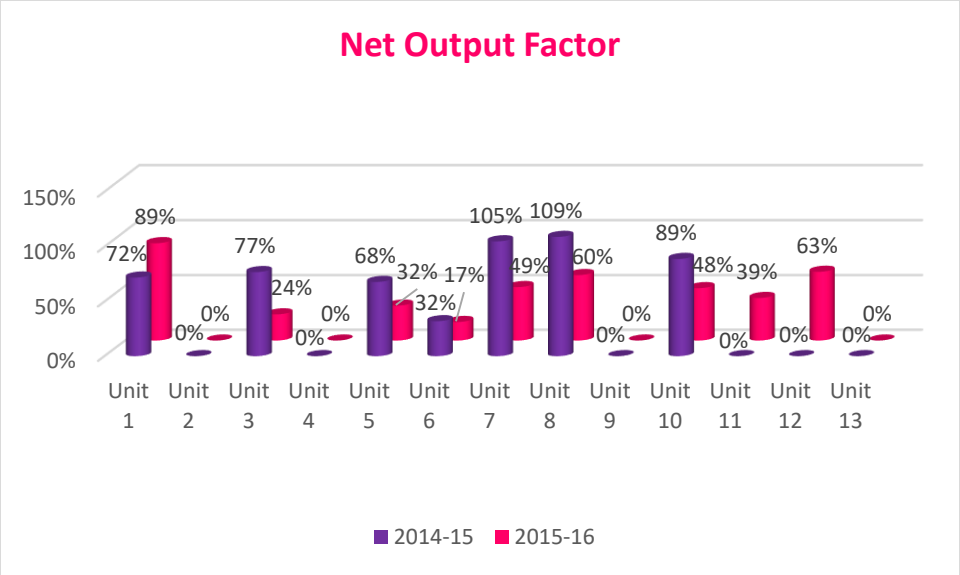

Figure 31

5.7.2 Thermal Power Station Guddu (14-16)

Units	Year	Net Output Factor
14	2014-15	72%
	2015-16	89%
15	2014-15	81%
	2015-16	87%
16	2014-15	67%
	2015-16	69%

Table 42

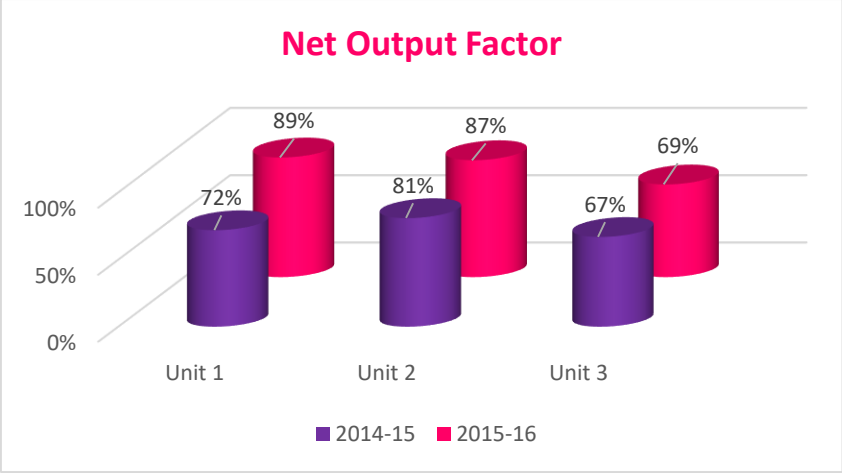

Figure 32

5.8 Unit wise Energy Availability Factor

5.8.1 Thermal Power Station Guddu (1-13)

Units	Year	Energy Availability Factor
1	2014-15	88%
	2015-16	15%
2	2014-15	0%
	2015-16	0%
3	2014-15	80%
	2015-16	62%
4	2014-15	0%
	2015-16	0%
5	2014-15	55%
	2015-16	44%
6	2014-15	2%
	2015-16	31%
7	2014-15	84%
	2015-16	62%
8	2014-15	90%
	2015-16	49%
9	2014-15	0%
	2015-16	0%
10	2014-15	31%
	2015-16	43%
11	2014-15	0%
	2015-16	40%
12	2014-15	0%
	2015-16	22%
13	2014-15	0%
	2015-16	0%

Table 43

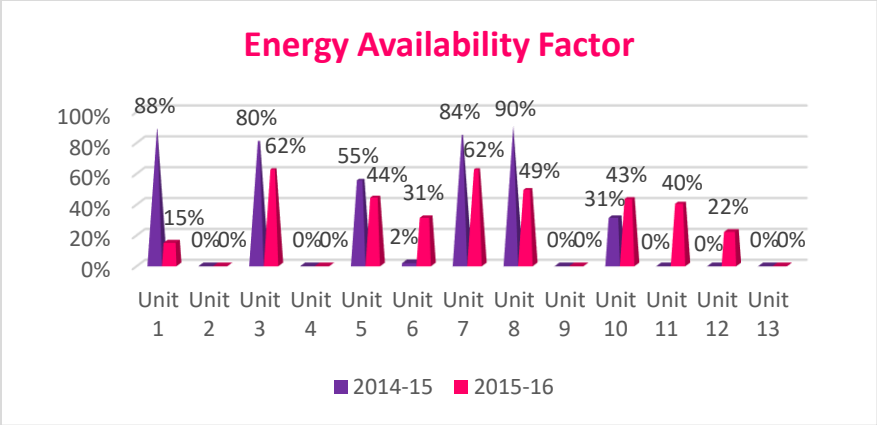

Figure 33

5.8.2 Thermal Power Station Guddu (14-16)

Units	Year	Energy Availability Factor
14	2014-15	59%
	2015-16	56%
15	2014-15	76%
	2015-16	74%
16	2014-15	60%
	2015-16	67%

Table 44

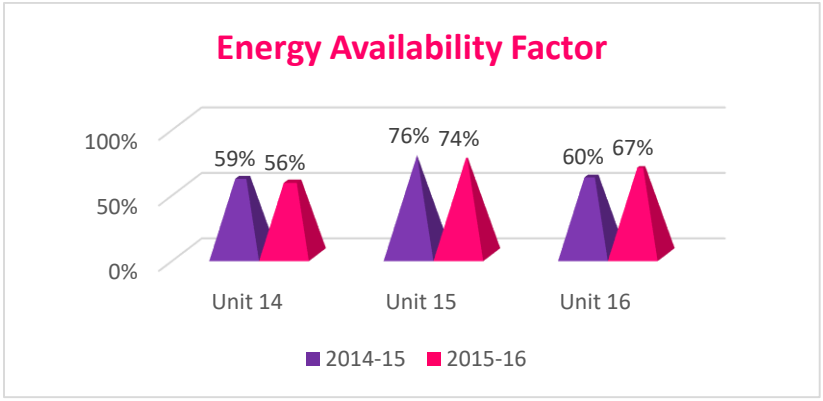

Figure 34

6. Analysis of Northern Power Generation Company Limited (NPGCL) - GENCO- III:

TPS MUZAFFARGARH (GENCO-III)

6.1 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-III	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
1	2014-15	210	200	190	5% (10 MW)	10.27% (20.54 MW)	20.44	10.44	6231.5	65.06	0.1	1258	0.13
	2015-16	210	200	190	5% (10 MW)	8.59% (17.18 MW)	17.09	7.09	6720.5	47.65	0.09	671	0.06
2	2014-15	210	200	182.5	8.75% (17.5 MW)	8.81% (17.62 MW)	17.55	0.05	5738.9	0.29	0.07	2055	0.14
	2015-16	210	200	182.5	8.75% (17.5 MW)	8.19% (16.38 MW)	16.31	0	6089.4	0	0.07	1365	0.10
3	2014-15	210	200	183.5	8.25% (16.5 MW)	8.85% (17.7 MW)	17.63	1.13	4887.1	5.52	0.07	1974	0.14
	2015-16	210	200	183.5	8.25% (16.5 MW)	7.60% (15.2 MW)	15.14	0	6200.2	0	0.06	1021	0.06
4	2014-15	320	300	272.2	9.27% (27.8 MW)	16.96% (50.88 MW)	50.5	22.7	5070.9	115.11	0.38	2159	0.82
	2015-16	320	300	272.2	9.27% (27.8 MW)	12.06% (36.18 MW)	35.91	8.11	4802.3	38.95	0.27	628	0.17
5	2014-15	200	200	177.66	11.17% (22.34 MW)	11.21% (22.42 MW)	22.33	0	5030.8	0	0.09	2432	0.22
	2015-16	200	200	177.66	11.17% (22.34 MW)	11.10% (22.2 MW)	22.11	0	5203.8	0	0.09	1061	0.095
6	2014-15	200	200	177.66	11.17% (22.34 MW)	13.06% (26.12 MW)	26.02	3.68	4464.9	16.43	0.1	3258	0.33
	2015-16	200	200	177.66	11.17% (22.34 MW)	12.58% (25.16 MW)	25.06	2.72	4951.4	13.47	0.1	2088	0.21
Overall		**1350**	**1300**	**1183.52**				**55.92**		**302.47**	**1.49**		**2.46**

Table 45

NOTE

* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-III

** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-III

GTPS FAISALABAD (GENCO-III)

6.2 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-III	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
1	2014-15	25	19	18.75	1.32% (0.25 MW)	1.53% (0.29 MW)	0.02	0	69.8	0	0.27	8308	2.24
	2015-16	25	19	18.75	1.32% (0.25 MW)	1.44% (0.27 MW)	0.02	0	124.6	0	0.25	8122	2.03
2	2014-15	25	19	18.75	1.32% (0.25 MW)	0.01% (0.002 MW)	0	0	0.0	0	0.002	6391	0.013
	2015-16	25	19	18.75	1.32% (0.25 MW)	0.07% (0.0136 MW)	0	0	0.0	0	0.0136	1378	0.019
3	2014-15	25	19	18.75	1.32% (0.25 MW)	7.54% (1.43 MW)	0.06	0	21.4	0	1.37	8468	11.60
	2015-16	25	19	18.75	1.32% (0.25 MW)	0.6% (0.11 MW)	0	0	281.2	0	0.11	8434	0.93
4	2014-15	25	19	18.75	1.32% (0.25 MW)	210.68% (40.03 MW)	11.26	11.01	0.7	0.008	28.77	6295	181.1
	2015-16	25	19	18.75	1.32% (0.25 MW)	102.16% (19.41 MW)	9.23	8.98	1.6	0.015	10.18	4607	46.9
5	2014-15	25	23	20	13% (3 MW)	0.65% (0.15 MW)	0	0	194.1	0	0.15	8554	1.28
	2015-16	25	23	20	13% (3 MW)	0.09% (0.02 MW)	0.01	0	2787.7	0	0.01	5935	0.059
6	2014-15	25	23	20	13% (3 MW)	9.80% (2.25 MW)	0.06	0	135.0	0	2.19	8561	18.75
	2015-16	25	23	20	13% (3 MW)	0.64% (0.15 MW)	0.05	0	2207.1	0	0.1	5466	0.55
7	2014-15	25	23	20	13% (3 MW)	0.42% (0.10 MW)	0	0	315.6	0	0.1	8429	0.84
	2015-16	25	23	20	13% (3 MW)	0.09% (0.02 MW)	0.01	0	2413.1	0	0.01	6151	0.06
8	2014-15	25	23	20	13% (3 MW)	0.39% (0.09 MW)	0	0	314.9	0	0.09	8437	0.76
	2015-16	25	23	20	13% (3 MW)	0.08% (0.02 MW)	0.01	0	2611.4	0	0.01	6043	0.06
9	2014-15	44	42	37	11.9% (5 MW)	13.18% (5.54 MW)	0.58	0	309.1	0	4.96	7870	39.04
	2015-16	44	42	37	11.9% (5 MW)	6.54% (2.75 MW)	1.2	0	2737.4	0	1.55	4956	7.68
Overall		**244**	**210**	**192**				**19.99**		**0.02**	**50.14**		**313.92**

Table 46

NOTE
* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-III
** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-III

SPS FAISALABAD (GENCO-III)

6.3 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-III	Loss during Service Mode				Loss during Standby Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)**	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
1	2014-15	66	50	48.5	3.13% (1.5 MW)	11.86% (5.93 MW)	5.42	3.92	833.7	3.27	0.51	7194	3.67
	2015-16	66	50	48.5	3.13% (1.5 MW)	-	0	0	0	0	0	3672	0
2	2014-15	66	50	48.5	3.13% (1.5 MW)	11.86% (5.93 MW)	5.4	3.9	1525.2	5.95	0.53	6514	3.45
	2015-16	66	50	48.5	3.13% (1.5 MW)	11.31% (5.65 MW)	5.6	4.1	2152.9	8.83	0.05	5720	0.29
Overall		**132**	**100**	**97**				**11.92**		**18.04**	**1.09**		**7.41**

Table 47

NOTE
* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-III
** Auxiliary Consumption during Standby mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-III

CCPP NANDIPUR (GENCO-III)

6.4 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & STANDBY MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Loss during Service Mode				Loss during Standby Mode		
						Auxiliary Consumption during Service Mode (MW)	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Standby Mode (MW)	Standby Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8=7-6	9	10=9*8	11	12	13=11*12
1	2015-16	95.4	95.4	92.31	3.2% (3.09 MW)	3.09	0	4063.9	0	0.34	2220.82	0.76
2	2015-16	95.4	95.4	92.31	3.2% (3.09 MW)	3.09	0	3290.8	0	0.34	2334.24	0.79
3	2015-16	95.4	95.4	92.31	3.2% (3.09 MW)	3.09	0	3547.1	0	0.34	2299.7	0.78
4	2015-16	138.9	138.9	134.41	3.2% (4.49 MW)	4.49	0	5200.9	0	0.5	2000.45	1
Overall		**425**	**425**	**411.34**			**0**		**0**	**1.52**		**3.33**

Table 48

NOTE
Auxiliary Consumption during Service and Standby mode has been worked out from the information provided by NPGCL vide letter dated 28.11.2016.

Reasons of Increase in Auxiliary Consumption as provided by GENCO-III:

i) Some of the essential auxiliaries remained in operation even during standby mode, which caused an increase in auxiliary consumption without any production.

ii) Operation of machines at part load due to less demand/dispatch from System Operator NPCC or certain technical constraints.

6.5 Unit wise Service Hours & Standby Hours w.r.t Period Hours

6.5.1 TPS Muzaffargarh

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby hours due to NPCC	Standby Hours due to Flood	Standby Hours due to Fuel Constraints
1	2	3	4	5=4/3	6	7	8=6/3	9	10	11
1	2014-15	8760	6231.45	71%	1258	1.75	14%	70	1075	114
	2015-16	8784	6720.54	77%	671	0.93	8%	671	-	-
2	2014-15	8760	5738.92	66%	2055	2.86	23%	2023	-	32
	2015-16	8784	6089.35	69%	1365	1.90	16%	1365	-	-
3	2014-15	8760	4887.11	56%	1974	2.74	23%	1351	396	227
	2015-16	8784	6200.24	71%	1021	1.42	12%	1021	-	-
4	2014-15	8760	5070.86	58%	2159	2.99	25%	1792	-	367
	2015-16	8784	4802.34	55%	628	1	7%	628	-	-

5	2014-15	8760	5030.83	57%	2432	3	28%	2432	-	-
	2015-16	8784	5203.79	59%	1061	1	12%	1061	-	-
6	2014-15	8760	4464.91	51%	3258	4.53	37%	2754	335	170
	2015-16	8784	4951.4	56%	2089	2.90	24%	2089	-	-

Table 49

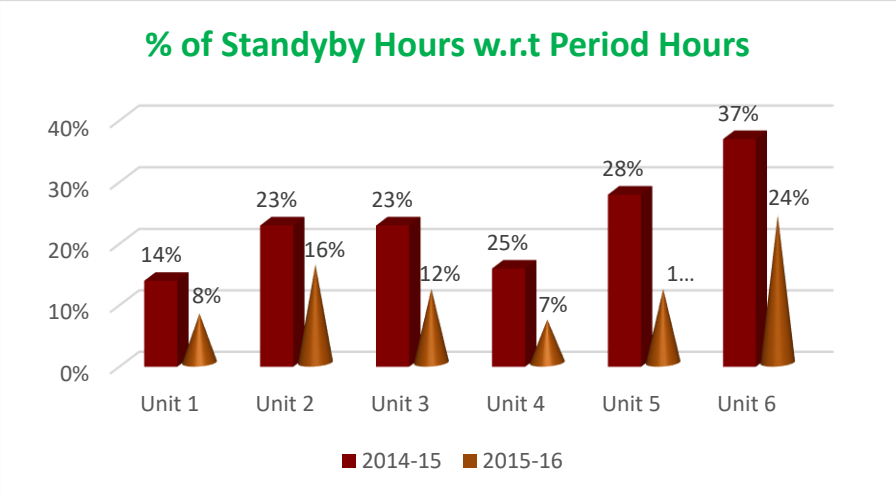

Figure 35

6.5.2 GTPS Faisalabad

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby Hours due to NPCC
1	2	3	4	5=4/3	6	7	8=6/3	9
1	2014-15	8760	69.77	1%	8308	11.54	95%	8308
	2015-16	8784	124.622	1%	8122	11.28	92%	8122
2	2014-15	8760	0	0%	6391	8.88	73%	6391
	2015-16	8784	0	0%	1378	1.91	16%	1378
3	2014-15	8760	21.448	0%	8468	11.76	97%	8468
	2015-16	8784	281.248	3%	8434	11.71	96%	8434
4	2014-15	8760	0.737	0%	6295	8.74	72%	6295
	2015-16	8784	1.617	0%	4607	6	52%	4607
5	2014-15	8760	194.081	2%	8554	12	98%	8554
	2015-16	8784	2787.65	32%	5935	8	68%	5935
6	2014-15	8760	135.015	2%	8561	11.89	98%	8561
	2015-16	8784	2207.11	25%	5466	7.59	62%	5466

7	2014-15	8760	315.553	4%	8429	11.71	96%	8429
	2015-16	8784	2413.11	27%	6151	8.54	70%	6151
8	2014-15	8760	314.88	4%	8437	9.97	96%	8437
	2015-16	8784	2611.4	30%	6043	8.39	69%	6043
9	2014-15	8760	309.079	4%	7870	10.93	90%	7870
	2015-16	8784	2737.43	31%	4956	6.88	56%	4956

Table 50

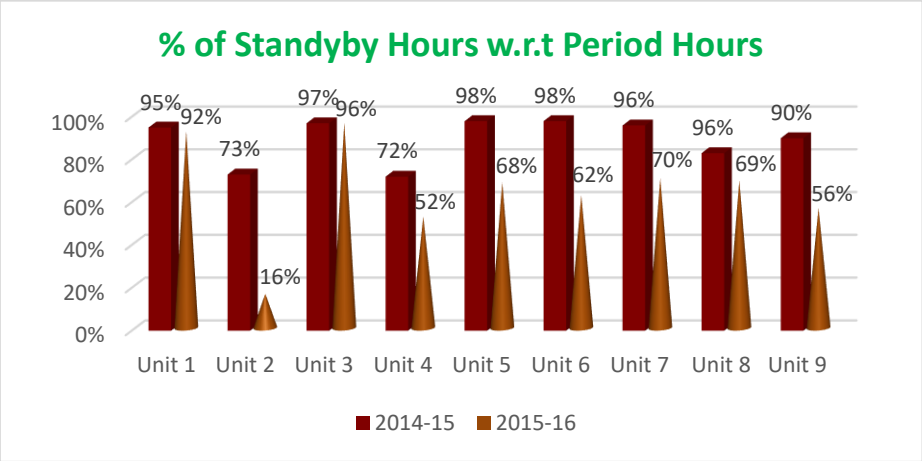

Figure 36

6.5.3 SPS Faisalabad

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours	Standby Hours due to NPCC
1	2	3	4	5=4/3	6	7	8=6/3	9
1	2014-15	8760	833.67	10%	7194	9.99	82%	7194
	2015-16	8784	0	0%	3672	5.10	42%	3672
2	2014-15	8760	1525.2	18%	6514	9.05	74%	6514
	2015-16	8784	2152.9	25%	5720	7.94	65%	5720

Table 51

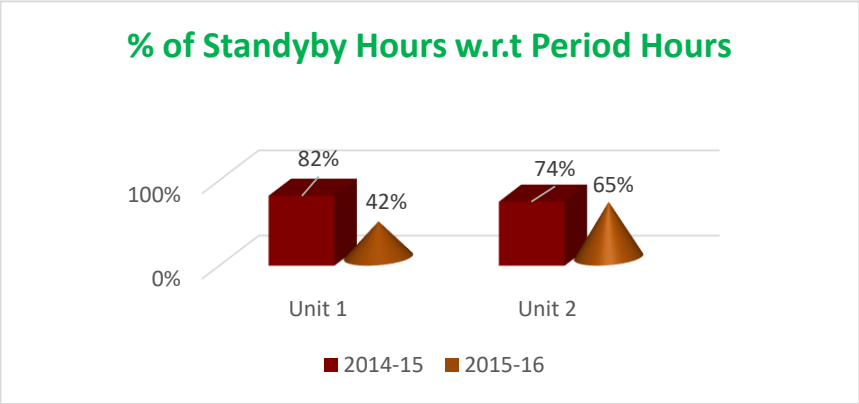

Figure 37

6.5.4 CCPP Nandipur

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours
1	2	3	4	5=4/3	6	7	8=6/3
1	2015-16	8784	4063.9	46%	2220.82	3.08	25%
2	2015-16	8784	3290.8	37%	2334.24	3.24	27%
3	2015-16	8784	3547.1	40%	2299.7	3.19	26%
4	2015-16	8784	5200.9	59%	2000.45	3	23%

Table 52

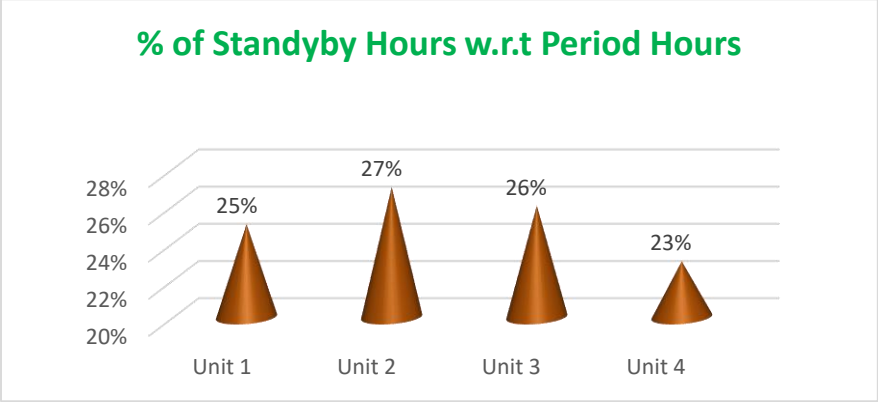

Figure 38

Reasons of Standby Hours as provided by GENCO-III:

i) Standby due to NPCC instructions

ii) Standby due to shortage of Fuel

iii) Standby due to other reasons such as Flood in 2014-15.

6.6 Unit wise Planned & Unplanned Outage Hours w.r.t to Period Hours, Consumption of Extra Outage Hours, Subsequent Energy Loss and Financial Impact

6.6.1 TPS Muzaffargarh

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
1	2014-15	190	8760	468	5.3	802.34	9.2	14.5	17	0	0	0
	2015-16	190	8784	596.16	6.8	795.83	9.1	15.8	17	0	0	0
2	2014-15	182.5	8760	634.2	7.2	331.19	3.8	11	17	0	0	0
	2015-16	182.5	8784	792.16	9	537.91	6.1	15.1	17	0	0	0
3	2014-15	183.5	8760	1599.3	18.3	299.28	3.4	21.7	17	4.7	409.4	75.1
	2015-16	183.5	8784	828.1	9.4	734.82	8.4	17.8	17	0.8	69.6	12.8
4	2014-15	272.2	8760	888.4	10	642.17	7	17	17	0	0	0
	2015-16	272.2	8784	744	8.5	2606.8	29.7	38.1	17	21.1	1857.5	505.6
5	2014-15	177.66	8760	1020.3	11.6	276.78	3.2	14.8	17	0	0	0
	2015-16	177.66	8784	1465.2	16.7	1031.51	11.7	28.4	17	11.4	1003.4	178.3
6	2014-15	177.66	8760	853.5	9.7	183.21	2.1	11.8	17	0	0	0
	2015-16	177.66	8784	768.87	8.8	974.92	11.1	19.9	17	2.9	250.5	44.5
Overall		1183.52									598	816.3

Table 53

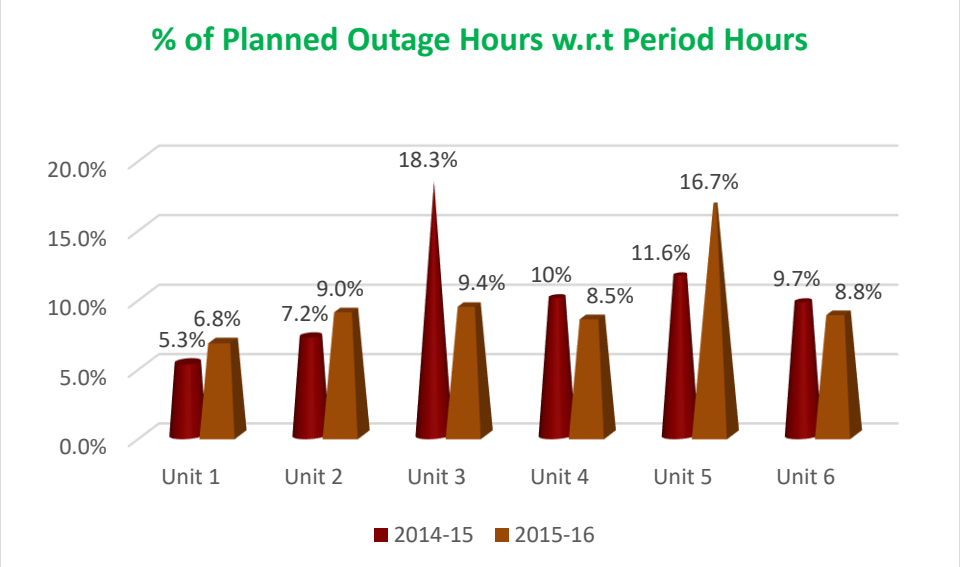

Figure 39

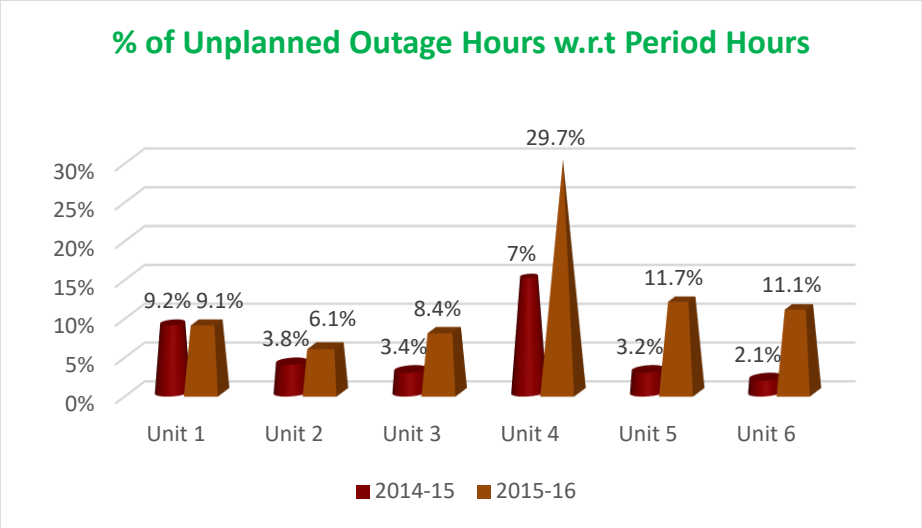

Figure 40

6.6.2 GTPS Faisalabad

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
1	2014-15	18.75	8760	0	0	382.33	4.4	4.4	17	0	0	0
	2015-16	18.75	8784	0	0	537.133	6.1	6.1	17	0	0	0
2	2014-15	18.75	8760	0	0	2369.2	27	27	17	10	880	16.5
	2015-16	18.75	8784	0	0	7405.5	84.3	84.3	17	67.3	5912.2	110.9
3	2014-15	18.75	8760	0	0	270.167	3.1	3.1	17	0	0	0
	2015-16	18.75	8784	0	0	68.813	0.8	0.8	17	0	0	0
4	2014-15	18.75	8760	1017	11.6	1447.64	16.5	28.1	17	11.1	975.4	18.3
	2015-16	18.75	8784	0	0	4175.77	47.5	47.5	17	30.5	2682.5	50.3
5	2014-15	20	8760	0	0	11.69	0.1	0.1	12	0	0	0
	2015-16	20	8784	0	0	61.33	0.7	0.7	12	0	0	0
6	2014-15	20	8760	0	0	64.07	0.7	0.7	12	0	0	0
	2015-16	20	8784	0	0	1111.23	12	12	12	0	0	0
7	2014-15	20	8760	0	0	15.38	0.2	0.2	12	0	0	0
	2015-16	20	8784	0	0	220.19	2.5	2.5	12	0	0	0
8	2014-15	20	8760	0	0	7.8	0.1	0.1	12	0	0	0
	2015-16	20	8784	0	0	129.87	1.5	1.5	12	0	0	0
9	2014-15	37	8760	576.1	6.6	4.68	0.1	6.6	17	0	0	0
	2015-16	37	8784	734.75	8.4	355.72	4	12.4	17	0	0	0
Overall		**192**									**1161**	**195.9**

Table 54

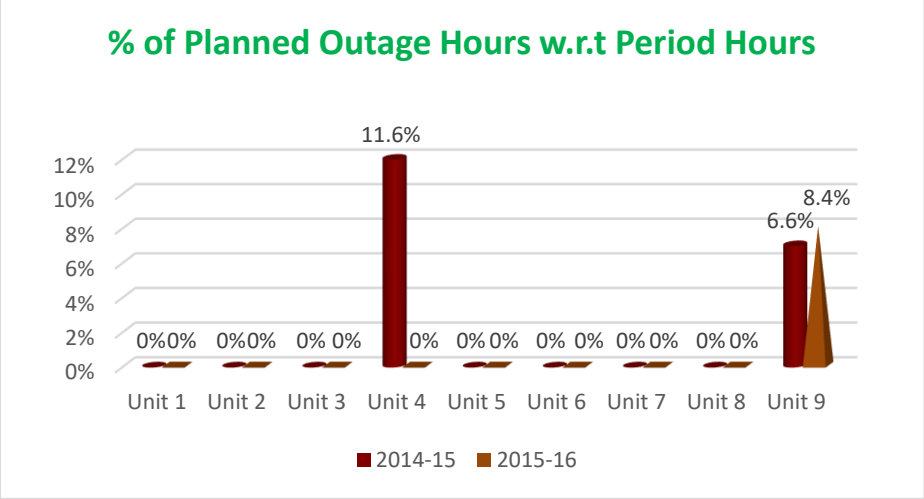

Figure 41

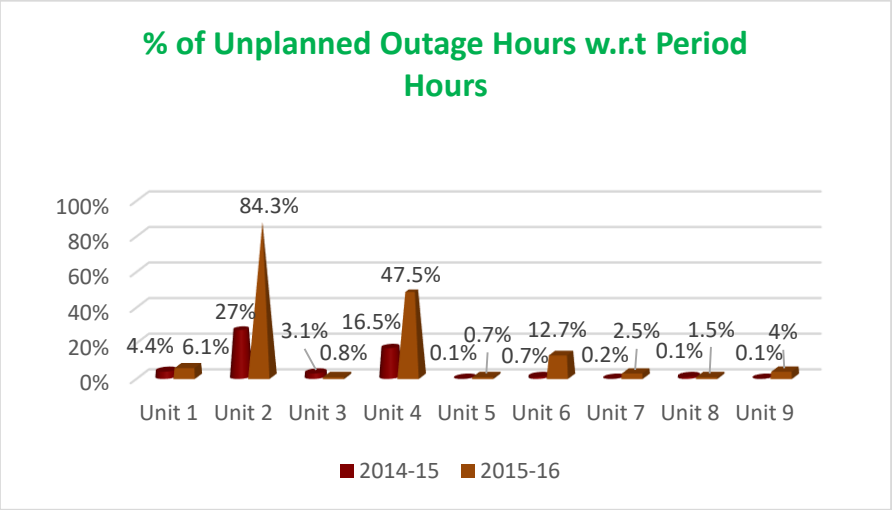

Figure 42

6.6.3 SPS Faisalabad

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
1	2014-15	48.5	8760	0	0	731.84	8.4	8.4	17	0	0	0
	2015-16	48.5	8784	0	0	5112	58.2	58.2	17	41.2	3618.7	175.5
2	2014-15	48.5	8760	456	5.2	192.81	2.2	7.4	17	0	0	0
	2015-16	48.5	8784	720	8.2	191.38	2.2	10.4	17	0	0	0
Overall		97									1809	175.5

Table 55

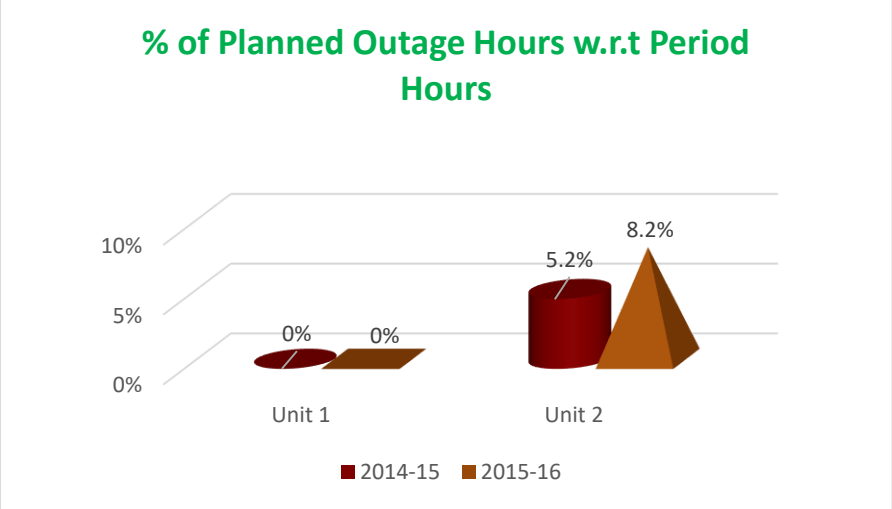

Figure 43

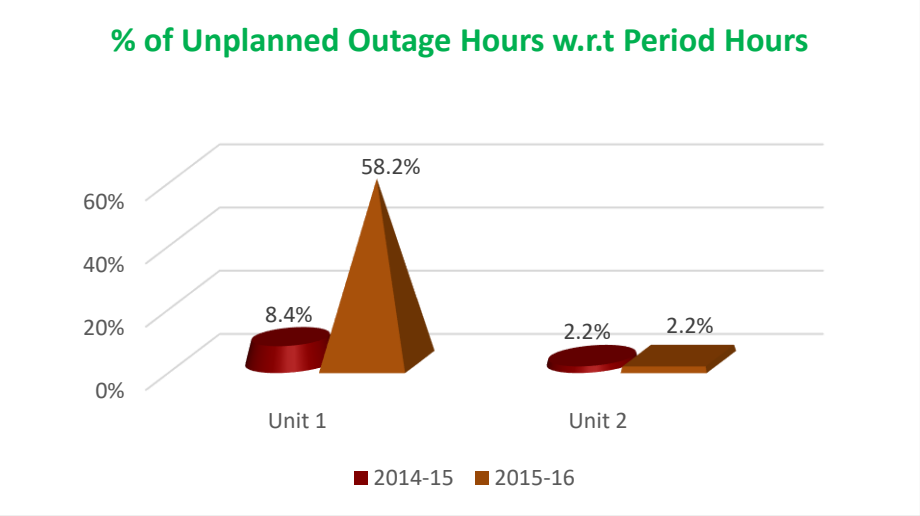

Figure 44

6.6.4 CCPP Nandipur

Unit	Year	Net Capacity as per Tariff (MW)	Period Hours (PH)	Planned Outage Hours (POH)	% of POH w.r.t PH	Unplanned Outage Hours (UOH)	% of UOH w.r.t PH	Total Outage Hours w.r.t PH (%)	Allowed Limit as per PPA (%)	Violation of Allowed Limit by (%)	Extra Outage Hours Consumed	Energy Loss (Mln.kWh)
1	2	3	4	5	6=5/4	7	8=7/4	9=6+8	10	11=9-10	12=11*4	13=12*3
1	2015-16	92.31	8784	930.93	10.6	1568.36	17.9	28.5	17	11.5	1006.0	92.9
2	2015-16	92.31	8784	1209.28	13.8	1949.64	22.2	36	17	19	1665.6	153.8
3	2015-16	92.31	8784	1193.32	13.6	1743.91	19.9	33.4	17	16.4	1444	133.3
4	2015-16	134.41	8784	994.94	11.3	587.72	6.7	18	21	0	0	0
Overall		**411.34**									**1029**	**379.9**

Table 56

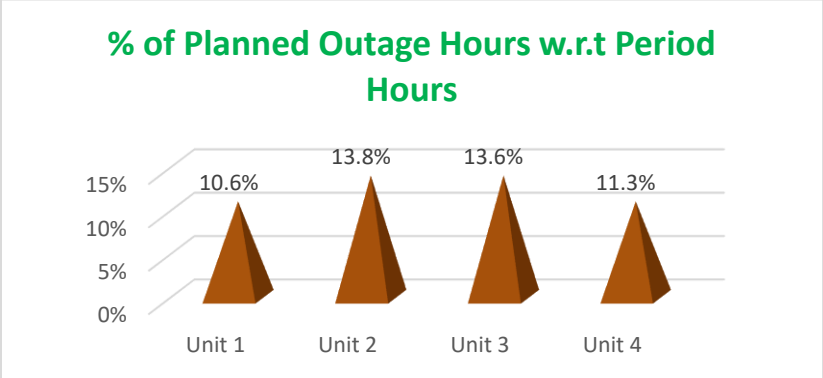

Figure 45

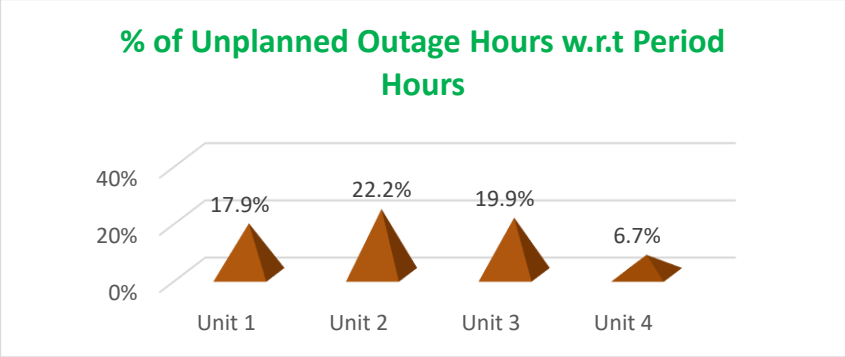

Figure 46

6.7 Availability Factor

6.7.1 TPS Muzaffargarh

Units	Year	Availability Factor	Allowed Limit as per PPA
1	2014-15	85%	83%
	2015-16	84%	83%
2	2014-15	89%	83%
	2015-16	85%	83%
3	2014-15	78%	83%
	2015-16	82%	83%
4	2014-15	85%	83%
	2015-16	62%	83%
5	2014-15	85%	83%
	2015-16	72%	83%
6	2014-15	88%	83%
	2015-16	80%	83%

Table 57

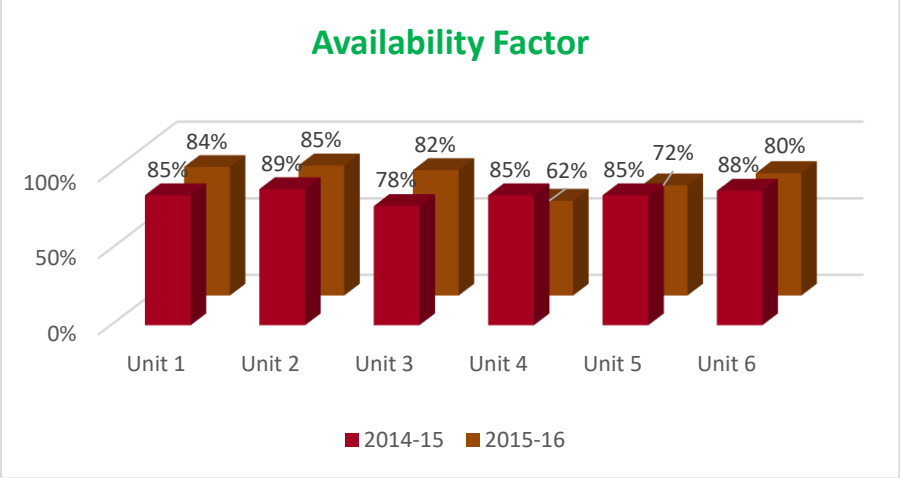

Figure 47

6.7.2 GTPS Faisalabad

Units	Year	Availability Factor	Allowed Limit as per PPA
1	2014-15	96%	83%
	2015-16	94%	83%
2	2014-15	73%	83%
	2015-16	16%	83%
3	2014-15	97%	83%
	2015-16	99%	83%
4	2014-15	72%	83%
	2015-16	52%	83%
5	2014-15	100%	88%
	2015-16	99%	88%
6	2014-15	99%	88%
	2015-16	87%	88%
7	2014-15	100%	88%
	2015-16	97%	88%
8	2014-15	99%	88%
	2015-16	99%	88%
9	2014-15	93%	83%
	2015-16	88%	83%

Table 58

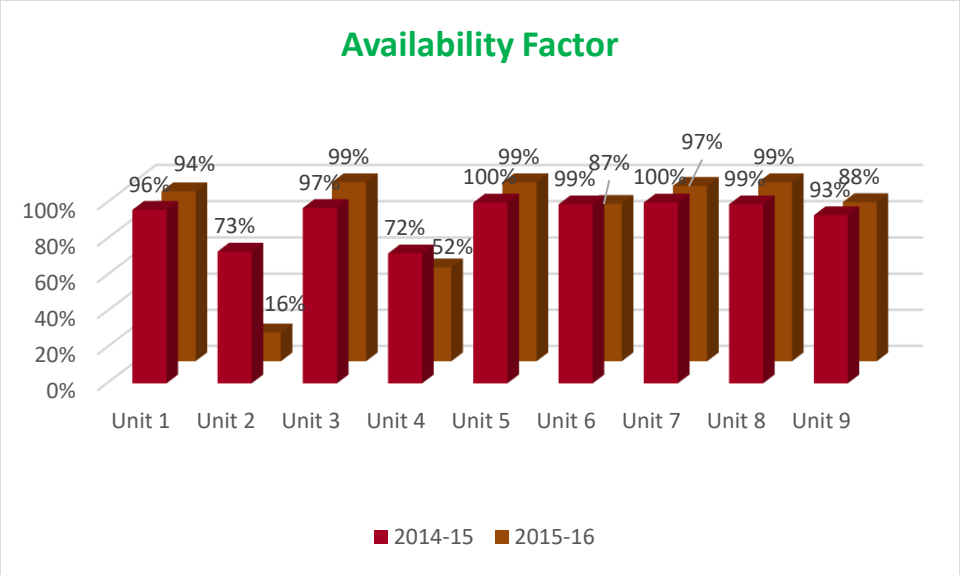

Figure 48

6.7.3 SPS Faisalabad

Units	Year	Availability Factor	Allowed Limit as per PPA
1	2014-15	92%	83%
	2015-16	42%	83%
2	2014-15	93%	83%
	2015-16	90%	83%

Table 59

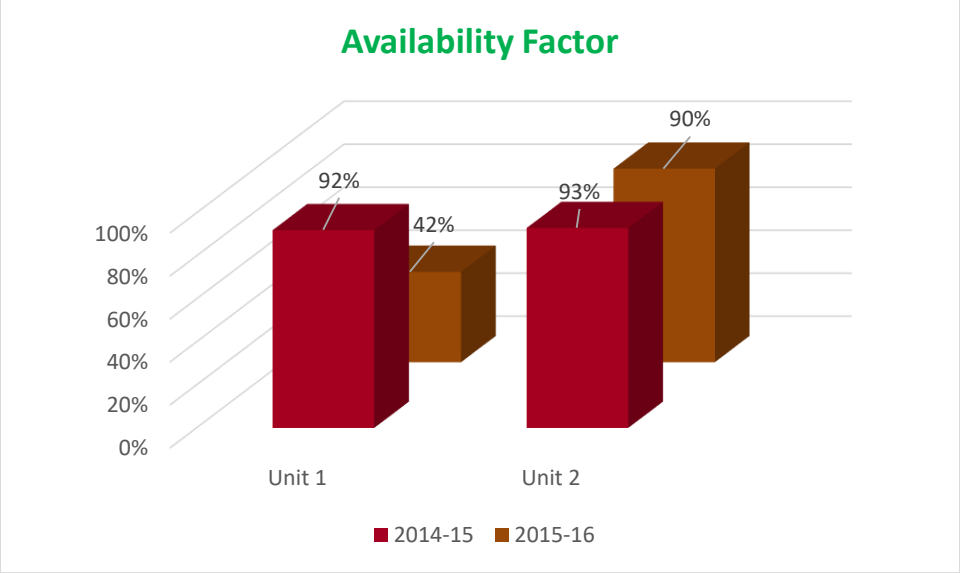

Figure 49

6.7.4 CCPP Nandipur

Units	Year	Availability Factor	Allowed Limit as per PPA
1	2015-16	72%	83%
2	2015-16	64%	83%
3	2015-16	67%	83%
4	2015-16	82%	79%

Table 60

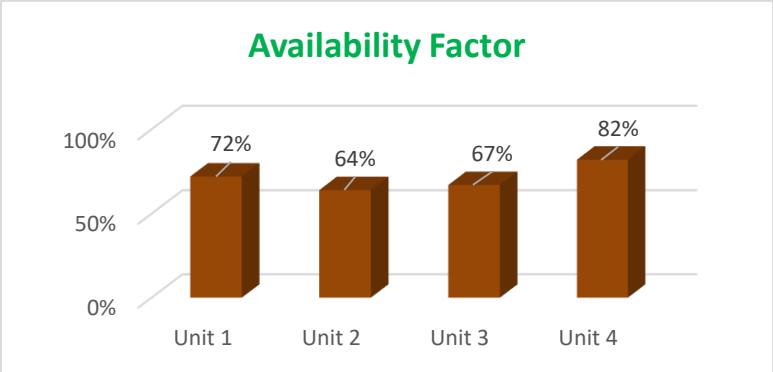

Table 50

Note: Allowed Limit of Availability Factor for each Unit has been calculated by subtracting the allowed limit of total outages from 100%.

6.8 Unit wise Net Capacity Factor

6.8.1 TPS Muzaffargarh

Units	Year	Net Capacity Factor
1	2014-15	58%
	2015-16	63%
2	2014-15	56%
	2015-16	57%
3	2014-15	46%
	2015-16	57%
4	2014-15	44%
	2015-16	40%
5	2014-15	43%
	2015-16	38%
6	2014-15	38%
	2015-16	34%

Table 61

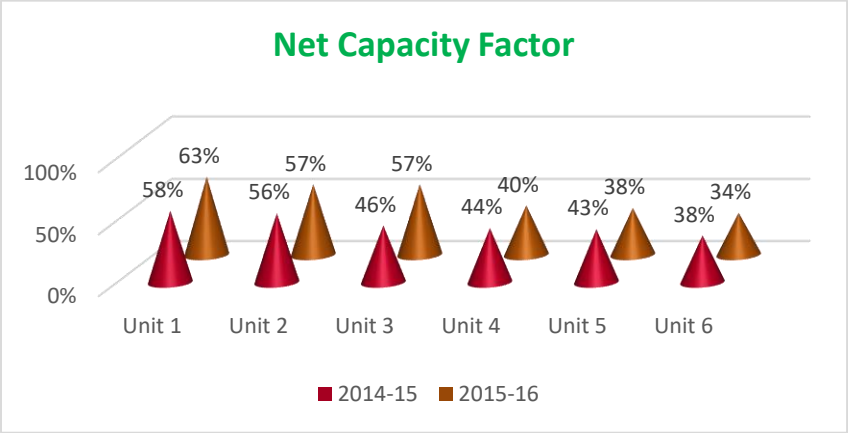

Figure 51

6.8.2 GTPS Faisalabad

Units	Year	Net Capacity Factor
1	2014-15	1%
	2015-16	1%
2	2014-15	0%
	2015-16	0%
3	2014-15	0%
	2015-16	3%
4	2014-15	0%
	2015-16	0%
5	2014-15	2%
	2015-16	26%
6	2014-15	1%
	2015-16	21%
7	2014-15	3%
	2015-16	23%
8	2014-15	12%
	2015-16	24%
9	2014-15	2%
	2015-16	23%

Table 62

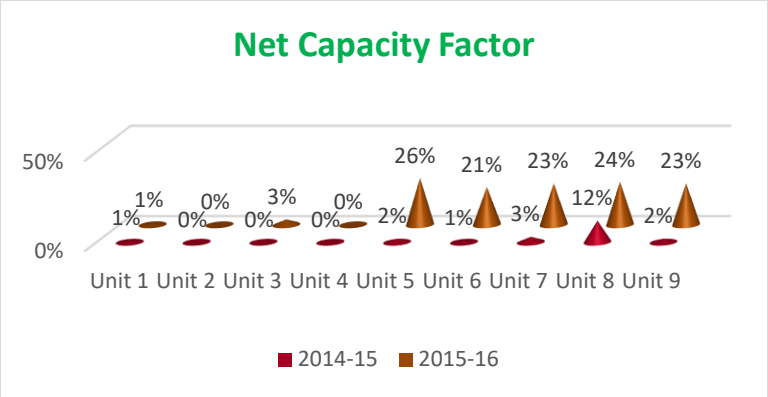

Figure 52

6.8.3 SPS Faisalabad

Units	Year	Net Capacity Factor
1	2014-15	4%
	2015-16	0%
2	2014-15	11%
	2015-16	22%

Table 63

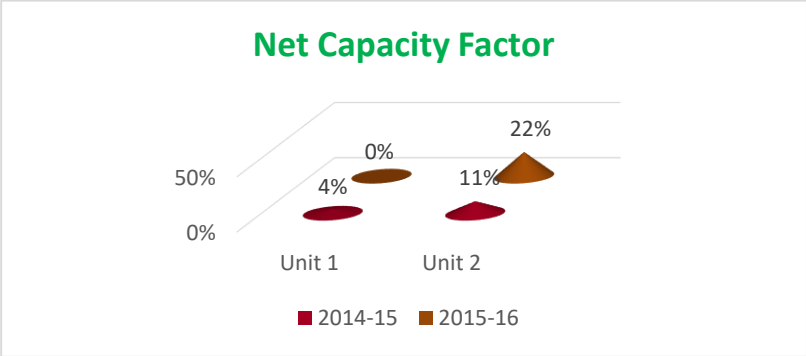

Figure 53

6.8.4 CCPP Nandipur

Units	Year	Net Capacity Factor
1	2015-16	41%
2	2015-16	33%
3	2015-16	34%
4	2015-16	30%

Table 64

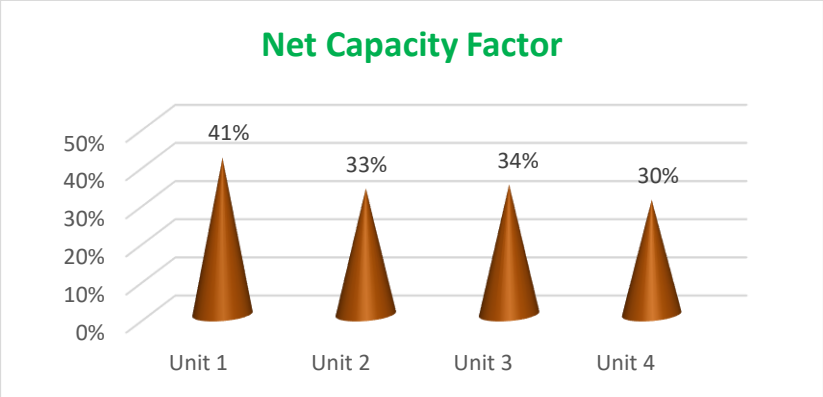

Figure 54

6.9 Unit wise Net Output Factor

6.9.1 TPS Muzaffargarh

Units	Year	Net Output Factor
1	2014-15	82%
	2015-16	83%
2	2014-15	85%
	2015-16	82%
3	2014-15	83%
	2015-16	80%
4	2014-15	64%
	2015-16	73%
5	2014-15	74%
	2015-16	64%
6	2014-15	74%
	2015-16	60%

Table 65

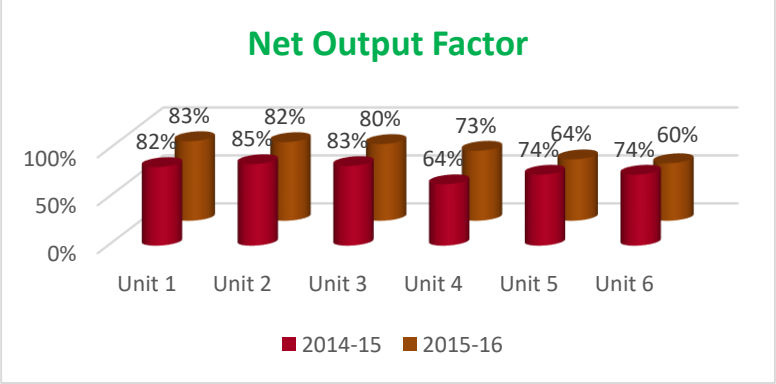

Figure 55

6.9.2 GTPS Faisalabad

Units	Year	Net Output Factor
1	2014-15	78%
	2015-16	84%
2	2014-15	0%
	2015-16	0%
3	2014-15	55%
	2015-16	80%
4	2014-15	-411%
	2015-16	-230%
5	2014-15	82%
	2015-16	82%
6	2014-15	59%
	2015-16	82%
7	2014-15	83%
	2015-16	84%
8	2014-15	75%
	2015-16	79%
9	2014-15	54%
	2015-16	73%

Table 66

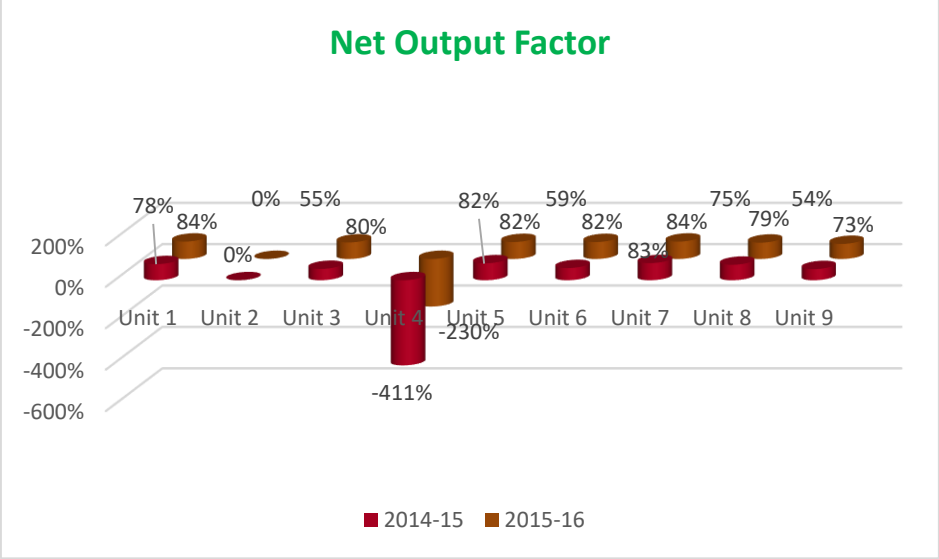

Figure 56

6.9.3 SPS Faisalabad

Units	Year	Net Output Factor
1	2014-15	47%
	2015-16	0%
2	2014-15	61%
	2015-16	89%

Table 67

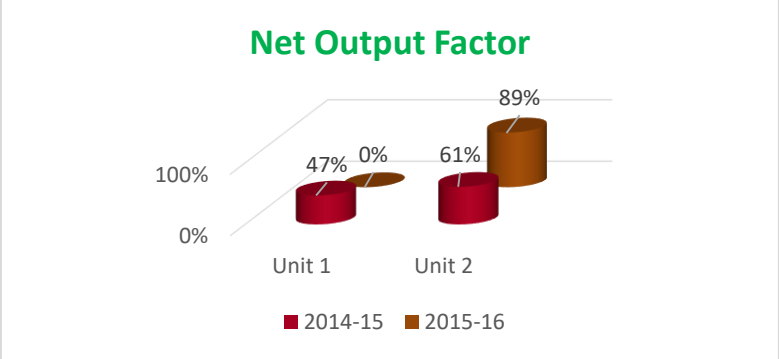

Figure 57

6.9.4 CCPP Nandipur

Units	Year	Net Output Factor
1	2015-16	88%
2	2015-16	89%
3	2015-16	84%
4	2015-16	50%

Table 68

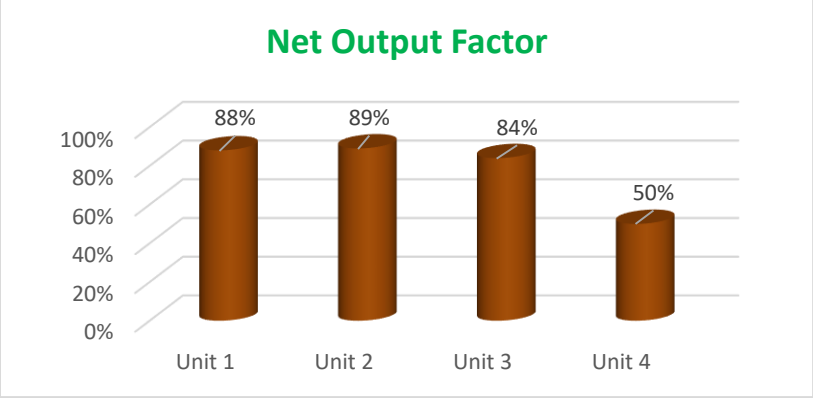

Figure 58

6.10 Unit wise Energy Availability Factor

6.10.1 TPS Muzaffargarh

Units	Year	Energy Availability Factor
1	2014-15	71%
	2015-16	58%
2	2014-15	75%
	2015-16	52%
3	2014-15	64%
	2015-16	50%
4	2014-15	85%
	2015-16	61%
5	2014-15	59%
	2015-16	28%
6	2014-15	71%
	2015-16	48%

Table 69

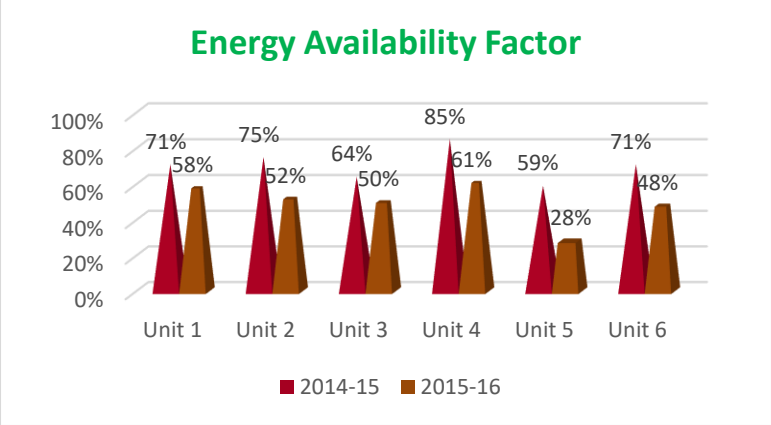

Figure 59

6.10.2 GTPS Faisalabad

Units	Year	Energy Availability Factor
1	2014-15	95%
	2015-16	94%
2	2014-15	73%
	2015-16	16%
3	2014-15	96%
	2015-16	99%
4	2014-15	72%
	2015-16	52%
5	2014-15	99%
	2015-16	99%
6	2014-15	99%
	2015-16	87%
7	2014-15	99%
	2015-16	97%
8	2014-15	98%
	2015-16	98%
9	2014-15	91%
	2015-16	87%

Table 70

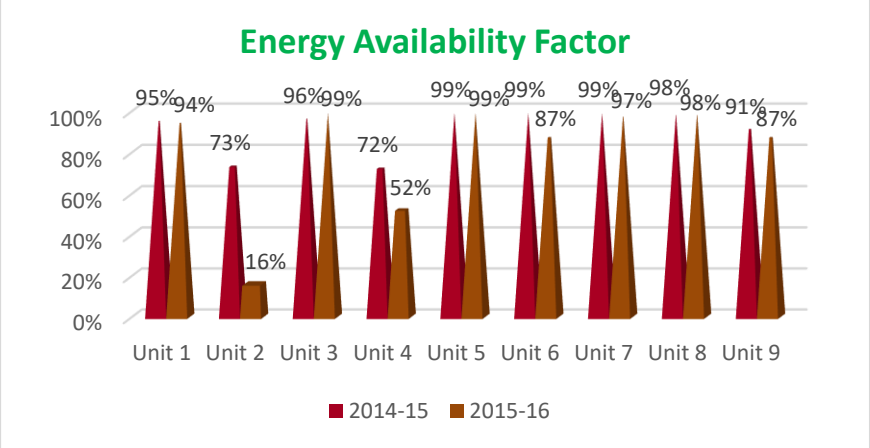

Figure 60

6.10.3 SPS Faisalabad

Units	Year	Energy Availability Factor
1	2014-15	91%
	2015-16	42%
2	2014-15	80%
	2015-16	88%

Table 71

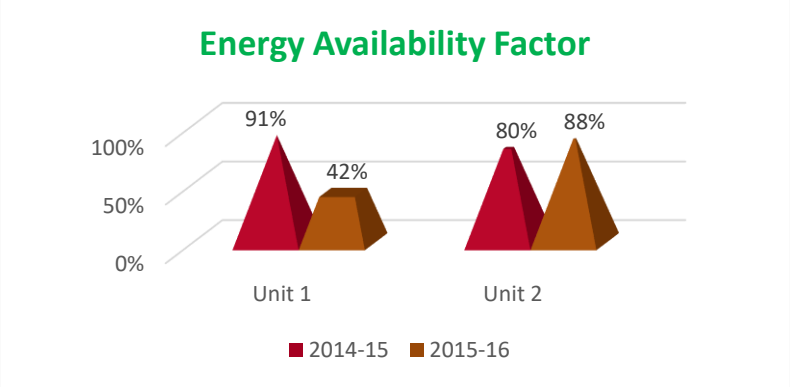

Figure 61

6.10.4 CCPP Nandipur

Units	Year	Energy Availability Factor
1	2015-16	72%
2	2015-16	64%
3	2015-16	67%
4	2015-16	82%

Table 72

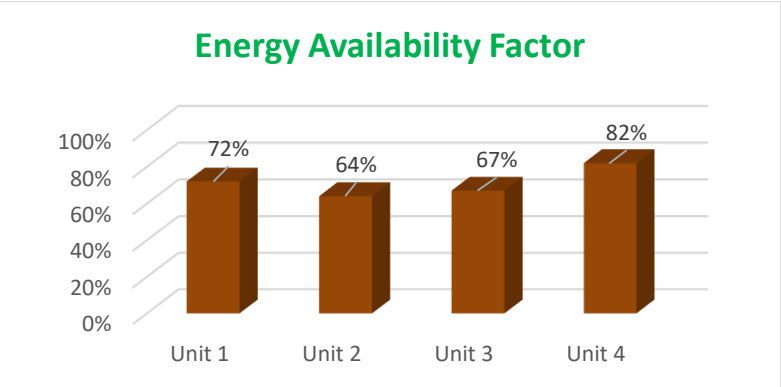

Figure 62

7. Analysis of Lakhra Power Generation Company Limited (LPGCL) - GENCO- IV:

LAKHRA POWER STATION (GENCO-IV)

7.1 UNIT WISE AUXILIARY CONSUMPTION DURING SERVICE & SHUTDOWN MODES, SUBSEQUENT ENERGY LOSS AND FINANCIAL IMPACT

Unit	Year	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity as per Tariff (MW)	Allowed Auxiliary Consumption	Total Auxiliary Consumption as calculated from E-Form provided by GENCO-IV	Loss during Service Mode				Loss during Shutdown Mode		
							Auxiliary Consumption during Service Mode (MW)*	Excess Auxiliary Consumption during Service Mode (MW)	Service Hours	Energy Loss (Mln.kWh)	Auxiliary Consumption during Shutdown Mode (MW)**	Total Outage Hours	Energy Loss (Mln.kWh)
1	2	3	4	5	6=4-5	7	8	9=8-6	10	11=9*10	12	13	14=12*13
1	2014-15	50	40	31.2	22% (8.8 MW)	29.4% (11.76 MW)	10	1.2	1817.8	2.18	1.76	6940.6	12.22
	2015-16	50	40	31.2	22% (8.8 MW)	29.1% (11.64 MW)	9.92	1.12	1438.06	1.61	1.72	7344.7	12.63
2	2014-15	50	40	31.2	22% (8.8 MW)	29.4% (11.76 MW)	10	1.2	3037.8	3.65	1.76	5721.3	10.07
	2015-16	50	40	31.2	22% (8.8 MW)	29.1% (11.64 MW)	9.92	1.12	3854.66	4.32	1.72	4927.7	8.48
Overall		**100**	**80**	**62.4**				**4.64**		**11.75**	**6.96**		**43.39**

Table 73

NOTE
* Auxiliary Consumption during Service mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-IV
** Auxiliary Consumption during Shutdown mode has been worked out from the total auxiliary consumption as provided in E-Form by GENCO-IV

7.2 Unit wise Service Hours & Standby Hours w.r.t Period Hours:

Units	Year	Period Hours	Service Hours	% of Service Hours w.r.t Period Hours	Standby Hours	Standby Months	% of Standby Hours w.r.t Period Hours
1	2	3	4	5=4/3	6	7	8=6/3
1	2014-15	8760	1817.8	19%	0	0	0%
	2015-16	8784	1438.1	14%	0	0	0%
2	2014-15	8760	3037.5	33%	0	0	0%
	2015-16	8784	3854.7	37%	0	0	0%

Table 74

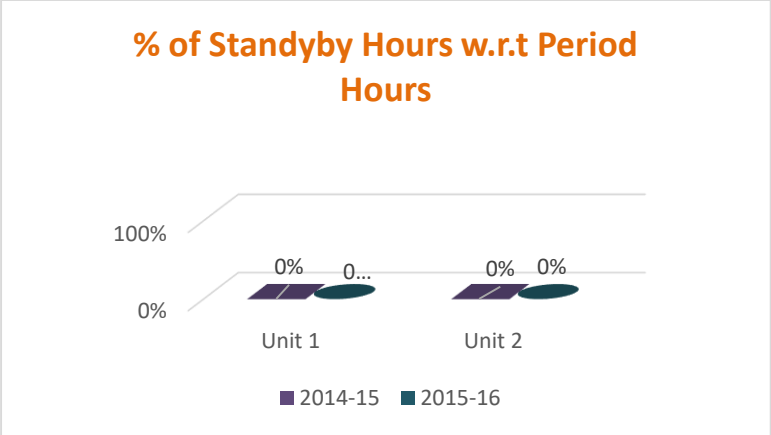

Figure 63

7.3 Unit wise Planned & Unplanned Outage Hours w.r.t Period Hours:

Units	Year	Ref. Capacity (MW)	Period Hours	Planned Outage Hours	% of POH w.r.t Period Hours	Unplanned Outage Hours	% of UOH w.r.t Period Hours	Total (POH+UOH)
1	2	3	4	5	6=5/4	7	8=7/4	9=8+6
1	2014-15	31.2	8760	2304	26%	4636.6	53%	79%
	2015-16	31.2	8784	2304	26%	3417.3	39%	65%
2	2014-15	31.2	8760	2304	26%	5040.7	57%	83%
	2015-16	31.2	8784	2304	26%	2623.6	30%	56%

Table 75

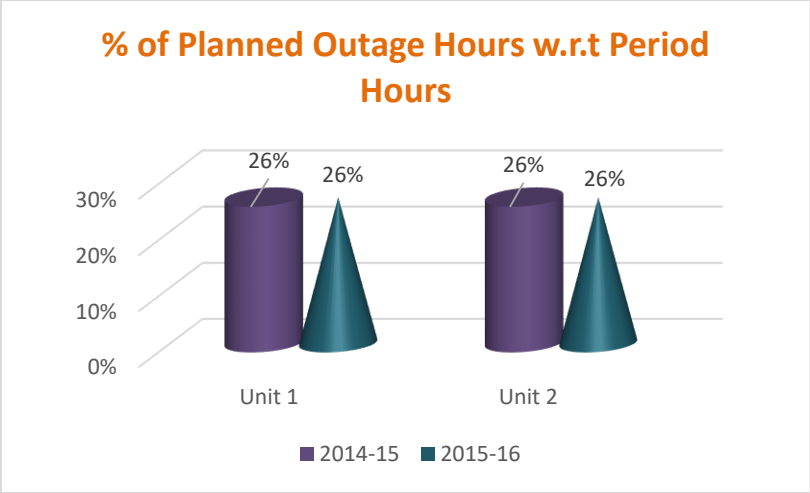

Figure 64

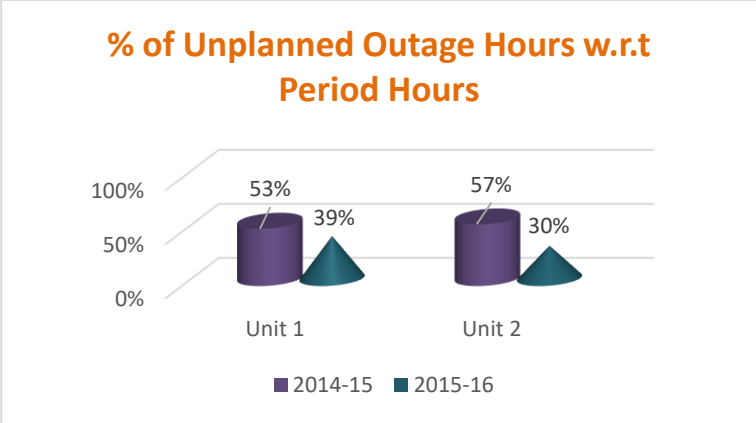

Figure 65

7.4 Unit wise Availability Factor

Units	Year	Availability Factor
1	2014-15	19%
	2015-16	14%
2	2014-15	33%
	2015-16	37%

Table 76

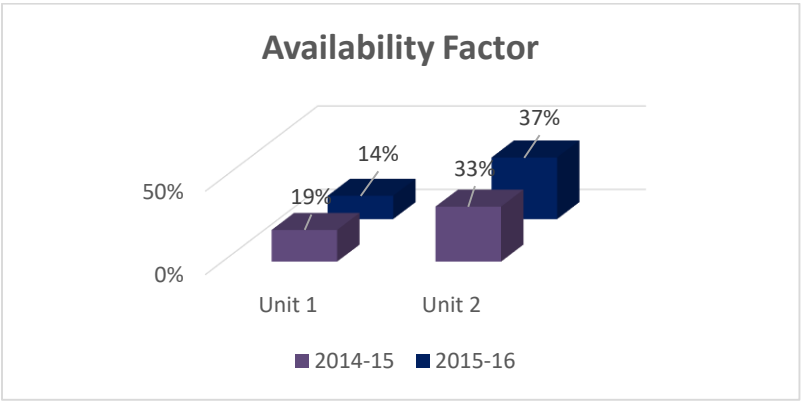

Figure 66

7.5 Unit wise Net Capacity Factor

Units	Year	Net Capacity Factor
1	2014-15	11%
	2015-16	6%
2	2014-15	24%
	2015-16	26%

Table 77

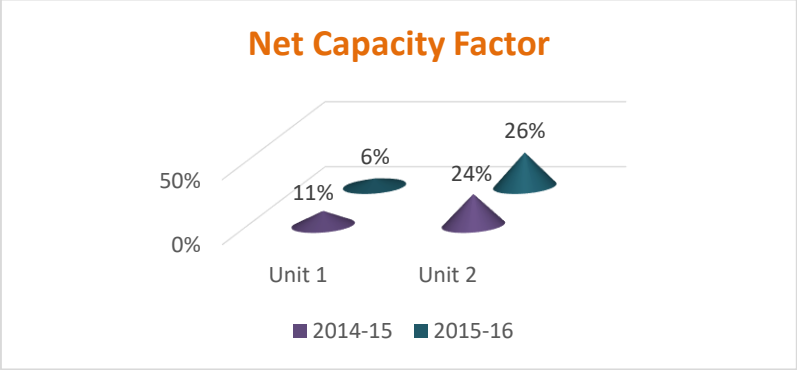

Figure 67

7.6 Unit wise Net Output Factor

Units	Year	Net Output Factor
1	2014-15	55%
	2015-16	45%
2	2014-15	75%
	2015-16	71%

Table 78

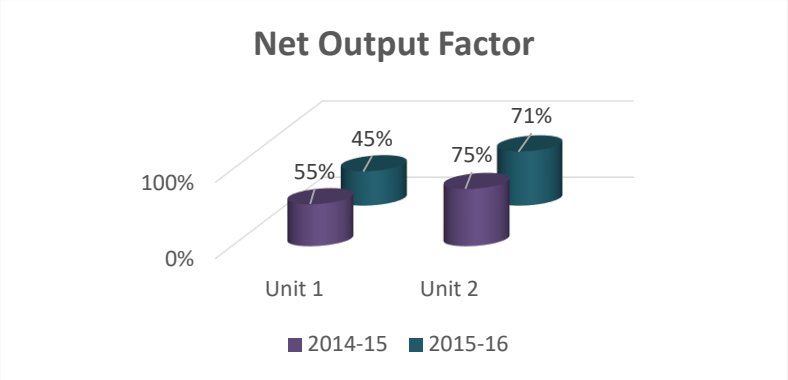

Figure 68

7.7 Unit wise Energy Availability Factor

Units	Year	Energy Availability Factor
1	2014-15	19%
	2015-16	14%
2	2014-15	33%
	2015-16	37%

Table 79

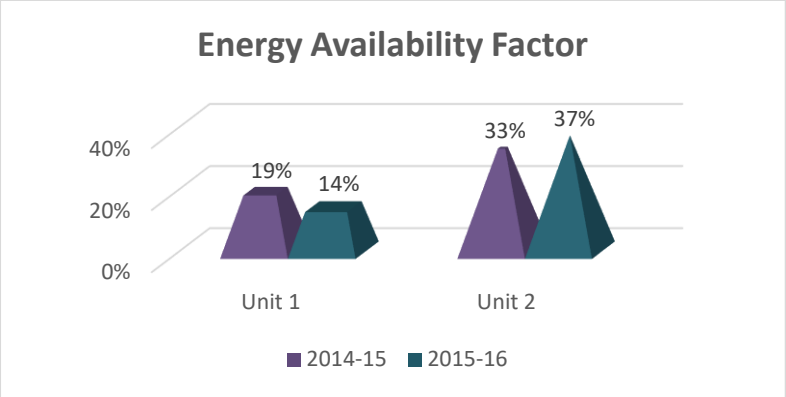
Energy Availability Factor
40%
20%
0%
19%
14%
33%
37%
Unit 1
Unit 2
2014-15
2015-16

Figure 69

8. CONCLUSION:

On the basis of all above, it can be deduced that there are three major reasons of energy loss by the units/machines of public sector GENCOs:

i. Excess consumption of auxiliary power during service mode than the allowed limit specified in their respective tariff determinations.
ii. Auxiliary power consumption during standby mode.
iii. Extra utilization of outage hours than the allowed limit specified in their respective PPAs signed with NTDC.

8.1 Auxiliary Power Consumption

(a) During Service Mode

While reviewing the data regarding auxiliary power consumption during service mode, as submitted by public sector GENCOs for the years 2014-15 and 2015-16, it has been noted that over the period of two years, GENCO-I, II, III & IV have consumed more amount of power under the head of auxiliary consumption as compared to that allowed by NEPRA in their respective tariff determinations. This resulted in huge loss of energy which could be contributed by GENCOs and ultimately caused considerable financial loss to the national exchequer. The detail is as under;

GENCO	Power Station	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity (MW)	Energy Loss (Mln.kWh)
I	TPS Jamshoro	880	710	649.02	141.24
	GTPS Kotri	144	132	106.5	0
II	TPS Guddu (1-13)	1655	1480	1400	141.32
	Guddu 747 CCPP	776.7	747	720.79	53.56
III	TPS Muzaffargarh	1350	1300	1183.52	302.47
	GTPS Faisalabad	244	193.67	192	0.023
	SPS Faisalabad	132	100	97	18.04
	CCPP Nandipur	425	425	411.34	0
IV	Lakhra PS	150	120	93.6	11.75
TOTAL		**5756.7**	**5207.67**	**4853.77**	**668.4**

The figures indicated in above table show that overall, **668.4 Million kWh** energy was lost due to excess consumption of auxiliary power by the units of public sector GENCOs during service mode, which could be contributed to national grid otherwise.

(b) During Standby Mode

Similarly, while reviewing the data related to standby mode, as submitted by GENCOs for the years 2014-15 and 2015-16, it has been observed that few GENCOs put their units/machines on standby mode for unexplainably longer period due to which the power was drawn by them from national grid for operation of certain essential auxiliaries instead of generating the energy. On inquiry about the reasons of such a longer duration of standby mode, GENCOs attributed the **NPCC instructions** and the **fuel constraints** as its two major reasons.

The detail of energy loss and subsequent financial impact due to auxiliary power consumption during standby mode is as follows;

GENCO	Power Station	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity (MW)	Energy Loss (Mln.kWh)
I	TPS Jamshoro	880	710	649.02	3.33
	GTPS Kotri	144	132	106.5	0.78
II	TPS Guddu	1655	1480	1400	51.30
	Guddu 747 CCPP	776.7	747	720.79	0.025
III	TPS Muzaffargarh	1350	1300	1183.52	2.46
	GTPS Faisalabad	244	210	192	313.81
	SPS Faisalabad	132	100	97	7.41
	CCPP Nandipur	425	425	411.34	3.33
IV	Lakhra PS	150	120	93.6	-
TOTAL		**5756.7**	**5224**	**4853.77**	**382.44**

Above table shows that overall, **382.44 Million kWh** energy was lost due to auxiliary power consumption by the units of GENCO-I, II & III during standby mode.

8.2 Extra Utilization of Outage Hours

While reviewing the data pertaining to scheduled and unscheduled outage hours as provided by GENCOs, it has been noted with great concern that few units/machines of GENCO-I, II & III have violated the allowed limit in this regard as specified in their respective PPAs signed with NTDC.

The detail is as follows;

GENCO	Power Station	Installed Capacity (MW)	De-rated Capacity (MW)	Net Capacity (MW)	Energy Loss (Mln.kWh)
I	TPS Jamshoro	880	710	649.02	616.13
	GTPS Kotri	144	132	106.5	10.63
II	TPS Guddu	1655	1480	1400	10312.83
	Guddu 747 CCPP	776.7	747	720.79	1589.71
III	TPS Muzaffargarh	1350	1300	1183.52	816.3
	GTPS Faisalabad	244	210	192	195.94
	SPS Faisalabad	132	100	97	175.51
	CCPP Nandipur	425	425	411.34	392.7
IV	Lakhra PS	150	120	93.6	-
TOTAL		**5756.7**	**5224**	**4853.77**	**14109.7**

Had the allowed limit of scheduled and unscheduled outages not been violated by the units/machines of GENCO-I, II &III and had they remained in operation during that period, **14109.7 Million kWh** energy could have been produced by them.

Hence, these statistics clearly speak about the poor condition of GENCOs' power stations which may include equipment deterioration, lack of scheduled & preventive maintenance, drought of technical expertise and poor management, etc.