Chapter 7
Consumption of Coal by Power Stations

Coal is the primary fuel for the coal fired power stations while oil (High Speed Diesel and Light Diesel Oil) is the secondary fuel. Coal is used to boil water which is converted into steam. The steam, in turn, drives turbine generators to produce electricity. For producing one unit of electricity, 500 gm to one kg of coal and around one ml of oil is consumed. Audit analysed various aspects relating to consumption of coal by the 13 stations selected for audit and the following position emerged:

7.1 Specific Coal Consumption by Stations

Coal used to produce one unit of energy is termed as 'Specific Coal Consumption' (SCC). SCC is arrived at by dividing the quantity of coal consumed by the number of units of electricity generated by the station, for a given period. The pattern of SCC in 11 out of 13 stations examined by Audit during the period from 2010-11 to 2015-16 is summarized in the following table. Monthly average SCC for the stations (from April 2010 to March 2016) is given in **Annexure 7.1.**

Table-7.1: Specific Consumption of Coal by Stations

Name of station	Coal used to produce one unit of energy (yearly average in kg)						Min SCC	Max SCC
	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	(Monthly avg. in kg)	
Dadri	0.66	0.67	0.69	0.67	0.71	0.65	0.61	0.76
Badarpur	0.81	0.89	0.88	0.86	0.82	0.76	0.70	1.02
Mouda	0.00	0.00	0.00	0.84	0.69	0.65	0.56	3.21
Rihand	0.64	0.67	0.69	0.71	0.69	0.66	0.60	0.75
Sipat	0.00	0.64	0.64	0.63	0.60	0.63	0.56	0.73
Vindyachal	0.68	0.69	0.73	0.69	0.70	0.69	0.64	0.77
Vallur	0.00	0.00	0.79	0.67	0.68	0.67	0.60	0.87
Talcher	0.82	0.81	0.82	0.82	0.80	0.82	0.66	0.84
Jhajjar	0.70	0.80	0.72	0.73	0.78	0.70	0.63	0.93
Ramagundum	0.59	0.59	0.62	0.67	0.69	0.67	0.50	0.75
Farakka	0.66	0.69	0.80	0.73	0.73	0.75	0.57	0.89
Korba	0.74	0.72	0.75	0.73	0.72	0.70	0.61	0.82
Barh	0.00	0.00	0.00	0.00	0.60	0.63	0.57	0.66

The above data shows that the average coal used annually to produce one unit of energy ranged between 0.59 kg to 0.89 kg in the sample reviewed during the period from 2010-11 to 2015-16. Although yearly average SCC remained below one kg, there were significant monthly variations as can be seen from the range of minimum and maximum monthly SCC. Notably, the maximum SCC in some cases was very high, at 3.21 kg in the case of Mouda and 1.02 kg in the case of Badarpur. Keeping in view the fact that the stations were required to meet their coal requirements from the ACQ allocated to them, SCC beyond a limit ought to be monitored by the power stations for their smooth operation.

Ministry has noted the Audit observation (November 2016).

7.2 Blending of imported coal with domestic coal

The stations were allocated imported coal by the Corporate Office of the Company to supplement domestic coal supplies. The imported coal was blended with domestic coal and fired in the boilers. GCV of imported coal ranged from 5700 to 6300 kCal/kg while that of domestic coal ranged from around 2900 to 4200 kCal/kg (GCV of coal measured at the time of 'firing'). The blending ratio adopted by the eleven stations reviewed in audit varied between 0 to 55 *percent*.

Audit noticed that maximum permissible blending ratio as per Central Electricity Authority (CEA) was 30 *percent* which was exceeded in five stations, *viz.,*Vallur (55.04 *percent*), Farakka (40.15 *percent*), Jhajjar (41.25 *percent*), Barh (36.86 *percent*) and Mouda (61 *percent*). Given the very high difference in quality (GCV) between domestic and imported coal, it was expected that blending of higher percentage of imported coal would result in lower consumption of the blended coal for the same amount of energy generated. Audit noticed instances where the coal used to produce one unit of energy, *i.e.*, SCC remained the same, irrespective of whether imported coal was blended to a lesser or greater extent as shown in **Annexure 7.2**. This raises doubts whether imported coal was indeed superior to domestic coal even though the Company incurred higher cost for procuring it.

Ministry stated (November 2016) that SCC at any time depends upon several factors including the coal quality, which may be very poor for domestic coal based on the source/seam/season etc. and added that imported coal was blended with domestic coal to maintain the SCC at desired level. Ministry further stated that GCV of domestic coal varied widely depending on the coal source (whether supply was from ECL, CCL *etc.*) and added that even there was no blending, SCC varied from 0.66 to 0.73 at Rihand.

Ministry has argued that domestic coal quality was very poor. Audit noticed that while domestic coal supplies were from mines which have a 'Declared Grade', the source of imported coal was not known to the Company (refer Para 4.2 of Chapter 4 - Import of Coal). Quantity-wise imported coal was considered to be equivalent to 1.3 to 1.5 times of domestic coal but no perceptible advantage in SCC was noticed even after blending imported coal up to 30 *percent* in some months.

7.3 Use of washed coal to reduce environmental pollution

Ministry of Environment and Forests (MoEF) guidelines (September 1997 and June 1998) stipulated that from June 2001 onwards (extended to June 2002), raw coal has to be cleaned to reduce the ash content to less than 34 *percent*, if coal is transported beyond 1000 kms[31] or if burnt in environmentally sensitive areas. In that case, the entire coal to be used in those stations should be washed coal in order to meet the requirement of MoEF guidelines.

Out of 13 stations selected for audit, six stations (Vindyachal, Korba, Sipat, Rihand, Talcher Thermal and Ramagundum) are pithead and the above guidelines were not applicable to them. Use of washed coal by Dadri and Badarpur stations in the sample is given below:

[31] Subsequently, vide Notification No.-GSR- 02(E) dated 02 January 2014, these Rules were made applicable for 750-1000 Kms. w.e.f. 01 January 2015 and for 500-750 Kms. w.e.f. 05 June 2016.

Table-7.2: Use of washed coal by stations

Name of station	Year	Total quantity of coal procured (Tonnes)	Total quantity of washed coal procured (Tonnes)	Percentage of washed coal to total coal procured
a	**b**	**c**	**d**	**e= d/c x 100**
Dadri	2010-11	64,73,355	45,15,269	69.75
	2011-12	71,76,435	49,41,399	68.86
	2012-13	71,82,266	46,65,349	64.96
	2013-14	71,45,332	38,62,744	54.06
	2014-15	66,71,333	30,30,935	45.43
	2015-16	59,48,795	33,51,437	56.34
	Total	**405,97,516**	**243,67,133**	**60.02**
Badarpur	2010-11	32,78,899.73	8,82,067.32	26.90
	2011-12	41,60,266.90	3,42,537.74	8.23
	2012-13	41,13,054.98	4,50,893.91	10.96
	2013-14	38,42,055.75	5,87,812.16	15.30
	2014-15	28,39,043.56	4,71,932.64	16.62
	2015-16	15,00,499.02	4,44,978.92	29.66
	Total	**197,33,819.94**	**31,80,222.69**	**16.12**

***Note**: Among other five non-pit head stations in the audit sample viz.,Vallur and Jhajjar procured 4957858.60 MT and 15543135 MT of coal respectively during the period of audit, out of which washed coal quantity was 'nil'. Data in respect of Mouda, Farakka and Barh were not made available.*

From the above data, Audit observed that:

(i) At Dadri station, percentage of washed coal to total coal showed a declining trend during the period from 2010-11 to 2014-15. In 2014-15, quantity of raw coal exceeded quantity of washed coal, indicating that there was deterioration in the degree of compliance with MoEF orders. The situation improved in 2015-16.

(ii) In the case of Badarpur, percentage of washed coal to total coal decreased drastically from 2010-11 to 2011-12 but has been increasing gradually over the years. However, procurement of washed coal, on an average during 2010-11 to 2015-16 was only 16 *percent* of total coal procured.

Ministry stated (November 2016) that coal of requisite quality conforming to statutory obligations was required to be supplied by the coal companies. Ministry added that as per MoEF gazette notification dated 02 January 2014, coal companies were responsible for supplying coal with less than 34 *percent* ash to the identified power stations.

Use of un-washed coal infringed upon the guidelines issued by MoEF. NTPC ought to have taken appropriate steps to ensure compliance (to wash coal on its own or tie up with washeries) quite apart from the obligations of the coal companies.