



**Report
on
Fly Ash Generation
at
Coal/Lignite Based Thermal Power Stations
and
its Utilization in the Country
for the Year 2010-11**



CENTRAL ELECTRICITY AUTHORITY
New Delhi
December, 2011



REPORT
ON
FLY ASH GENERATION
AT
COAL/LIGNITE BASED THERMAL
POWER STATIONS
AND
ITS UTILIZATION IN THE COUNTRY
FOR
THE YEAR 2010-11



CENTRAL ELECTRICITY AUTHORITY

New Delhi

December 2011



(K.P. Singh)
Member (Thermal), CEA
& Ex-officio Additional Secretary
to the Government of India

FOREWORD

Fly ash is a major issue because electricity generation in the country would remain predominantly coal-based for a couple of coming decades. The coal being made available to thermal power stations has ash content in relatively large proportions. The ash generation has increased to about **131 million tonne during 2010-11** and shall continue to grow.

A large number of technologies have been developed for gainful utilization and safe management of fly ash under the concerted efforts of **Fly Ash Mission of the GOI** since 1994. As a result, the utilization of fly ash has increased to over **73 million tonne in 2010-11**. Fly ash was moved **from “hazardous industrial waste” to “waste material” category during the year 2000 and during November 2009, it became a saleable commodity**. Fly ash utilization has started gaining acceptance, it being **55.79% during 2010-11**.

The **areas of concern** include:

- ❖ Improving the collection efficiency of the ESP & of quality of fly ash generated.
- ❖ Need for development and implementation of systems for collection of classified fly ash, certification of its quality for value addition and bulk environment friendly transportation options.
- ❖ Need for development of schemes for collection of dry bottom ash and its effective utilization.
- ❖ Need to develop energy efficient ash slurry pumps capable of handling dense ash slurry.
- ❖ Open trucks are used to transport fly ash for manufacture of building products. There is a need to develop efficient bulk transportation options for supply of fly ash from power plant to the end user.

For 100% fly ash utilization at the generating stations:

- ❖ Technologies are to be developed for demonstration of bulk utilization options of fly ash **in roads and embankments, mine fills, sea erosion tetrapods, roller compacted concrete.**
- ❖ **Guideline standards** to be developed to ensure quality assurance in value added products from fly ash, viz., bricks, blocks, pavers, kerbstones, tiles, etc.
- ❖ **Development and application of high value added utilization of fly ash such as:**
 - Extraction of cenospheres (A cenosphere is a lightweight, inert, hollow sphere filled with inert air or gas, typically produced as a byproduct of coal combustion at thermal power plants.)
 - Extraction of titanium oxide, Alumina
 - Development of composite materials, acid/fire resistant bricks /tiles
 - Development of abrasion resistant materials
 - Value added building materials
 - Agriculture amendments, etc.
- ❖ **Incubation centers** should be set up for technology validation.
- ❖ **“Self sustaining technology demonstration centers”** to be established for technology propagation schemes.
- ❖ Encourage **“Industry–Institute interactions”** for entrepreneur development, awareness, training programmes and workshops.
- ❖ Induction of **“fly ash subject in academic curriculum”** of Engineering, Architecture, and Post Graduate Science Courses is needed now.

Fly ash has acquired the status of a **“useful commodity”** which opens up plenty of opportunities in terms of **laying & fine tuning policies, conducting gainful businesses and R& D efforts,** and addressing the concerns of **environment** at the same time. Report that follows in the succeeding pages of this document gives an **overview** of size of this bye-product and its current status of utilization for the **year 2010-11** which, I am sure, will serve a good purpose to guide further strategies that all stakeholders can evolve to turn the **“menace” into a “meaningful”** engagement on issues related to implementation of Ministry of Environment & Forests notification dated 3rd November, 2009 on fly ash, a task force has been constituted vide Ministry of Power O.M. No. 9/7/2011.S.Th. dated 29th September, 2011. The task force will identify two or three operating open cast mines for taking up as pilot project by the NTPC.

Data collection, its compilation & collation is quite a vast task. Moreover, to provide a dependable/ accurate data in desired format is equally a major job. The team under the leadership of the Chief Engineer (TCD), CEA deserves all the appreciation for preparing this report. And, thanks are also due to all the utilities for furnishing data in a timely manner all round the year.

New Delhi

Dated: December 30, 2011



(K.P. Singh)
**Member (Thermal), CEA
 & Ex-officio Additional Secretary
 to the Government of India**

CONTENTS

Para No.	Description	Page
1.0	Background	1
2.0	Ash Generation & Utilization during the Year 2010-11	1
2.1	A Brief Summary	1
2.2	Power Utility wise Status of Fly Ash Generation & its Utilization during the Year 2010-11	2
2.3	State wise Status of Fly Ash Generation & its Utilization during the Year 2010-11	3
3.0	Targets for Fly Ash Utilization as per MoEF's Amendment Notification dated 3rd November, 2009	4
3.1	Thermal Power Station in Operation as on 03.11.2009	4
3.2	Thermal Power Station Commissioned after 03.11.2009	4
4.0	Present Status of Fly Ash Utilization as per MoEF's Amendment Notification dated 3rd November, 2009	4
4.1	Status during the Year 2010-11	4
4.2	Range of Percentage Ash Utilization during the Year 2010-11	5
4.3	Thermal Power Stations that have Achieved 100% or more Ash Utilization during the year 2010-11	5
4.4	Power Stations in Ash Utilization Range of less than 100% and up to 75% during 2010-11	6
4.5	Power Stations in Ash Utilization Range of less than 75% and up to 50% during the Year 2010-11	7
4.6	Power Stations with Ash Utilization Level of less than 50% during the Year 2010-11	7
5.0	Modes of Ash Utilization during 2010-11	8
6.0	Progressive Fly Ash Generation & Utilization during the period from 1996-97 to 2010-11	9
7.0	Progressive Fly ash Utilization in Various Modes/Sectors during the Period from 1998-99 to 2010-11	11
7.1	Cement Industry	11
7.2	Reclamation of Low Lying Areas	11
7.3	Road and Embankments	12
7.4	Back Filling/Stowing of Mines	12
7.5	Building Materials like Bricks, Blocks, Tiles etc.	13
7.6	Agriculture	13
8.0	Conclusions & Recommendations	14
Annex I	Fly Ash Generation and its Utilization at Coal/Lignite Based Thermal Power Stations in the Country during the Year 2010-11 (Power Station and Utility Wise)	15

LIST OF TABLES

Table No.	Title of Table	Page
I	Power Utility wise Fly Ash Generation and Utilization for the Year 2010-11	2
II	State wise Fly Ash Generation and its Utilization for the Year 2010-11	3
III	Targets for Fly Ash Utilization for Thermal Power Stations in Operation as on 3.11.2009	4
IV	Targets for Fly Ash Utilization for Thermal Power Station Commissioned after 3.11.2009	4
V	Status of Utilization of Fly Ash as per MoEF's Notification dated 3rd November, 2009 during the Year 2010-11	5
VI	Range of Percentage Ash Utilization during the Year 2010-11	5
VII	Thermal Power Stations with Ash Utilization Level of Less Than 100% or more during the year 2010-11	5
VIII	Thermal Power Stations with Ash Utilization Level of Less Than 100% and Up to 75% during the year 2010-11	6
IX	Thermal Power Stations with Ash Utilization Level of Less Than 75% and Up to 50% during the year 2010-11	7
X	Power Utility wise details of Thermal Power Stations which have not been able to Achieve the Level of Fly Ash Utilization as per MoEF's Amendment Notification of 3rd November, 2009	7
XI	Major Modes of Fly Ash Utilization during the Year 2010-11	8
XII	Fly Ash Generation and its Utilization during the period from 1996-97 to 2010-11	9

LIST OF FIGURES

Figure No.	Title of Figure	Page
1	Mode of Fly Ash Utilization during 2010-11	9
2	Progressive Generation and Utilization of Fly Ash during the period from 1996-97 to 2010-11	10
3	Progressive Utilization of Fly Ash in Cement Industry during the period from 1998-99 to 2010-11	11
4	Progressive Utilization of Fly Ash in Reclamation / Land Filling during the period from 1998-99 to 2010-11	11
5	Progressive Utilization of Fly Ash in Construction of Roads / Embankments/ Ash Dyke Raising during the period from 1998-99 to 2010-11	12
6	Progressive Utilization of Fly Ash in Mine Filling during the period from 1998-99 to 2010-11	12
7	Progressive Utilization of Fly Ash in Manufacture of Flyash based Bricks / Blocks / Tiles during the period from 1998-99 to 2010-11	13
8	Progressive Utilization of Fly Ash in Agriculture during the period from 1998-99 to 2010-11	13

REPORT ON FLY ASH GENERATION AT COAL/LIGNITE BASED THERMAL POWER STATIONS AND ITS UTILIZATION IN THE COUNTRY FOR THE YEAR 2010-11

1.0 BACKGROUND

Coal/Lignite based Thermal Power Generation has been the backbone of capacity addition in the country. Indian coal is of low grade having high ash content up to 40% in comparison to imported coals which have ash content of the order of 10-15%. Large quantity of ash is being generated at coal/lignite based Thermal Power Stations in the country, which has been one of the source of pollution of both air and water.

To address the problem of pollution, caused by fly ash and to reduce the requirement of land for disposal of fly ash in slurry form in ash ponds, MoEF has issued notifications stipulating targets for utilization of the fly ash to achieve 100% utilization in phased manner.

The monitoring of generation and utilization of fly ash at coal/lignite based thermal power stations is necessary to have factual status of fly ash utilization in relation to targets prescribed in MoEF's notification dated 3rd November, 2009 and take corrective measures in cases of Thermal Power Stations that are not able to achieve the targets of fly ash utilization.

Central Electricity Authority is monitoring fly ash generation and its utilization at coal/ lignite based thermal power stations in the country since 1996 on behalf of Ministry of Power. Data on fly ash generation and utilization including modes of utilization is obtained from thermal power stations on half yearly and yearly basis. The data obtained is analyzed and a report bringing out the status of fly ash generation and its utilization is prepared. The Report is submitted to Ministry of Power and Ministry of Environment and Forest.

2.0 ASH GENERATION & UTILIZATION DURING THE YEAR 2010-11

2.1 A Brief Summary

Fly ash generation & utilization data for the year 2010-11 has been received from 88 (Eighty eight) coal/lignite based thermal power stations of various power utilities in the country with a total installed capacity of about 80,458 MW. Data received has been analyzed to derive conclusions on present status of fly ash utilization. A brief summary of status is given below:

- Nos. of Coal/ Lignite based Thermal power Stations from which data has been received : 88 nos.
- Installed capacity : 80458 MW
- Coal consumed : 407.61 million-tonne
- Average Ash content : 32.16%
- Total Ash generated : 131.09 million-tonne
- Total Ash utilized : 73.13 million-tonne
- Percentage Utilization : 55.79%

Power Station wise fly ash generation & utilization data including mode of utilization for all the 88 (eighty eight) thermal power stations is given in the statement at **Annex-I**.

Two Thermal Power Stations, namely Faridabad TPS (165 MW) in Haryana and I.P. Station (247.5 MW) in Delhi have been decommissioned during 2010-11.

2.2 Power Utility wise Status of Fly Ash Generation & its Utilization during the Year 2010-11

The ash generation & utilization data for various power utilities in the country for the year 2010-11 is given in Table-I below:

Table - I
Power Utility wise Fly Ash Generation and Utilization for the Year 2010-11

Sl. No.	Name of Power Utility	Nos. of TPS	Installed Capacity (MW)	Fly Ash Generation (mtpa)*	Fly Ash Utilization (mtpa)*	Percentage Utilization
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Andhra Pradesh Power Generation Corporation (A.P.GEN.CO)	5	4092	8.34	3.73	44.69
2	Torrent Power Ltd.	1	400	0.34	0.34	100
3	Bihar State Electricity Board	1	110	0.10	0.09	87.17
4	Reliance Infrastructure Limited (R.I.L)	1	500	0.80	0.61	75.93
5	C.E.S.C. Ltd.	3	1125	2.06	2.06	100.00
6	Chattisgarh State Power Generation Company Ltd. (C.S.P.G.C.L.)	2	1280	3.22	0.90	28.08
7	Damodar Valley Corporation (D.V.C.)	4	3060	5.44	4.40	80.80
8	Durgapur Projects Ltd. (D.P.L.)	1	690	0.57	0.51	89.34
9	Gujarat Industries Power Corporation Ltd. (G.I.P.C.L.)	1	500	0.40	0.40	100.00
10	Gujarat Mineral Development Corpon. Ltd. (G.M.D.C.L.)	1	250	0.18	0.20	108.15
11	Gujarat State Electricity Corporation Ltd. (G.S.E.C.L.)	5	3720	6.14	2.43	39.56
12	Haryana Power Generation Corporation Ltd. (H.P.G.C.L.)	3	3168	3.47	1.02	29.30
13	Inderprastha Power Generation Company Ltd. (.I.P.G.C.L)	1	136	0.24	0.20	84.27
14	Jharkhand State Electricity Board (J.S.E.B.)	1	840	0.23	0.10	42.65
15	Karnataka Power Corporation Ltd. (K.P.C.L.)	2	1970	1.91	0.96	50.16
16	Madhya Pradesh Power Generation Corporation Ltd. (M.P.P.G.C.L.)	3	2932	4.33	1.49	34.36
17	Maharashtra State Power Generation Corporation Ltd. (MHAGENCO)	7	7360	11.66	5.55	47.56
18	Neyveli Lignite Corporation Ltd. (N.L.C. LTD)	3	2490	1.46	0.79	54.09
19	N.T.P.C. LTD.	15	25875	46.17	25.81	55.91
20	Orissa Power Generation Corporation Ltd. (O.P.G.C.L.)	1	420	1.11	0.31	27.66
21	Punjab State Power Corporation Ltd. (P.S.P.C.L.)	3	2620	3.87	2.94	75.81
22	Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (R.R.V.U.N.L.)	2	2740	4.10	3.90	95.13
23	ST-CMS Electric Company Pvt. Ltd.	1	250	0.12	0.10	86.16
24	Tata Power Company (T.P.CO.)	2	1178	1.00	0.92	91.46

Sl. No.	Name of Power Utility	Nos. of TPS	Installed Capacity (MW)	Fly Ash Generation (mtpa)*	Fly Ash Utilization (mtpa)*	Percentage Utilization
(1)	(2)	(3)	(4)	(5)	(6)	(7)
25	Tenughat Vidyut Nigam Ltd. (T.V.N.L.)	1	420	0.71	0.67	93.98
26	Tamil Nadu Electricity Board (T.N.E.B.)	4	2970	5.47	5.66	103.46
27	Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd. (U.P.R.V.U.N.L.)	5	4072	6.35	0.84	13.29
28	West Bengal Power Development Corporation Ltd. (W.B.P.D.C. L)	5	3610	6.11	3.79	62.01
29	LANCO	1	600	1.07	.003	0.33
30	Kanti Bijlee Utpadan Nigam Ltd. (K.B.U.N.L.)	1	220	0.15	1.36	913.69
31	JSW Energy Ltd.	2	860	0.32	0.26	81.25
	GRAND TOTAL		80,458	131.09	73.13	55.79

* mtpa: million tonne per annum (rounded off to two significant figures).

It may be seen from above table that out of 31 power utilities, six utilities have achieved ash utilization level of 100% or more and eleven power utilities have achieved ash utilization level in the range of 100 to 75%. The performance of these seventeen power utilities in ash utilization during 2010-11 has been excellent.

2.3 State wise Status of Fly Ash Generation & its Utilization during the Year 2010-11

The state wise status of fly ash generation & utilization is given in Table-II below:

Table - II

State wise Fly Ash Generation and its Utilization for the Year 2010-11

Sl. No.	Name of State	Nos. of TPS	Capacity (MW)	Fly Ash Generation (mtpa)*	Fly Ash Utilization (mtpa)*	Percentage Utilization
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	ANDHRA PRADESH	7	7692	14.60	7.66	52.44
2	BIHAR	3	2670	4.06	2.36	58.05
3	CHHATISGARH	5	5480	11.84	3.27	27.62
4	GUJARAT	8	4870	7.06	3.36	47.60
5	HARYANA	3	3168	4.98	1.15	23.09
6	JHARKHAND	5	3068	4.14	3.46	83.40
7	KARNATAKA	4	2830	2.46	1.24	50.41
8	MADHYA PRADESH	4	6193	9.71	4.70	48.43
9	MAHARASHTRA	9	8610	12.54	6.22	49.58
10	ORISSA	3	3880	9.05	3.76	41.53
11	PUNJAB	3	2620	3.87	2.94	75.81
12	RAJASTHAN	2	2740	4.10	3.90	95.13
13	TAMILNADU	8	5710	7.05	6.55	92.98
14	UTTAR PRADESH	10	11,382	19.33	9.85	50.95
15	WEST BENGAL	12	8705	14.98	11.57	77.23
16	DELHI	2	840	1.33	1.19	89.47
	GRAND TOTAL		80458	131.09	73.13	55.79

* mtpa: million tonne per annum (rounded off to two significant figures).

It may be seen from above table that five states out of sixteen have generated more than 10 million tonne of fly ash during 2010-11 and the maximum of more than 19 million tonne was generated in U.P.

3.0 TARGETS FOR FLY ASH UTILIZATION AS PER MOEF'S AMENDMENT NOTIFICATION DATED 3rd NOVEMBER, 2009

3.1 Thermal Power Station in Operation as on 03.11.2009

All coal/lignite based thermal Power Stations and/or expansion units in operation before the date of notification i.e. 03.11.2009 are required to achieve the target of fly ash utilization as given in Table-III below:

Table - III

Targets for Fly Ash Utilization for Thermal Power Stations in Operation as on 03.11.2009

SI.No.	Percentage Utilization of Fly Ash	Target Date
(1)	(2)	(3)
1	At least 50% of fly ash generation	One year from the date of the notification
2	At least 60% of fly ash generation	Two years from the date of the notification
3	At least 75% of fly ash generation	Three years from the date of the notification
4	At least 90% of fly ash generation	Four years from the date of the notification
5	100% of fly ash generation	Five years from the date of the notification

The unutilized fly ash in relation to the target during a year, if any, shall be utilized within next two years in addition to the targets stipulated for those years and the balance unutilized fly ash accumulated during first five years (the difference between the generation and the utilization target) shall be utilized progressively over next five years in addition to 100% utilization of current generation of fly ash.

3.2 Thermal Power Station Commissioned after 03.11.2009

New coal/lignite based thermal Power Stations and/or expansion units commissioned after notification are required to achieve the target of fly ash utilization as given in Table-IV below:

Table - IV

Targets for Fly Ash Utilization for Thermal Power Station Commissioned after 03.11.2009

SI.No.	Percentage Utilization of Fly Ash	Target Date
(1)	(2)	(3)
1	At least 50% of fly ash generation	One year from the date of Commissioning
2	At least 70% of fly ash generation	Two years from the date of Commissioning
3	At least 90% of fly ash generation	Three years from the date of Commissioning
4	100% of fly ash generation	Four years from the date of commissioning.

The unutilized fly ash in relation the target during a year, if any, shall be utilized within next two years in addition to the targets stipulated for these years and the balance unutilized fly ash accumulated during first four years (the difference between the generation and utilization target) shall be utilized progressively over next five years in addition to 100% utilization of current generation of fly ash.

4.0 PRESENT STATUS OF FLY ASH UTILIZATION AS PER MOEF'S AMENDMENT NOTIFICATION DATED 3rd NOVEMBER, 2009

4.1 Status during the Year 2010-11

Fly ash generation and its utilization data received from various power utilities for the year 2010-11 has been analyzed to ascertain the numbers of power stations which have archived the target of fly ash utilization as per MoEF's notification of 3rd November, 2009 i.e., (i) all thermal power stations in operation on the date of notification should have achieved the target of 50% fly ash utilization within one year from the date of notification i.e., by 2nd November, 2010; and (ii) all new thermal power stations which have come into operation after the date of notification should have also achieved the target of 50% of fly ash utilization within one year of commissioning.

The status of compliance of MoEF's amendment notification of 03.11.2009 based on fly ash generation and utilization data for the year 2010-11 received in CEA from power utilities is given in Table-V below.

Table - V
Status of Utilization of Fly Ash as per MoEF's Notification dated 3rd November, 2009 during the Year 2010-11

SI. No.	Description	Nos.
(1)	(2)	(3)
1	Nos. of TPS which have achieved the target of fly ash utilization as per MoEF's Amendment Notification of 03.11.2009	57
2	Nos. of TPS which have not been able to achieve the target of fly ash utilization as per MoEF's Amendment Notification of 03.11.2009	31

It may be seen from above table that out of 88 thermal power stations for which data was received, fifty seven power stations have achieved the ash utilization level of 50% or more during 2010-11 as per target of utilization stipulated in MoEF's Amendment Notification of 03.11.2009.

4.2 Range of Percentage Ash Utilization during the Year 2010-11

Based on the analysis of ash utilization data received from power utilities, range of percentage of ash utilization and numbers of stations in that range are given in Table-VI below:

Table - VI
Range of Percentage Ash Utilization during the Year 2010-11

SI. No.	Level of Ash Utilization	Nos. of Power Stations
(1)	(2)	(3)
1	100% and more than 100%	13
2	Less than 100% and up to 75%	24
3	Less than 75% and up to 50%	20
4	Less than 50%	31

4.3 Thermal Power Stations that have Achieved 100% or more Ash Utilization during the year 2010-11

13 (Thirteen) thermal power stations have achieved the ash utilization level of 100% or more during the year 2010-11. The names of these thermal power stations and utilities along with level of ash utilization achieved at each power station are given in Table-VII below:

Table - VII
Thermal Power Stations with Ash Utilization Level of Less Than 100% or more during the year 2010-11

SI.No.	Name of Thermal Power Station	Name of Power Utilities	Fly Ash Utilization in Percentage
(1)	(2)	(3)	(4)
1	Sabermati	TORRENT POWER LIMITED	100.00
2	Mettur	T.N.E.B.	145.19
3	B.B.G.S	C.E.S.C.	100.00
4	S.G.S	C.E.S.C.	100.00
5	T.G.S	C.E.S.C.	100.00
6	North Chennai	T.N.E.B.	100.29
7	Surat Lignite	G.I.P.C.L.	100.00

SI.No.	Name of Thermal Power Station	Name of Power Utilities	Fly Ash Utilization in Percentage
(1)	(2)	(3)	(4)
8	Akrimota	G.M.D.C.L.	108.15
9	Kutch Lignite	G.S.E.C.L.	100.00
10	Muzaffarpur	K.B.U.N.L	913.69
11	Durgapur	D.V.C.	164.68
12	Bandel	W.B.P.D.C.L	125.68
13	Talchar TPS	N.T.P.C. LTD.	100.00

Power Stations which have achieved the level of ash utilization of more than 100% during 2010-11, have utilized ash stored in ash ponds during previous years. At Muzaffarpur T.P.S., ash accumulated during last few years has been utilized within plant for land development work for erection of two new units of 195 MW each.

4.4 Power Stations in Ash Utilization Range of less than 100% and up to 75% during 2010-11

24 (Twenty four) Power Stations have achieved ash utilization level in the range of 100% to 75%. The names of these thermal power stations and utilities along with level of ash utilization achieved at each power station are given in Table-VIII below :

Table - VIII

Thermal Power Stations with Ash Utilization Level of Less Than 100% and Up to 75% during the year 2010-11

SI.No.	Name of Thermal Power Station	Name of Power Utilities	Fly Ash Utilization in Percentage
(1)	(2)	(3)	(4)
1	BOKARO 'B'	D.V.C.	99.63
2	UCHAHAR	N.T.P.C.LTD.	87.07
3	D.P.L	D.P.L	89.34
4	BADARPUR	N.T.P.C.LTD.	89.30
5	DADRI	N.T.P.C.LTD.	82.41
6	ROPAR	P.S.P.C.L	78.28
7	BHUSAWAL	M.S.P.G.C.L.	75.92
8	RAJGHAT	I.P.G.C.L	84.27
9	TROMBAY	T.P.CO.	79.97
10	LAHERA MOHABAT	P.S.P.C.L.	79.60
11	NEYVELI-EXPN	N.L.C.LTD	94.22
12	NEYVELI-I	N.L.C.LTD	83.82
13	CUDDALORE	ST-CMS Electric Co.Pvt. Ltd.	86.16
14	KOTA	R.R.V.U.N.L.	97.31
15	TUTICORIN	T.N.E.B.	77.07
16	BARAUNI	B.S.E.B.	87.17
17	KHAPARKHEDA	M.S.P.G.C.L.	87.33
18	JOJOBERA	T.P. Co.	92.42
19	TENUGHAT	T.V.N.L.	93.98
20	SURATGARH	R.R.V.U.N.L.	96.54
21	DAHANU	R.I.L.	75.93
22	FARRAKKA	N.T.P.C. LTD.	86.94
23	RATNAGIRI	J.S.W. ENERGY LTD.	75.69
24	VIJAYANAGAR	J.S.W. ENERGY LTD.	93.06

4.5 Power Stations in Ash Utilization Range of less than 75% and up to 50% during the Year 2010-11

20 (Twenty) Power Stations have achieved ash utilization in the range of 75% to 50% during 2010-11. The names of these thermal power stations and utilities along with level of ash utilization achieved at each power station are given in Table-IX below:

Table - IX
Thermal Power Stations with Ash Utilization Level of Less Than 75% and Up to 50% during the year 2010-11

SI.No.	Name of Thermal Power Station	Name of Power Utilities	Fly ash Utilization in Percentage
(1)	(2)	(3)	(4)
1	GANDHINAGAR	G.S.E.C.L	67.63
2	VIJAYAWADA	A.P.GENCO	60.38
3	SINGARALI	N.T.P.C. LTD.	60.01
4	RAYALSEEMA	A.P.GENCO	67.30
5	PANKI	U.P.R.V.U.N.L	51.88
6	RAICHUR	K.P.C.L	65.92
7	SIMADRI	N.T.P.C.LTD.	60.00
8	BAKARESHWAR	W.B.P.D.C.L	55.41
9	SANJAYGANDHI TPS	M.P.P.G.C.L	74.41
10	MEJIA	DVC	64.39
11	PARAS	MAHAGENCO	62.45
12	NASIK	MAHAGENCO	54.89
13	PARLI	MAHAGENCO	59.25
14	VINDHYACHAL	N.T.P.C.LTD.	63.25
15	RIHAND	N.T.P.C.LTD.	60.52
16	BHATINDA	P.S.P.C.L.	52.34
17	ENNORE	T.N.E.B.	72.73
18	KOLAGHAT	W.B.P.D.C.L	72.25
19	TANDA	N.T.P.C. LTD.	60.04
20	RAMAGUNDUM	N.T.P.C. LTD.	64.22

4.6 Power Stations with Ash Utilization Level of less than 50% during the Year 2010-11

31 (Thirty one) Power Stations out of 88 have not been able to achieve target of fly ash utilization of 50% during 2010-11 as per MoEF's notification of 3rd November, 2009. The names of these thermal power stations and utilities along with level of ash utilization achieved at each power station are given in Table-X below :

Table - X

Power Utility wise details of Thermal Power Stations which have not been able to Achieve the Level of Fly Ash Utilization as per MoEF's Amendment Notification of 3rd November, 2009

SI.No.	Name of Power Utilities	Name of Thermal Power Station	Fly Ash Utilization in Percentage
(1)	(2)	(3)	(4)
1	A.P.G.E.N.CO	(i) Kothagudam (ii) Kothagudem-V (iii) Ramagundum'B'	0.64 30.41 46.46
2	LANCO	(i) Amarkantak	0.33
3	C.S.P.G.C.L	(i) Korba(West) (ii) Korba(East)	20.27 38.33

SI.No.	Name of Power Utilities	Name of Thermal Power Station	Fly ash Utilization in Percentage
(1)	(2)	(3)	(4)
4	D.V.C	(i) Chanderpura	47.13
5	G.S.E.C.L	(i) Sikka (ii) Ukai (iii) Wanakbori	37.66 29.78 27.63
6	H.P.G.C.L	(i) Hisar (ii) Yamunanagar (iii) Panipat	0.0 14.84 33.10
7	J.S.E.B	(i) Patratu	42.65
8	K.P.C.L	(i) Bellary	6.98
9	MPPGCL	(i) Satpura (ii) Amarkantak	10.05 1.47
10	MAHAGENCO	(i) Chaderpur (ii) Koradi	25.93 19.16
11	N.L.C	(i) Neyveli-II	39.66
12	N.T.P.C. Ltd	(i) Kahalgaon (ii) Korba (iii) Sipat (iv) Talchar(Kan)	23.93 40.08 10.52 33.48
13	O.P.G.C.L	(i) Ib Valley	27.66
14	U.P.R.V.U.N.L	(i) Anpara'A'&'B' (ii) Harduaganj (iii) Obra (iv) Paricha	1.91 19.44 5.40 49.31
15	W.B.P.D.C.L	(i) Sagardighi (ii) Santaldih	43.58 0.16

These power stations shall be required to utilize unutilized ash in relation to the target during a year progressively during next five years in addition to target stipulated for those years in terms of provisions of MoEF's Notification of 3rd November, 2009.

5.0 MODES OF ASH UTILIZATION DURING 2010-11

The major modes in which ash was utilized during the year 2010-11 along with utilization in each mode are given in Table-XI below.

Table - XI
Major Modes of Fly Ash Utilization during the Year 2010-11

SI.No.	Mode of Utilization	Utilization in (mtpa)	Percentage Utilization
(1)	(2)	(3)	(4)
1	Cement	35.47	48.50
2	Reclamation of low lying area	9.31	12.73
3	Roads & Embankments	8.52	11.65
4	Mine filling	6.04	8.26
5	Bricks & Tiles	4.61	6.30
6	Agriculture	1.27	1.74
7	Others	7.91	10.82
	Total	73.13	100

It may be seen from above table that the maximum utilization of fly ash to the extent of 48.50% has been in Cement sector, followed by 12.73% in reclamation of low lying area, 11.65% in roads & embankments etc. The utilization of fly ash in mine filling was 8.26% and in making fly ash based building products like bricks, tiles etc was only 6.3%. These two areas have large potential of ash utilization which needs to be explored for increasing overall ash utilization in the country.

A pie diagram showing the modes of utilization of ash during 2010-11 is given in Figure-1 below:

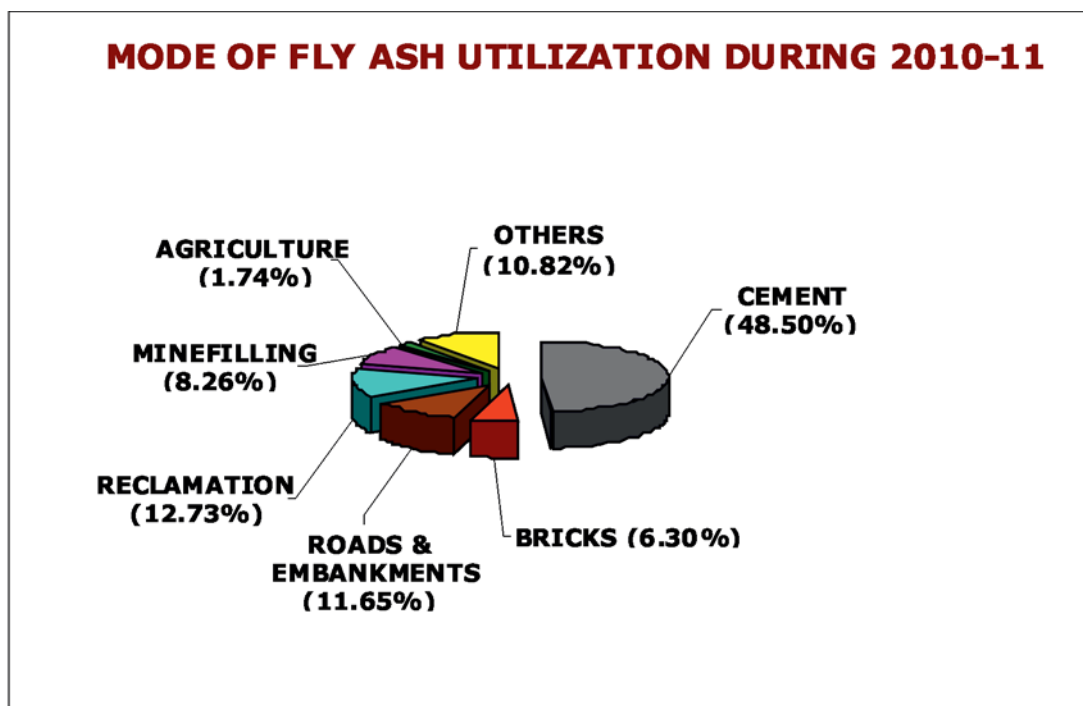


FIGURE-1

6.0 PROGRESSIVE FLY ASH GENERATION & UTILIZATION DURING THE PERIOD FROM 1996-97 TO 2010-11

The progressive ash generation at coal/lignite based thermal power stations and its utilization for the period from 1996-97 to 2010-11 as per data received in CEA from power utilities is given in Table-XII below:

Table - XII

Fly Ash Generation and its Utilization during the period from 1996-97 to 2010-11

Sl. No.	Year	Fly Ash Generation (mtpa)	Fly Ash Utilization (mtpa)	Percentage Utilization
(1)	(2)	(3)	(4)	(5)
1	1996-97	68.88	6.64	9.63
2	1997-98	78.06	8.43	10.80
3	1998-99	78.99	9.22	11.68
4	1999-2000	74.03	8.91	12.03
5	2000-01	86.29	13.54	15.70
6	2001-02	82.81	15.57	18.80
7	2002-03	91.65	20.79	22.68
8	2003-04	96.28	28.29	29.39
9	2004-05	98.57	37.49	38.04

Sl. No.	Year	Fly Ash Generation (mtpa)	Fly Ash Utilization (mtpa)	Percentage Utilization
(1)	(2)	(3)	(4)	(5)
10	2005-06	98.97	45.22	45.69
11	2006-07	108.15	55.01	50.86
12	2007-08	116.94	61.98	53.00
13	2008-09	116.69	66.64	57.11
14	2009-10	123.54	77.33	62.60
15	2010-11	131.09	73.13	55.79

It may be seen from the above table that fly ash utilization has increased from 9.63% in 1996-97 to the highest level of 62.60% in 2009-10 and it was about 56% during 2010-11. The quantity wise, fly ash utilization has increased from 6.64 million tonne in 1996-97 to maximum level of 77.33 million tonne in 2009-10 and it was 73.13 million tonne in 2010-11.

A decrease in fly ash utilization has been observed during 2010-11. Some of the possible reasons for decrease in ash utilization during 2010-11 in comparison to 2009-10 are as under :

- Level of ash utilization at 42 Thermal Power Stations has decreased during 2010-11 in comparison to 2009-10 whereas increased level of utilization during 2010-11 has been observed only at 40 Thermal Power Stations.
- At one power station, level of ash utilization during 2009-10 and 2010-11 is practically the same.
- Fly Ash data from two new Thermal Power Stations commissioned during 2010-11 has been received where utilization level was nil or less than 1%.

A graph showing progressive ash generation and its utilization for the period from 1996-97 to 2010-11 is given in Figure-2 below.

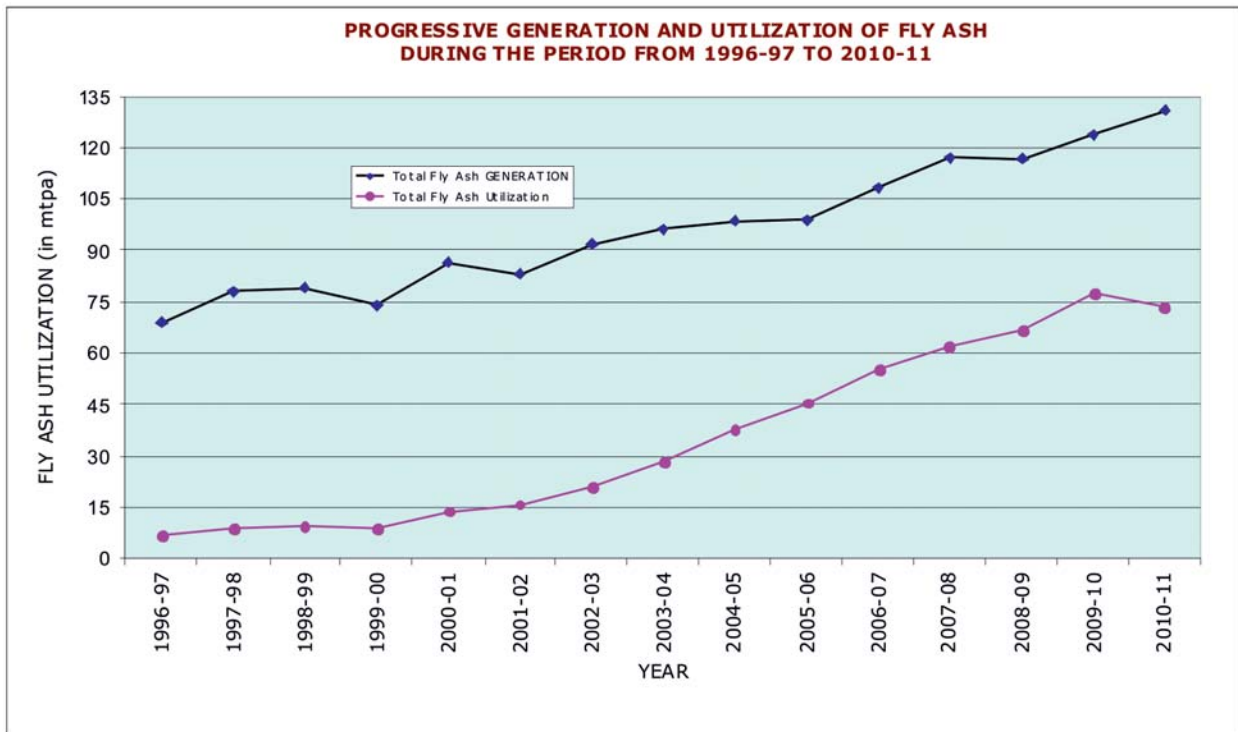


FIGURE-2

7.0 PROGRESSIVE FLY ASH UTILIZATION IN VARIOUS MODES/SECTORS DURING THE PERIOD FROM 1998-99 TO 2010-11

7.1 Cement Industry

Fly ash is being used by Cement Industry as a pozzolanic material in manufacturing of Portland Pozzolana Cement. In 1998-99, 2.45 million tonne of fly ash was used by Cement Industry which has now increased to 35.47 million tonne in 2010-11 and constitutes 48.5% of total utilization. A graph showing progressive utilization of fly ash by Cement Industry for the period from 1998-99 to 2010-11 is given in Figure-3 below.

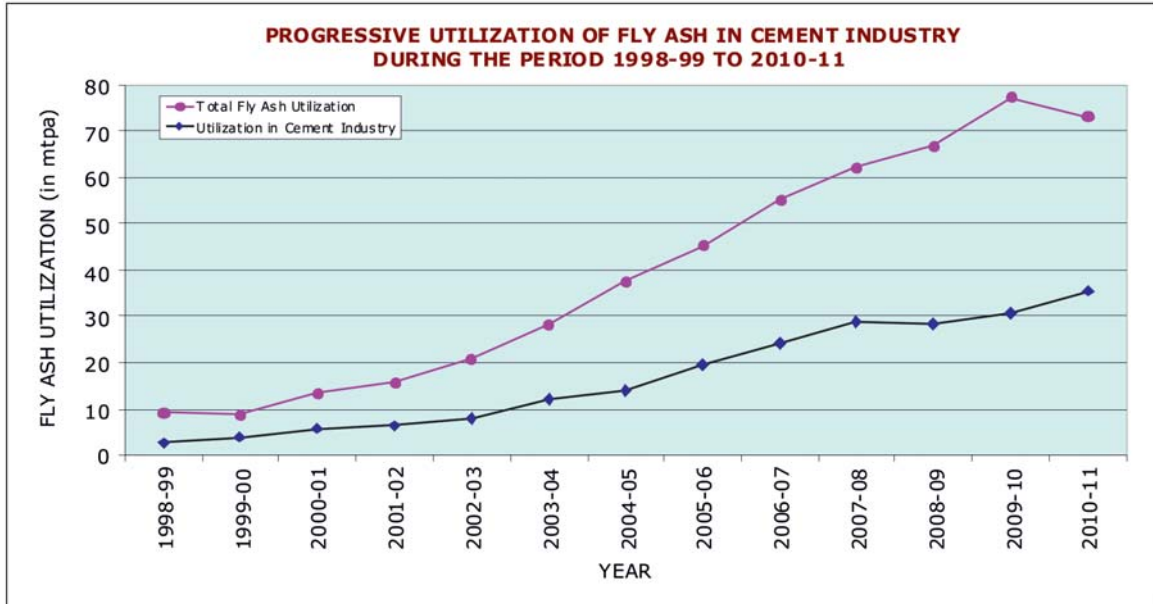


FIGURE-3

7.2 Reclamation of Low Lying Areas

Fly ash is being used to reclaim the low lying areas. In 1998-99, 4.17 million tonne of fly ash was used for reclamation of the low lying area which has now increased to 9.31 million tonne in 2010-11 and constitutes 12.73% of total utilization. A graph showing the progressive utilization of fly ash in reclamation of low lying area for the period from 1998-99 to 2010-11 is given in Figure-4 below :

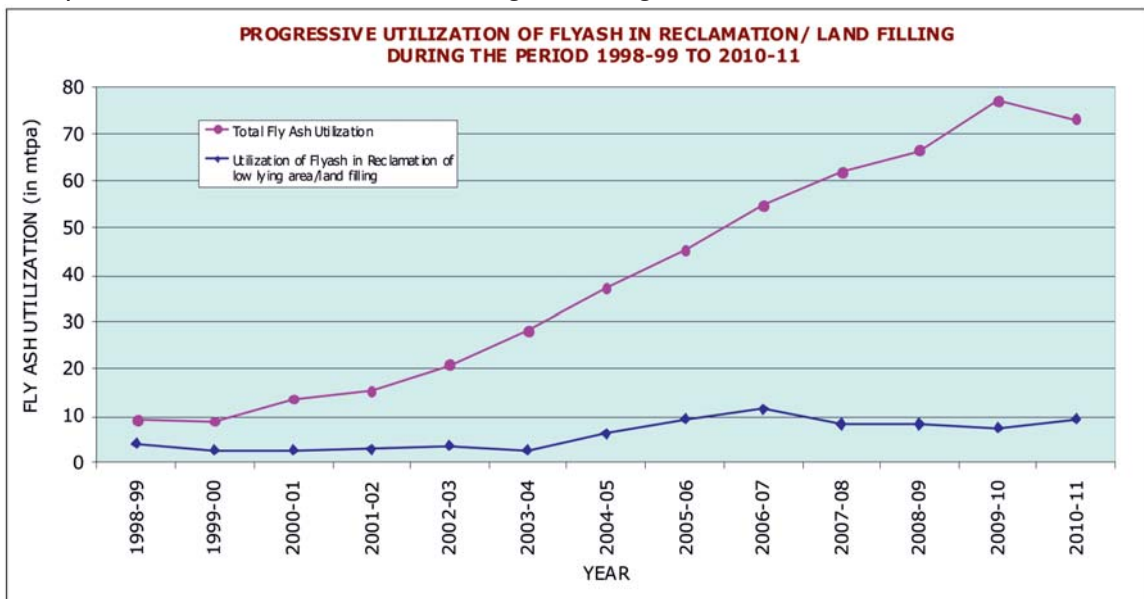


FIGURE-4

7.3 Road and Embankments

Fly ash is being used in construction of road and embankments. In 1998-99, 1.055 million tonne of fly ash was used in the construction of roads and embankments, which has now increased to 8.52 million tonnes in 2010-11 and constitutes 11.65% of total utilization. A graph showing the progressive utilization of fly ash in the road & embankment construction for the period from 1998-99 to 2010-11 is given in Figure-5 below.

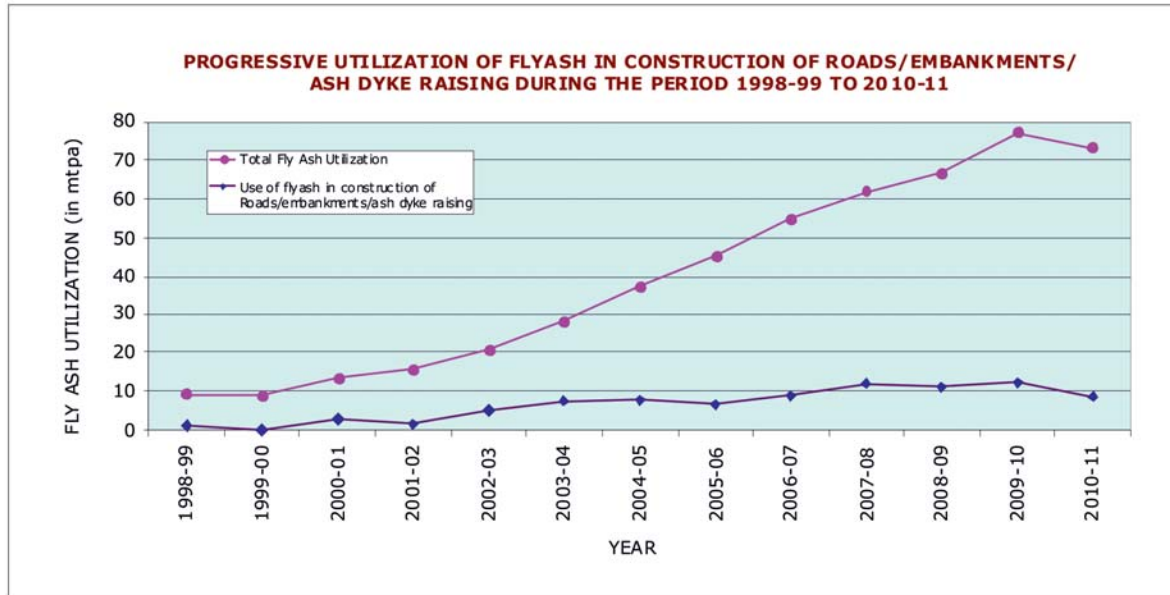


FIGURE-5

7.4 Back Filling/Stowing of Mines

Fly ash is being used for backfilling/ stowing of open cast and underground mines and it has large potential for ash utilization. In 1998-99, 0.65 million tonne of fly ash was used ash for backfilling / stowing of open cast and underground mines, which has now increased to 6.04 million tonnes in 2010-11 and constitutes 8.26% of total utilization. A graph showing the progressive utilization of fly ash in backfilling/ stowing of mines for the period from 1998-99 to 2010-11 is given in Figure-6.

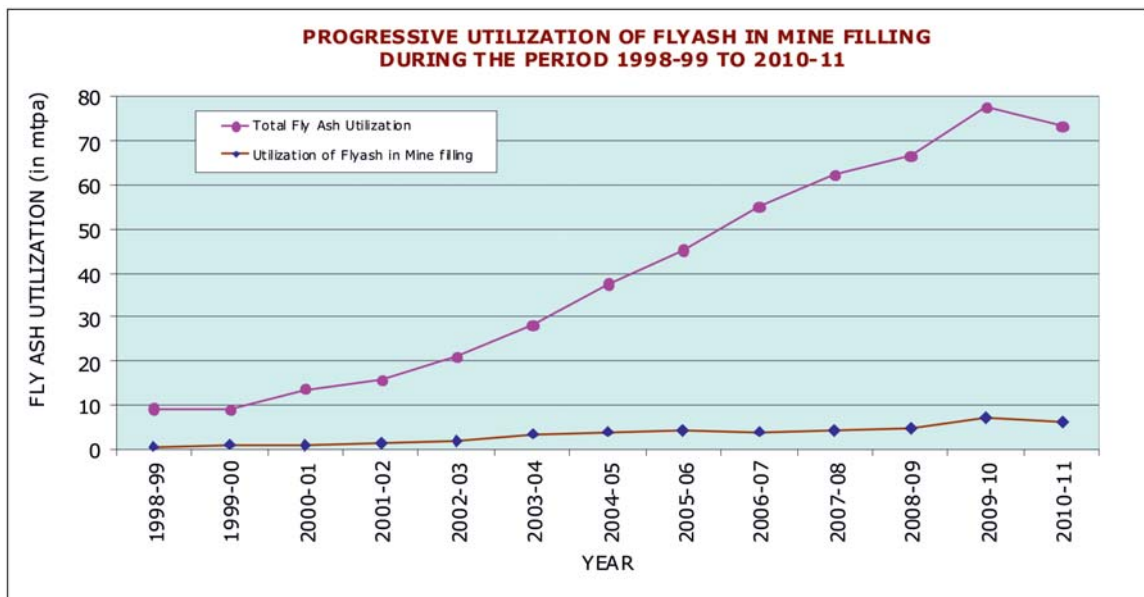


FIGURE-6

7.5 Building Materials like Bricks, Blocks, Tiles etc.

Fly ash is being used in manufacturing of fly ash based bricks, blocks, tiles etc. Fly ash bricks are as good as clay bricks. In 1998-99, 0.70 million tonne of fly ash was used for making of fly ash based bricks, blocks, tiles etc which has now increased to 4.61 million tonne in 2010-11 and constitutes 6.30% of total utilization. A graph showing progressive utilization of fly ash in making of fly ash based building products for the period from 1998-99 to 2010-11 is given in Figure -7.

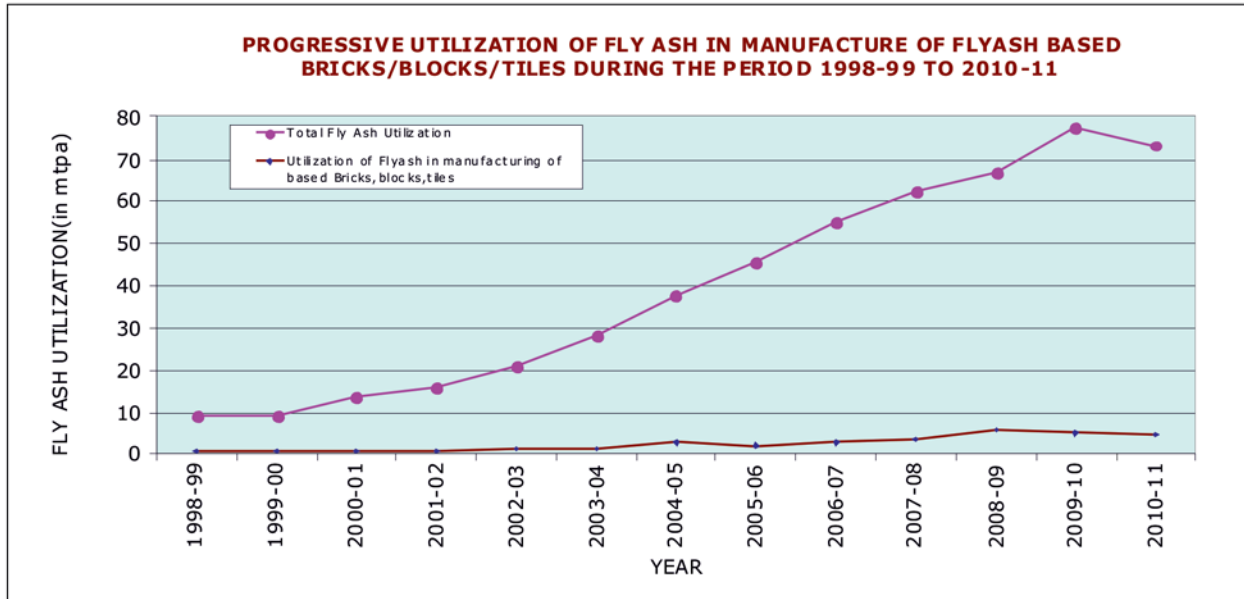


FIGURE-7

7.6 Agriculture

Fly ash is being used as manure in agricultural sector as it has many micronutrients. In 1998-99, 0.126 million tonnes of fly ash was used in agricultural sector, which has now increased to 1.27 million tonnes in 2010-11 and constitutes about 1.74% of total utilization. The progressive utilization of fly ash in Agricultural Sector for the period from 1998-99 to 2010-11 is given in Figure-8.

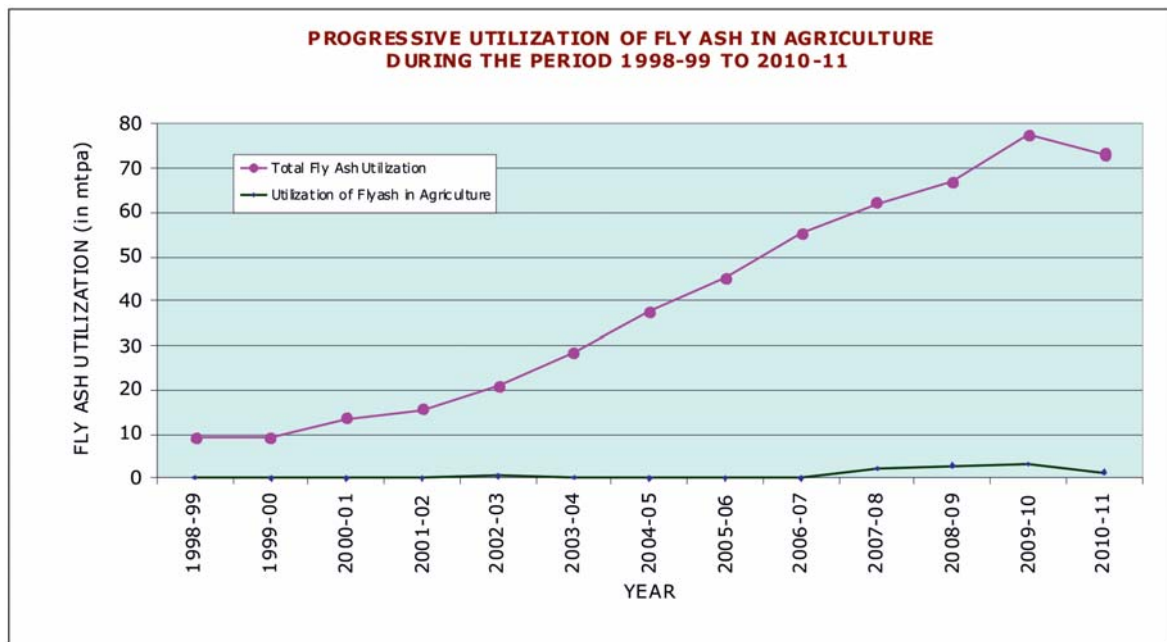


FIGURE-8

8.0 CONCLUSIONS & RECOMMENDATIONS

We achieved the highest level of fly ash utilization of 63% in 2009-10 and it was about 56% in 2010-11. However, it would require a lot of efforts to reach the target of 100% ash utilization as mandated by MoEF's Amendment Notification of 3rd November, 2009. A few strategies which need to be adopted to further increase the utilization level are given below:

- Renovation and modernization of coal/lignite based Thermal Power Station needs to include the technological advancement required to ensure development of dry fly ash collection, storage and disposal facilities so that fly ash in dry form could be made available to its user. Renovation and modernization should also include a marketing strategy for development of ash based industries and making available ash and ash based product in the nearby market.
- The states and districts where thermal power stations are located need to be sensitized to the need for utilization of fly ash and fly ash based building materials and take necessary measures to promote the use of fly ash and fly ash based products in Government buildings and in infrastructure projects. Measures can include policy intervention, planning strategies, fiscal incentives, recognizing specific efforts.
- Use of fly ash in backfilling/stowing of closed/abandoned/running open cast and underground mines has large potential for utilization of fly ash, especially for thermal power stations located close to mines. There are safety concerns for use of fly ash along with OB material for back filling operating open cast mines. These concerns need to be addressed.
- Use of fly ash in the construction of road embankment and flyovers is well established and is slowly & slowly picking up. However, its potential is yet to be fully utilized. As such, there is a need to sensitize National Highway Authority of India, CPWD, State PWDs and other concerned agencies both at Central and State levels that are involved in construction of roads and flyovers.
- Use of fly ash in the construction of embankments for laying railway lines has also significant potential for large scale utilization of fly ash. There are safety concerns in use of fly ash in the construction of railway embankment having passage traffic. There is a need to address those concerns by carrying out necessary studies by organizations like RDSO, a research organization under the Ministry of Railway.
- Use of fly ash based building materials, like fly ash based bricks, blocks, tiles etc. by Govt. agencies, both at Central and State level, is required to be ensured as per stipulations of MOEF notification especially in construction works within 100 km of any coal/lignite based thermal power stations in accordance with MoEF's notification.
- Some of the thermal power stations are restricting to single mode of ash utilization e.g. for cement or mine filling. The other modes of ash utilization have to be developed to increase the fly ash utilization.
- The utilization of fly ash and fly ash based building materials within the thermal power stations for the development of infrastructure like construction/raising of ash dyke, access roads, and buildings.

**FLY ASH GENERATION AND ITS UTILIZATION AT COAL/LIGNITE BASED THERMAL POWER STATIONS
IN THE COUNTRY DURING THE YEAR 2010-11 (POWER STATION AND UTILITY WISE)**

Sl. No.	Name of TPS	Power Utility & State	FLY ASH GERNERATION AND ITS UTILIZATION						MODES OF UTILIZATION								Total Utilization
			Coal consumed	Ash content	Installed Capacity	Fly Ash Generation	Fly Ash Utilization	Percentage Utilization	Cement	Bricks	Roads, Embankments, & Ash Dykes	Reclamation	Mine filling	Agriculture	Others		
			mtpa	%	(MW)	mtpa	mtpa	%	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
1	KOTHAGUDEM	A.P.GENCO (Andhra Pradesh)	4.32	44.75	720.00	1.93	0.01	0.64	-	-	-	-	-	-	-	0.01	0.01
2	KOTHAGUDEM-V		2.53	47.52	500.00	0.87	0.26	30.41	0.23	0.04	-	-	-	-	0.00	0.26	
3	RAMAGUNDAM'B'		0.33	43.16	62.50	0.14	0.07	46.46	0.03	0.04	-	-	-	-	-	0.07	
4	RAYALSEEMA		4.42	40.10	1050.00	1.81	1.22	67.30	0.83	0.39	-	-	-	-	-	1.22	
5	VIJAYWADA		8.65	41.47	1760.00	3.59	2.17	60.38	1.35	0.50	-	0.20	-	-	0.13	2.17	
6	SABARMATI	Torrent Power Ltd. (Gujarat)	1.74	22.62	400.00	0.34	0.34	100.00	0.33	0.01	-	-	-	-	-	0.34	
7	BARAUNI	B.S.E.B. (Bihar)	0.21	46.54	110.00	0.10	0.09	87.17	-	0.06	0.02	-	-	-	-	0.09	
8	DAHANU	Reliance Infrastructure Ltd. (Maharashtra)	2.77	29.03	500.00	0.80	0.61	75.93	-	0.00	0.34	-	-	-	0.27	0.61	
9	B.B.G.S.	C.E.S.C. (West Bengal)	3.33	35.33	750.00	1.40	1.40	100.00	1.14	0.00	-	-	-	-	0.26	1.40	
10	S.G.S.	C.E.S.C.	0.79	30.43	135.00	0.29	0.29	100.00	0.24	-	-	-	-	-	0.04	0.29	
11	T.G.S.	C.E.S.C.	1.24	24.32	240.00	0.37	0.37	100.00	-	0.06	0.07	-	-	-	0.24	0.37	
12	Amarkantak TPS	Lanco Power Ltd. (Chhatisgarh)	0.27	40.00	600.00	1.07	0.00	0.33	-	-	-	-	-	-	-	0.00	
13	KORBA (WEST)	C.S.P.G.C.L. (Chhatisgarh)	4.78	41.00	840.00	1.96	0.42	20.76	-	-	0.21	0.21	-	-	0.00	0.42	
14	KORBA (EAST)		2.82	44.70	440.00	1.26	0.48	38.33	-	-	0.11	0.38	-	-	-	0.48	
15	Muzaffarpur TPS	K.B.U.N.L (Bihar)	0.31	48.53	220.00	0.15	1.36	913.69	-	-	-	1.36	-	-	-	1.36	
16	BOKARO 'B'	D.V.C. (Jharkhand)	2.93	49.29	630.00	1.45	1.45	99.63	0.02	-	-	-	1.43	-	-	1.45	
17	CHANDRAPURA	D.V.C. (Jharkhand)	1.72	48.57	750.00	0.83	0.39	47.13	-	-	-	-	0.39	-	-	0.39	
18	DURGAPUR	D.V.C. (West Bengal)	1.17	44.39	340.00	0.52	0.86	164.78	-	0.00	-	-	0.86	-	-	0.86	
19	MEJIA	D.V.C.	6.04	43.30	1340.00	2.64	1.70	64.39	0.56	0.04	-	-	1.10	0.00	-	1.70	
20	D.P.L	D.P.L (West Bengal)	1.49	39.90	690.00	0.57	0.51	89.34	0.06	0.00	0.11	0.12	-	0.33	-	0.51	

Sl. No.	Name of TPS	Power Utility & State	FLY ASH GERNERATION AND ITS UTILIZATION						MODES OF UTILIZATION							Total Utilization
			Coal consumed	Ash content	Installed Capacity	Fly Ash Generation	Fly Ash Utilization	Percentage Utilization	Cement	Bricks	Roads, Embankments, & Ash Dykes	Reclai- mation	Mine filling	Agricul- ture	Others	
			mtpa	%	(MW)	mtpa	mtpa	%	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
21	SURAT LIGNITE	G.I.P.C.L. (Gujarat)	2.49	15.87	500.00	0.40	0.40	100.00	-	0.27	-	-	0.10	-	0.02	0.40
22	AKRIMOTA	G.M.D.C.L. (Gujarat)	0.97	18.65	250.00	0.18	0.20	108.15	0.02	-	-	-	0.18	-	-	0.20
23	GANDHINAGAR	G.S.E.C.L. (Gujarat)	3.75	32.35	870.00	1.21	0.82	67.63	0.79	0.01	-	-	-	-	0.02	0.82
24	KUTCH LIGNITE		1.62	14.60	290.00	0.24	0.24	100.00	-	-	-	-	0.24	-	-	0.24
25	SIKKA		0.95	40.76	240.00	0.39	0.15	37.66	0.09	0.06	-	-	-	-	-	0.15
26	UKAI		3.94	37.64	850.00	1.48	0.44	29.78	0.32	0.01	-	-	-	-	0.11	0.44
27	WANAKBORI		7.14	39.24	1470.00	2.81	0.78	27.63	0.32	-	-	-	0.19	-	0.27	0.78
28	HISAR	H.P.G.C.L. (Haryana)	1.92	46.87	1200.00	0.90	0.00	0.00		-	-	-	-	-	-	0.00
29	YAMUNANAGAR	H.P.G.C.L.	2.68	42.09	600.00	1.13	0.17	14.84	0.17	-	-	-	-	-	-	0.17
30	PANIPAT	H.P.G.C.L.	7.14	41.33	1367.80	2.95	0.98	33.10	0.98	-	-	-	-	-	-	0.98
31	RAJGHAT	IPGCL (Delhi)	0.70	33.78	135.50	0.23	0.20	84.27	0.15	-	0.05	-	-	-	-	0.20
32	PATRATU	J.S.E.B. (Jharkhand)	0.62	36.30	840.00	0.23	0.10	42.65	0.02	0.01	0.06	-	-	-	-	0.10
33	BELLARY	K.P.C.L (Karnataka)	1.70	26.71	500.00	0.45	0.03	6.98	0.03	-	-	-	-	-	-	0.03
34	RAICHUR	K.P.C.L.	6.24	32.72	1470.00	1.67	0.95	65.92	0.77	0.17	-	-	-	-	-	0.95
35	SANJAY GANDHI	M.P.P.G.C.L. (Madhya Pradesh)	5.79	39.52	1340.00	1.65	1.23	74.41	1.22	0.00	-	-	-	-	0.01	1.23
36	SATPURA		6.13	41.10	1142.50	2.52	0.25	10.05		0.05	0.20	-	-	-	0.00	0.25
37	AMARKANTAK		1.36	34.62	450.00	0.47	0.01	1.47	0.01	0.00	-	-	-	-	-	0.01
38	BHUSAWAL	M.S.P.G.C.L. (Maharashtra)	2.28	31.96	475.00	0.68	0.51	75.92	0.28	0.19	-	-	-	0.01	0.04	0.51
39	CHANDRAPUR		9.37	37.39	2340.00	3.62	0.94	25.93	0.07	0.07	-	-	-	-	0.80	0.94
40	KHAPARKHEDA		4.97	31.36	840.00	1.56	1.36	87.33	0.42	0.49	0.41	-	-	-	-	1.36
41	KORADI		4.22	39.22	1100.00	1.66	0.32	19.16		0.14	0.18	-	-	-	-	0.32
42	NASHIK	M.S.P.G.C.L. (Maharashtra)	4.11	37.89	880.00	1.55	0.85	54.89	0.62	0.11	-	0.11	-	0.01	-	0.85
43	PARAS		2.06	38.26	555.00	0.78	0.49	62.45	0.08	0.41	-	-	-	-	-	0.49
44	PARLI		4.67	38.93	1170.00	1.82	1.08	59.25	0.77	0.32	-	-	-	0.01	-	1.08
45	NEYVELI - I	N.L.C. LTD (Tamil Nadu)	5.64	4.71	600.00	0.22	0.18	83.82	0.16	0.02	-	-	-	-	-	0.18

Sl. No.	Name of TPS	Power Utility & State	FLY ASH GERNERATION AND ITS UTILIZATION						MODES OF UTILIZATION							Total Utilization
			Coal consumed	Ash content	Installed Capacity	Fly Ash Generation	Fly Ash Utilization	Percentage Utilization	Cement	Bricks	Roads, Embankments, & Ash Dykes	Reclai- mation	Mine filling	Agricul- ture	Others	
			mtpa	%	(MW)	mtpa	mtpa	%	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
46	NEYVELI - I EXPN	N.L.C. LTD	3.08	6.75	420.00	0.21	0.20	94.22	0.14	0.01	-	-	0.05	-	-	0.20
47	NEYVELI - II	N.L.C. LTD	11.78	8.74	1470.00	1.03	0.41	39.66	0.20	0.05	-	-	0.16	-	-	0.41
48	RAMAGUNDAM	N.T.P.C. LTD (Andhra Pradesh)	12.39	32.82	2600.00	4.07	2.61	64.22	1.99	0.01	-	-	-	-	0.61	2.61
49	SIMHADRI		6.01	36.50	1000.00	2.19	1.32	60.04	0.35		0.81	0.08	-	-	0.07	1.32
50	KAHALGAON	N.T.P.C. LTD. (Bihar)	11.21	34.00	2340.00	3.81	0.91	23.93	0.12	0.00	0.52	0.26	-	-	0.01	0.91
51	KORBA	N.T.P.C. LTD. (Chhatisgarh)	12.71	42.01	2600.00	5.34	2.14	40.08	0.74	0.02	0.91	0.48	-	-	-	2.14
52	BADARPUR	N.T.P.C. LTD. (Delhi)	3.68	30.00	705.00	1.10	0.99	89.30	0.19	0.00	0.76	0.03	-	-	-	0.99
53	VINDHYACHAL)	N.T.P.C. LTD. (Madhya Pradesh)	15.33	33.10	3260.00	5.07	3.21	63.25	1.16	0.00	0.40	0.59	-	-	1.05	3.21
54	SIPAT	N.T.P.C. LTD. (Chhatisgarh)	5.63	39.23	1000.00	2.21	0.23	10.52	0.23			0.00	-	-	0.00	0.23
55	TALCHAR(KAN)	N.T.P.C. LTD. (Orissa)	17.61	38.33	3000.00	6.75	2.26	33.48	0.07	0.01	0.98	0.80	-	-	0.40	2.26
56	TALCHAR (TPS)		30.97	3.85	460.00	1.19	1.19	100.00	0.01	0.00	-	-	1.18	-	-	1.19
57	RIHAND	N.T.P.C. LTD. (U.P.)	10.42	27.88	2000.00	2.91	1.76	60.52	0.05	0.01	-	1.70	-	-	-	1.76
58	SINGRAULI		12.04	33.65	2000.00	4.05	2.43	60.01	0.37	0.01	-	1.30	-	-	0.76	2.43
59	UNCHAHAR		5.73	32.82	1050.00	2.32	2.02	87.07	1.69	0.01	-		-	-	0.33	2.02
60	TANDA		2.80	41.40	440.00	1.16	0.70	60.04	0.31	0.00	0.03	0.11	-	-	0.25	0.70
61	DADRI		7.33	34.78	1820.00	2.55	2.10	82.41	1.47	0.00	0.34	0.29	-	-	-	2.10
62	FARAKKA	N.T.P.C. LTD. (W.B.)	7.39	33.57	1600.00	2.48	2.16	86.94	1.07	0.00	0.34	0.74	-	-	-	2.16
63	IB VALLEY	O.P.G.C.L. (Orissa)	2.74	40.70	420.00	1.11	0.31	27.66	0.04	0.01	-	-	-	-	0.25	0.31
64	BATHINDA	P.S.P.C.L. (Punjab)	1.32	33.02	440.00	0.44	0.23	52.34	0.20	0.02	-	-	-	-	-	0.23
65	LEHRA MOHABAT		4.22	31.43	920.00	1.32	1.05	79.60	1.01	0.02	0.01	-	-	-	0.02	1.05
66	ROPAR		6.41	33.01	1260.00	2.12	1.66	78.28	1.66	-	-	-	-	-	-	1.66
67	KOTA	R.R.V.U.N.L. (Rajasthan)	6.60	32.50	1240.00	2.14	2.09	97.31	1.80	0.09	0.15		-	0.01	0.03	2.09

Sl. No.	Name of TPS	Power Utility & State	FLY ASH GERNERATION AND ITS UTILIZATION						MODES OF UTILIZATION								Total Utilization
			Coal consumed	Ash content	Installed Capacity	Fly Ash Generation	Fly Ash Utilization	Percentage Utilization	Cement	Bricks	Roads, Embankments, & Ash Dykes	Reclai- mation	Mine filling	Agricul- ture	Others		
			mtpa	%	(MW)	mtpa	mtpa	%	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	mtpa	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
68	SURATGARH		6.26	31.21	1500.00	1.95	1.81	96.54	1.68	0.12	0.02	0.06	-	-	-	1.81	
69	CUDDALORE	ST-CMS (Tamil Nadu)	1.82	6.40	250.00	0.12	0.10	86.16	0.10	-	-	-	-	-	-	0.10	
70	JOJOBERA	T.P.CO. (Jharkhand)	2.13	44.48	427.50	0.92	0.85	92.42	0.52	0.00	0.16	-	0.18	-	-	0.85	
71	TENUGHAT	T.V.N.L. (Jharkhand)	1.71	41.62	420.00	0.71	0.67	93.98	-	-	-	0.67	-	-	-	0.67	
72	TROMBAY	T.P.CO. (Maharashtra)	2.69	3.00	750.00	0.08	0.06	79.97	0.06	0.01	-	-	-	-	-	0.06	
73	ENNORE	T.N.E.B. (Tamil Nadu)	1.58	43.20	450.00	0.68	0.50	72.73	0.14	0.03	0.05	-	-	-	0.28	0.50	
74	METTUR		4.53	35.60	840.00	1.61	2.34	145.19	2.02	0.30	0.01	-	-	-	0.02	2.34	
75	NORTH CHENNAI		3.29	35.40	630.00	1.16	1.27	109.29	0.50	0.06	0.71	0.02	-	-	0.00	1.27	
76	TUTICORIN		5.57	36.20	1050.00	2.01	1.55	77.07	0.88	0.10	0.37	-	-	-	0.21	1.57	
77	ANPARA 'A' & 'B'	U.P.R.V.U.N.L. (U.P.)	8.69	35.00	1630.00	3.04	0.06	1.91	0.05	-	-	-	-	0.01	-	0.06	
78	HARDUAGANJ		0.43	35.00	220.00	0.36	0.07	19.44	-	-	0.05	0.02	-	-	-	0.07	
79	OBRA		4.21	40.03	1372.00	1.70	0.09	5.40	0.09	-	-	-	-	-	-	0.09	
80	PANKI		1.01	33.30	210.00	0.33	0.17	51.88	0.11	0.00	0.07	-	-	-	-	0.17	
81	PARICHA		2.80	31.30	640.00	0.92	0.45	49.31	0.38	0.00	0.06	-	-	-	-	0.45	
82	KOLAGHAT	W.B.P.D.C.L (W.B.)	6.29	36.88	1260.00	2.55	1.84	72.25	0.64	0.09	-	-	-	0.89	0.22	1.84	
83	SAGARDIGHI		2.68	41.51	600.00	1.11	0.49	43.58	0.39	0.09	-	-	-	-	-	0.49	
84	BANDEL		1.60	41.00	450.00	0.66	0.83	125.68	-	0.03	-	-	-	-	0.80	0.83	
85	SANTALDIH		1.00	37.40	250.00	0.37	0.00	0.16	-	0.00	-	-	-	-	-	0.00	
86	BAKRESWAR		5.20	39.25	1050.00	2.02	1.12	55.41	0.72	0.03	-	-	-	-	0.37	1.12	
87	RATNAGIRI	JSW Energy Ltd. (Karnataka)	1.84	12.71	600.00	0.23	0.18	75.69	0.18	-	-	-	-	-	-	0.18	
88	VIJAYANAGAR		0.62	13.99	260.00	0.09	0.08	93.06	0.06	0.02	-	-	-	-	-	0.08	
GRAND TOTAL			407.61	32.16	80457.80	131.09	73.13	55.79	35.47	4.61	8.52	9.31	6.04	1.27	7.91	73.13	