



RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LTD.

KOTA SUPER THERMAL POWER STATION, KOTA

FLY ASH UTILIZATION-KOTA TPS

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KOTA SUPER THERMAL POWER STATION

LOCATION

- Kota Super Thermal Power Station is located on the left bank of river Chambal in Rajasthan's principal industrial city Kota. Infrastructural facilities like adequate water availability in Kota Barrage throughout the year, nearness to broad-gauge railway line, power load centre & existing transmission system for evacuation and distribution of power were some of the important factors responsible for selection of this location. Besides, better communication with all parts of the State, availability of adequate land for residential and non residential buildings and land required for ash disposal in the vicinity of the power house were some of the additional advantages in favour of the existing location.

SANCTION OF THE SCHEMES (STAGE-I to V)

- Stage-I (Units #1&2) was sanctioned by the Planning Commission in September, '76 whereas Stage-II (Units #3&4) was sanctioned in October, '80. Stage-III, Stage-IV & Stage-V comprising of only one Unit each were sanctioned in February 1989, August, 2001 & December, 2005 respectively.

KSTPS PROGRESS AT A GLANCE

<u>Stage</u>	<u>Unit No.</u>	<u>Capacity MW</u>	<u>Cost (Million Rs.)</u>	<u>Date of synchronization</u>	<u>Date of commercial run</u>
I	1	110	1430	17.01.83	01.04.83
	2	110		13.07.83	01.04.84
II	3	210	4800	25.09.88	11.03.89
	4	210		01.05.89	16.01.90
III	5	210	4800	26.03.94	18.07.95
IV	6	195	5370	30.07.03	01.08.04
V	7	195	* 8800	** 31.03.09	

* Estimated cost

** Target date of commissioning

FLY ASH UTILIZATION- ENDEVOURS

- A seminar was held at Kota Thermal Power Station in 1998 under auspicious of Fly Ash Mission, New Delhi for giving details on various uses of Coal Ash generated at KTPS. Cement industries, small entrepreneurs such as Brick & Block manufacturers, Cement pipe industries and agriculturists participated in the above seminar with interest and zeal for utilization of coal ash in their segments.
- Fly Ash Mission, Kota (FAMK) was set up in June, 2000 for protection of top soil & promotion of fly ash utilization within 50 KMs. radius of KTPS under chairman ship of District Collector, Kota with Director, Fly Ash Mission, G.O.I. as Chief Co-coordinator and Chief Engineer, KTPS, as the convener with members from all Govt. organizations such as PWD, Irrigation, PHED, RHB, Agriculture, UIT,RIICO, Engineering College etc.

FAMK OBJECTIVES

- The endeavour of FAMK was to achieve the above said objective by way of following & similar other activities :-
 1. To disseminate information and know how for gainful utilization of fly ash.
 2. To facilitate manufacture of fly ash product and/or use of fly ash in replacement of cement, good earth, soil, clays, minerals etc.
 3. Dissemination of information of safe disposition of unutilized fly ash.
 4. Specific actions to be taken with potential Govt. agencies / departments to patronize fly ash and its products for regular use (towards this, such departments should include fly ash and its products in their respective schedules of materials and rates).
 5. To disseminate information and know how for gainful utilization in agriculture application including forestry etc.
 6. To identify and co-ordinate technology / products development for existing / emerging application of fly ash preferably using local material and other industrial waste.
 7. To develop a mechanism that would bring to the notice of District Collector, the defaulters of Environment Protection Act of 14.9.99 for appropriate action.

ENVIRONMENTAL INDUSTRIAL ESTATE

- Kota Thermal Power Station deposited Rs. 7.37 lacs to Forest Department in Nov. 1997 for afforestation of the land in lieu of the allotment of 44.49 hect. of forest land for development of fly ash based units near KTPS.
- Accordingly Rajasthan State Industrial Development & Investment Corpn. (RIICO) set up Environmental Industrial Estate in the above land for setting up of various fly ash based small scale industries.
- Presently 10-15 Bricks & Blocks manufacturing Units are functioning in this Industrial Estate utilizing fly ash as supplied by KTPS free of cost.

POND ASH FOR ROAD EMBANKMENTS

- Concerted efforts were made with National Highway Authority of India (NHAI) to utilize the pond ash of KTPS for road embankment filling and protection of top soil.
- Accordingly outlets for supply of pond ash in covered vehicles were provided from the KTPS ash dykes to Four main firms engaged in the construction of National Quadrangle – NH 76 passing through Kota.
- This has helped in utilization of approximately 4.7 million tons of ash from the ash dyke during the last 3 years.

FLY ASH UTILIZATION AT KTPS

- **Concerted efforts have been made towards encouraging entrepreneurs for utilizing the ash generated at Kota Thermal Power Station. 100% fly ash utilization is expected upto March, 2009. The ash is being provided free of cost to various Cement Industries and brick kiln owners and other Industrialists. Pond Ash which was stored during earlier years have also been utilized in road works. The ash utilization at Kota TPS is highest in the Country.**
- **For achieving 100% Dry Fly Ash utilization KTPS has signed agreements with Cement manufacturing companies with dedicated unit allocations. The complete Dry Fly Ash evacuation system from each unit in 2 phases i.e. from ESP to intermediate silo to main supplying silo near KTPS boundary have been erected, tested, commissioned and operated by the respective Cement companies at their own cost.**
- **KOTA THERMAL POWER STATION ACHIEVED 98.48% DRY FLY ASH UTILIZATION DURING 2007-08)**

FLY ASH UTILIZATION AT KSTPS

In compliance to Govt. of India Gazette Notification issued on 14th Sept. 1999 for making available ash free of cost towards achieving 100% dry fly ash utilization upto 2009, KSTPS has signed agreements for dedicated generating units allocations including Construction & Operation of complete dry fly ash evacuation system from each unit in two phases i.e. from ESP to Intermediate Silo and intermediate silo to Main Supply Silo near KSTPS boundary with following cement manufacturing companies -

- ❖ Unit # 1&2 - M/s. Associated Cement Co. Ltd.**
- ❖ Unit # 3 - M/s. Birla Cement Works Ltd.**
- ❖ Unit # 4&5 - M/s. Grasim Industries Ltd.**
- ❖ Unit # 6 (50%) - M/s. Mangalam Cement Ltd.**
- ❖ Unit # 6 (50%) - M/s. Shree Cement Ltd.**

With above arrangements Kota TPS has been able to achieve 98.12% Dry Fly Ash utilization during 2007-08.

FLY ASH GENERATED AT KTPS

The daily coal consumption at Kota TPS in 2 x 110 MW + 3 x 210 MW + 1 x 195 MW Units is approximately 15000 MT. The daily generation at Kota TPS is approximately Fly Ash 4000 MT & Bottom Ash 500 MT. The total fly ash generated is Supplied / Utilized by various Cement Companies as detailed here under :-

❖ Unit # 1&2	- M/s. Associated Cement Co. Ltd.	- 750 MT
❖ Unit # 3	- M/s. Birla Cement Works Ltd.	- 750 MT
❖ Unit # 4&5	- M/s. Grasim Industries Ltd.	- 1500 MT
❖ Unit # 6	- M/s. Mangalam Cement Ltd.	- 400 MT
	- M/s. Shree Cement Ltd.	- 400 MT

From the Dry Flyash collected in various dedicated Silos of above companies about 200 MT flyash is made available to small Entrepreneurs such as Brick Manufacturer, Block & Pipe manufacturers & Concrete Readymix Plants.

DRY FLY ASH UTILIZATION ADVANTAGES

- 1. Minimum land requirement for ash storage.***
- 2. Minimum water requirement for conveying of ash.***
- 3. High ash storage density.***
- 4. ECO friendly – less airborne / water pollution.***
- 5. Reduction in Auxiliary Power Consumption***
- 6. 100% fly ash utilization prospects.***

DRY FLY ASH HANDLING : SYSTEM PHILOSOPHY (VACUUM)

- ***M/s. ACC & M/s BCW has installed dry fly ash handling system in two phases at KSTPS, Kota 2 x 110 MW & 1 x 210 MW respectively.***
- ***First phase is vacuum & collection system with mechanical exhausters.***
- ***Second is dense phase with K- pump & conveying air compressors to transfer the dry fly ash up to 500 Tons RCC silo.***

First Phase.

- ***There are 3 sets of bag filter cum receiving hoppers with lock hoppers connected with 2 Nos. intermediate surge hoppers, each hopper capacity is 75 Tons.***
- ***Dry Fly Ash conveying lines connected to the existing ash conveying lines of both ESP with the help of switch valve assemblies.***

Second Phase.

- ***K-Pump of 50 TPH cap. Connected to the ISH hoppers (First phase).***
- ***K-Pump connected to the 500 Tons cap. RCC silo (Second phase) with the Ash conveying lines of various sizes to the length of 1450 Mtrs.***
- ***All hoppers are having aeration system for material fluidising.***
- ***Complete system is being operated by the PLC system.***

DRY FLY ASH HANDLING : SYSTEM PHILOSOPHY

DENSE PHASE SYSTEM UNIT # 4, 5 & 6

- *M/s. GIL & M/s Shree has installed dry fly ash handling system in three phases / two phases at KSTPS, Kota 2 x 210 MW & 1 x 195 MW respectively.*
- *First phase is dense phase & collection system from ESP to 300 MT Silo.*
- *Second is dense phase with K- pump & conveying air compressors to transfer the dry fly ash up to 500 Tons RCC silos which are 1.2 km away from Main Plant.*
- *Third phase consist of coarse ash system having capacity of 100 MT per Unit per day.*

First Phase.

- *There are Y type tap of chutes installed below each ESP hopper, one for existing system & second for dense phase system. Each hopper is fitted with MD pumps & conveying lines connected upto 300 MT Intermediate Silo.*
- *Dry Fly Ash is conveyed from ESP to 300 MT Silo through air for which 3 Nos. conveying compressor are installed*

Second Phase.

- *K-Pumps 2 Nos. (1 W + 1 S) of 100 TPH cap. Connected from 300 MT IS Silo to 500 MT 2 Nos. RCC Silos.*
- *Ash from 300 MT IS Silo are conveyed through K-Pumps having different size of air lines (250 NB to 400 NB) with help of 2 Nos. compressors (2 w + 1 S) installed .*
- *300 MT Silo is having aeration system for material fluidising.*
- *Complete system is being operated by the PLC system.*

DRY FLY ASH HANDLING : SYSTEM PHILOSOPHY

DENSE PHASE SYSTEM UNIT # 4, 5 & 6

Second Phase

- *At 500 MT Silo fluidizing blowers with heaters are installed to keep ash in dry and fluidize stage.*
- *There are 2 Nos. loading spouts of capacity 100 TPH installed in each fly ash Silo for truck loading.*
- *One fluidizing spout of capacity 100 TPH installed in each Silo to make slurry of ash in case it is being not use.*
- *One bag filter of suitable capacity installed on each 500 MT Silo installed to discharge clean air to atmosphere.*

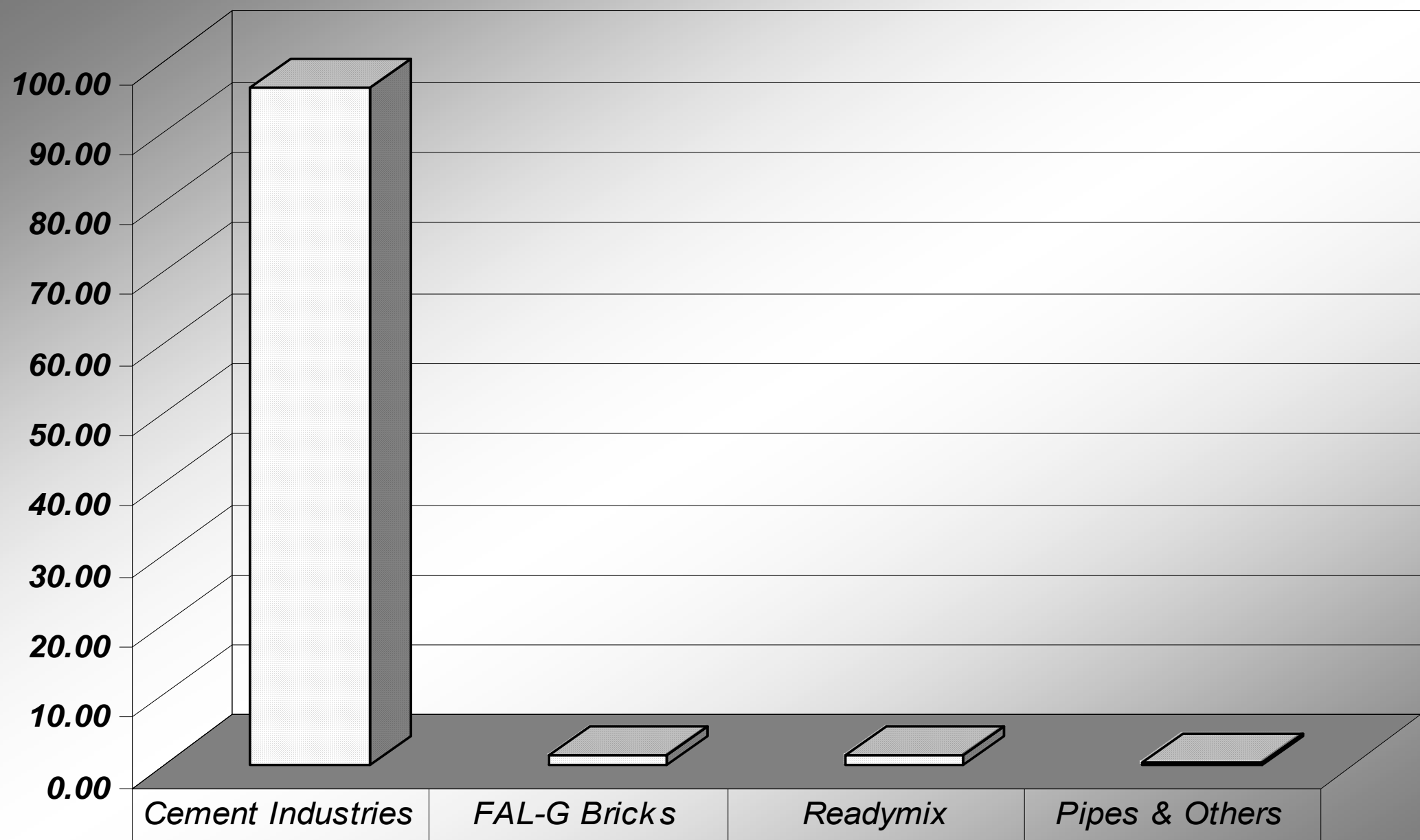
Third Phase

- *Third phase system is installed to collect coarse ash from ECCO / APH / Duct hopper in each Unit.*
- *One 100 MT steel Silo is installed in between Unit No. 4 & 5 to receive coarse ash generated in Unit No. 4 & 5.*
- *The coarse is conveyed through pipe line with help of compressors.*
- *Loading spout of 100 TPS installed below this Silo for loading in close tankers.*
- *Complete system is operated to PLC.*

KOTA THERMAL POWER STATION

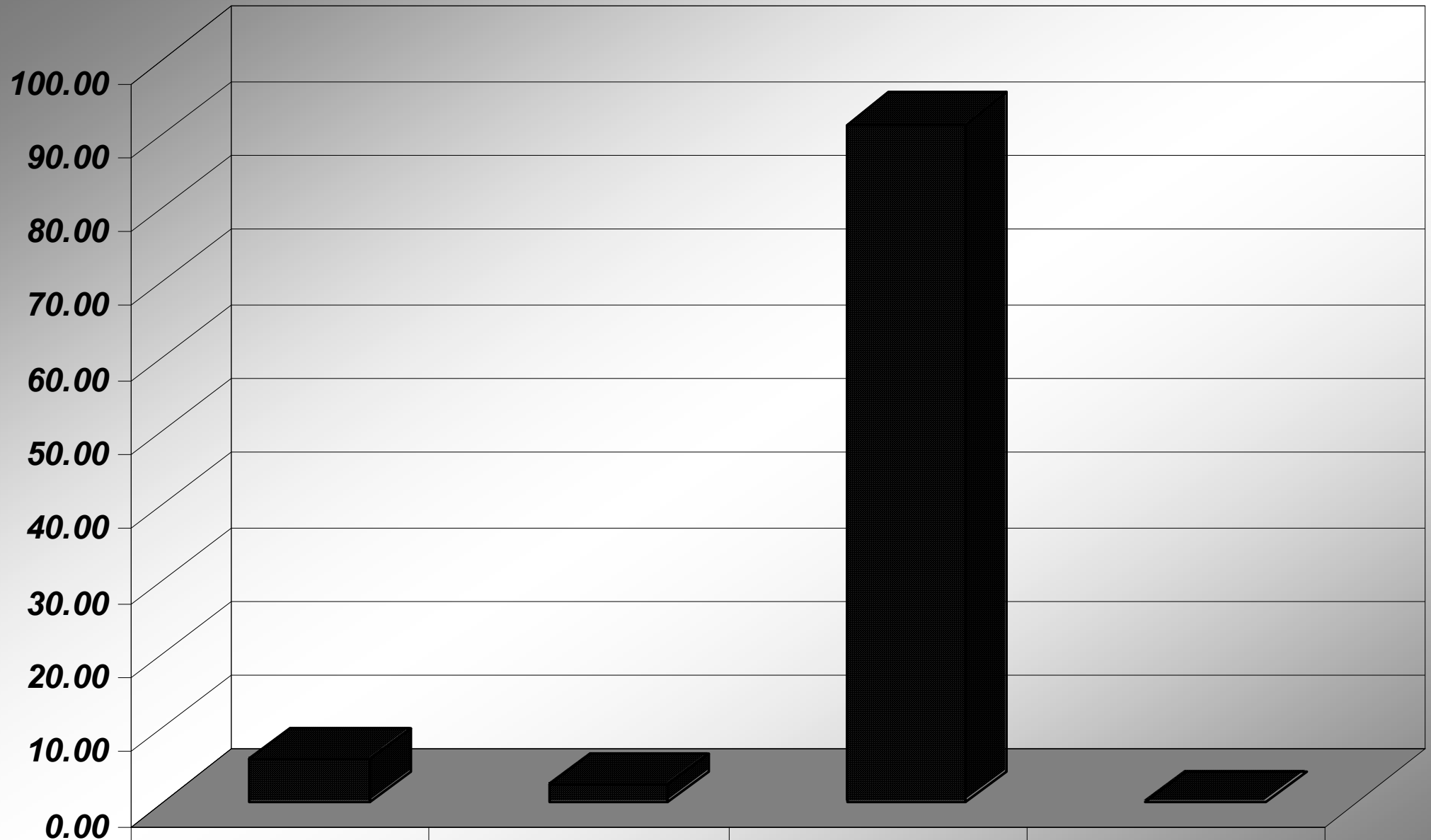
Year	Ash Gen.	Dry Fly Ash Utilization									
		BCW.	ACC	Shree	MCL	GIL	J.K. Nim.	Amb Uja	Shri Ram	Fly Ash prod.	Total
1982-97	8165239										
1997-98	1108375	550	1318	-	-		-	-	-	-	1868
1998-99	954274	15806	25599	2280	300		285	-	-	-	44270
1999-2K	1022763	38975	75285	750	-		3800	-	-	1575	120385
2000-01	1180553	76540	73320	-	6705	6495	-	-	-	11775	174835
2001-02	1218364	95275	94245	24945	46945	91350	-	-	10380	17356	380496
2002-03	1081260	106935	101895	41180	31925	192575	-	-	14625	23140	512275
2003-04	1244510	102095	93105	65118	47580	221565	-	-	22175	54678	606316
2004-05	1410138	146649	109235	83230	82395	256741	30682	-	41366	23301	773599
2005-06	1614428	185520	118048	136808	98168	302643	83276	25100	56450	38441	1044454
2006-07	1665961	197827	94853	202506	115536	453347	72751	32415	35738	59713	1264686
2007-08	1881783	265114	130156	186756	137909	672139	52612	41555	25473	57766	1569480
TOTAL	22547648	1231286	917059	743573	567463	2196855	243406	99070	206207	287745	6492664

DRY FLY ASH UTILIZATION 98.12% (2007-08)



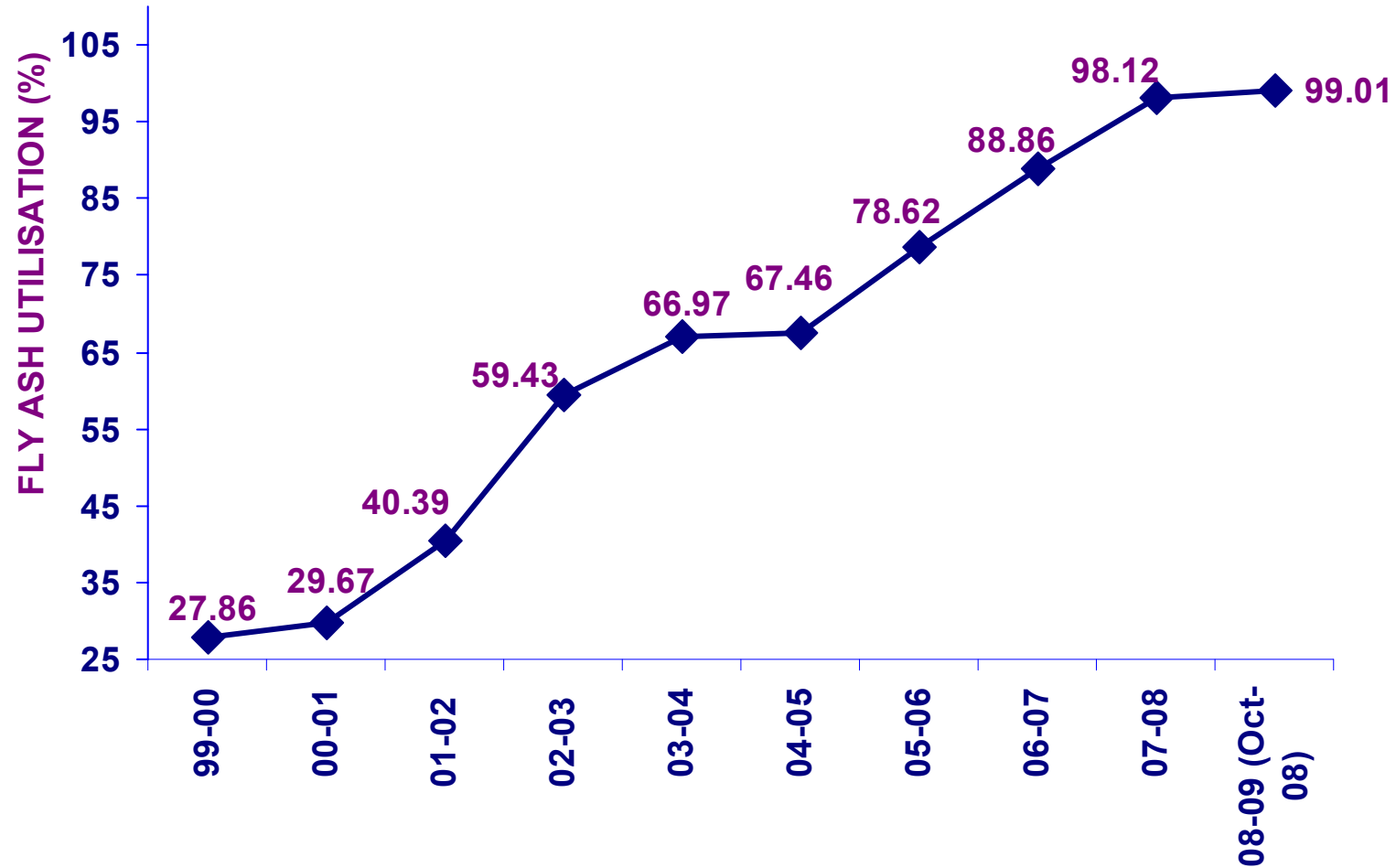
□ Series2	96.32	1.68	1.39	0.61
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POND ASH UTILIZATION (2007-08)



■ Series 1	5.85	2.39	91.48	0.28
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KOTA SUPER THERMAL POWER STATION FLY ASH UTILISATION (%)



POND ASH UTILIZATION

Concerted efforts have been made towards utilization of disposed fly & bottom ash accumulated in KSTPS ash dykes. The ash is provided free of cost and has been utilized by various small entrepreneurs i.e. Brick-kiln industries, small fly ash product industries, Cement manufacturing Industries and for land filling by National Highway Authority of India in construction of NH-12 and NH-76 :

- ❖ Brick-kiln Industries - 417853 Tons**
- ❖ Fly Ash product Industries - 1196257 Tons**
& Cement Plants
- ❖ Land filling (NHAI) - 4309430 Tons**

POND ASH UTILIZATION

Year	Ash Gen.	ACC	Amb Uja	Shree	J.K. Nim.	Vik. ram	DLF	MCL	Bric ks	Road NH-76	Land Fill	Total
1982-97	8165239	95684										95684
1997-98	1108375	25836	-	7789	-	-	-	-	13862	-	-	47487
1998-99	954274	14608	-	23168	10180	-	-	-	36014	-	-	83970
1999-2K	1022763	8416	-	53904	28363	4176	7232	-	54205	-	8110	164406
2000-01	1180553	15952	-	49440	29984	20544	5264	-	44277	-	10028	175489
2001-02	1218364	4416	-	8272	23488	6144	17968	-	45074	-	6244	111606
2002-03	1081260	7226	13140	-	75941	-	1504	-	24447	-	8117	130375
2003-04	1244510	22610	13374	5328	132544	920	6198	432	36151	-	9527	227084
2004-05	1410138	21373	-	-	89591	-	5314	-	61442	-	-	177720
2005-06	1614428	12314	-	-	36098	-	-	-	57383	39440	8024	153259
2006-07	1665961	21338	-	28254	59926	38431	13940	44695	-	1959421	9037	2175042
2007-08	1881783	7308	-	25080	44766	24092	-	738	70650	2700891	8272	2881797
TOTAL	22547648	257081	26514	201235	530881	94307	57420	45865	443505	4699752	67359	6423919

➤ **MANUFACTURING OF BRICKS, BLOCKS AND VALUE ADDED ITEMS**

- $\frac{3}{4}$ Fly ash bricks can be used in all types of brick masonry works and can
- substitute conventional clay bricks in nearly all applications. $\frac{3}{4}$ For making fly ash bricks, various technologies are available. The most
- common is FAL-G technology. In this technology Fly Ash, Lime, Gypsum
- and Sand are used as raw materials in proportion of 65:18:4:13. $\frac{3}{4}$ Due to non-availability of Lime Carbide Sludge, we at Renusagar, use
- optimum mix proportion of ingredients as follows:
- Fly Ash : 70%
- Lime Carbide Sludge : 4%
- Cement (OPC Gr.43) : 6%
- Coarse Sand : 20%
- Gypsum has been eliminated and % utilization of fly ash has been increased in the
- mix proportion
- Fly Ash bricks have many advantages over Conventional Clay bricks such as:
- $\frac{3}{4}$ Crushing strength is more than the good quality clay brick, hence can be used
- as load bearing member. $\frac{3}{4}$ Grey color in appearance and uniform in shape, hence
- plastering can be
- avoided. $\frac{3}{4}$ Lighter in weight than conventional clay brick. $\frac{3}{4}$ Bigger and uniformity in size
- results in 10% less consumption of bricks.
- Number of joints are also less. $\frac{3}{4}$ Requires less mortar & plaster thickness. $\frac{3}{4}$ Coloring of
- structure can be avoided.

➤ KSTPS KOTA

THANK YOU