



FLY ASH MANAGEMENT

Recent Regulatory Developments

By

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Indian Power and Fly Ash Scenario

- India - the **third-largest producer** and **second-largest consumer** of electricity worldwide.
- Indian power sector grown from an installed capacity of 1,713 MW in 1950's to 395.07 GW, as of January 2022.
- CEA Report for Fly Ash Utilisation -for the year 20-21 says installed capacity is – 2,09,990.50 MW.
- Planning Commission had projected an addition of about 120 GW of Coal based capacity during 2012-2022
- And by 2031, an addition of 600GW capacity.





Indian Power and Fly Ash Scenario

- Power generation is about 75% of Thermal (coal, Gas & Oil based), about 10% of Hydro, about 2.38 % of Nuclear and about 13.5% of Renewable Energy Sources.
- Out of the thermal- about 70% is coal based.
- 100% FDI allowed in the power sector has boosted FDI inflow in this sector



FLY ASH

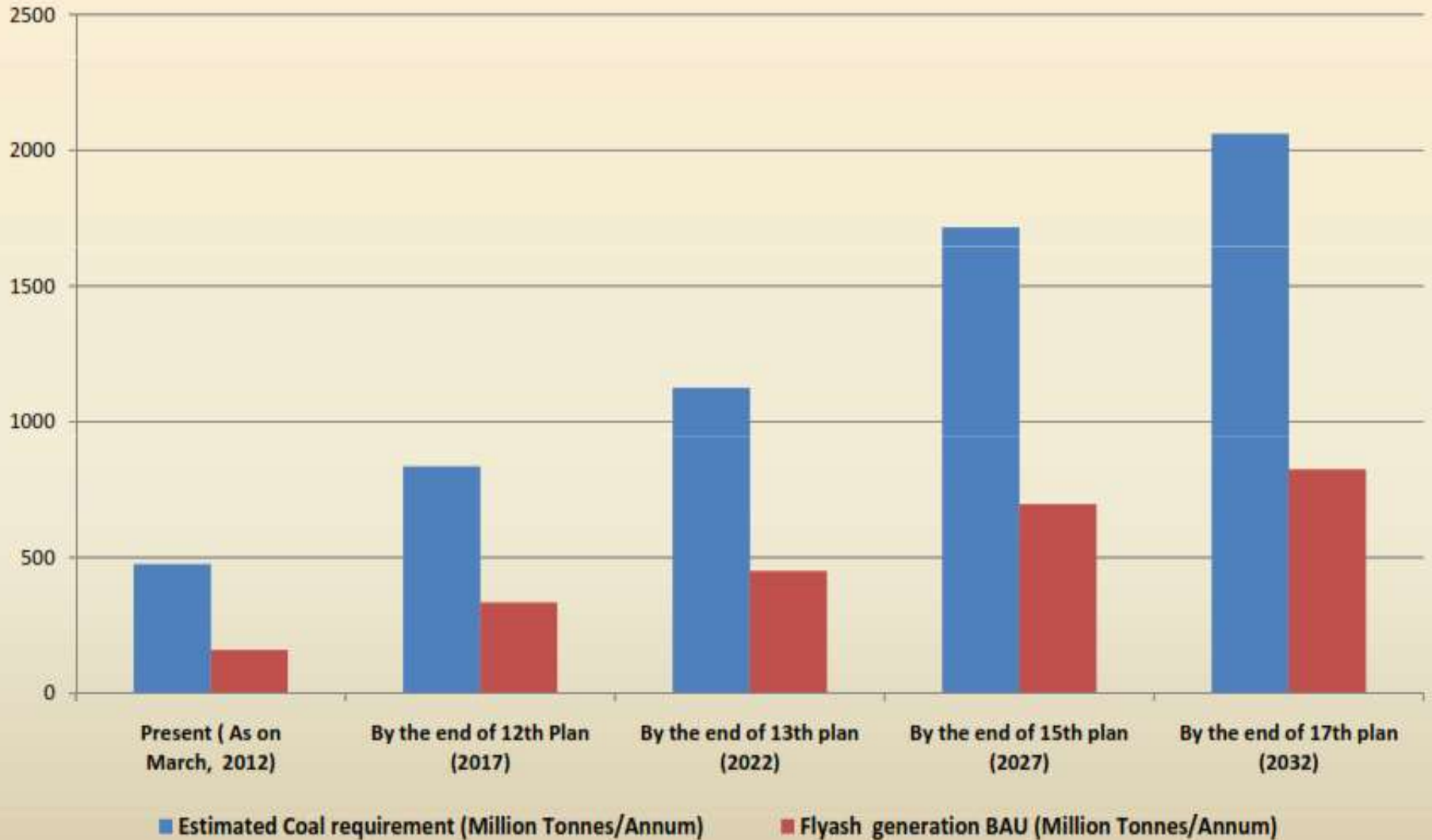


- Coal reserves- 211 billion tones.
- By 2032- consumption more than 1800 million tone per annum.
- Ash content -35-45%-50%.
- Ash Generation in 2020-21- **232.56 million tonnes**
- By 2032 about **600 million tones per annum** ash would be produced.





Projection of Fly Ash Generation





Summary of Ash Generation and Utilization -2020-21 - CEA

- *Data received from Thermal Power Stations :* 202
- *Installed capacity (MW) :* 209990.50
- *Coal consumed (Million tonnes) :* 686.34
- *Fly Ash Generation (Million tonnes) :* 232.56
- *Fly Ash Utilization (Million tonnes) :* 214.91
- *Percentage Utilization :* 92.41
- *Percentage Average Ash Content (%) :* 33.88





Summary of Ash Generation and Utilization during year 2020-21 - NGT

- *No. of Thermal Power Stations : 191*
- *Capacity (MW) : 2,13,030 MW*
- *Coal consumed : 672.130 Million Tonnes*
- *Fly Ash Generation : 222.789 Million Tonnes*
- *Fly Ash Utilization : 205.098 Million Tonnes*
- *Percentage Utilization : 92.06%*
- **Legacy based ash stored till 31.03.2021 : 1670.602 Million Tonnes**





Environmental Issues

- Air Pollution (Dust emission from ash pond)
- Water Pollution (Contamination of ground & surface water)
- Land degradation (Loosing top soil)
- Loosing precious land for Ash Ponds and Ash Mounds-
 - Occupied about 40,000 ha of land
 - requires about 1040 million M3 of water annually
- Downgrades the Pozollanic property of fly ash.
- Fails to recognise the utility of bottom ash









Ash Ponds





Ash Ponds in Orrissa





FLY ASH UTILISATION

***Hence ENVIRONMENT FRIENDLY MESURES
OF UTILISATION AND DISPOSAL OF FLY
ASH***

WAS FELT IMPERATIVE

HENCE

THE FLY ASH UTILISATION NOTIFICATION





FLY ASH UTILISATION NOTIFICATIONS

- Draft Notification containing certain directions for utilization of fly ash- **22nd May, 1998.**
- High Court Delhi Direction in CWP No. 2145/199 (Centre for Public Interest Litigation, Delhi Vs Union of India to finalize the Draft Notification in 4 weeks for ensuring the use of specified quantity of ash - **25th August, 1999.**
- Fly Ash Utilisation Notification- **14th September, 1999.**





Background

- Fly Ash First Amendment Draft Notification- 6th November 2002
- Fly Ash First Amendment Notification- 27th August, 2003
 - Revised Fly ash utilization targets for TPPs.
 - Mandate for brick kilns to use fly ash.
- Fly Ash Second draft Amendment Notification- 6th November, 2008
- Fly Ash Second Amendment Notification- 3rd November, 2009
 - Revised Fly ash utilization targets for TPPs.
 - Mandate for brick kiln to use fly ash withdrawn.
- Fly Ash Third Draft Amendment Notification- 25th May, 2015
- Fly Ash Third Amendment Notification- 25th January, 2016





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Fly Ash Dykes Breaches

- Rihand Reservoir on 07.08.2019 and 06.10.2019
- Six people died in Sasan Ultra Mega Power Project in Singrauli, Madhya Pradesh on April 15, 2020
- Fly ash slurry from NTPC Lara TPP in Chattisgarh flew over 9 hours on Nov 23, 2020 into Sukhanara nallah and entered near by agriculture fields.
- On June 15, 2021 from NTPC, Korba
- ACB India, North Chennai, Vindhyachal, Essar, Talchar, Bokaro, Khaparkheda, Koradi





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VARIOUS NGT ORDERS





Orders dated 20.11.2018 and 31.08.2018 in O.A. 593/2017

- OA No. 117/2014, *Shantanu Sharma vs. Union of India & Ors.*, OA No. 499/2014, *Anupam Raghav & Anr. vs. U.O.I. & Ors.* and OA No. 102/2014, *Sandplast (India) Ltd. & Ors. vs. MoEF & Ors.* And **O.A. 593/2017 clubbed**
- Need for invoking 'Polluter-Pays-Principle' as a component of 'Sustainable Development' principle.
- A Joint Committee was constituted to determine the amount of compensation required to be paid by individual TPPs and also interim compensation fixed by this Tribunal.
- Report of the Joint Committee submitted on 20.12.2019





Various Orders of NGT

- Environmental Compensation (EC) guidelines framed by CPCB.
- The maximum environmental compensation recommended was Rs. 30,000/- per day for the non-compliance suggested.
- **Rs 56 Crores** was imposed upon 3 TPP (Essar, Sasan and Vindhyachal) & 8 NCL mining projects in Singrauli, MP.
- EC ranging from **27 lakhs to 6 crores** was also imposed on various projects in Sonebharadra, UP
- **The EC has been stayed by the Supreme Court.**
- De-silting of the reservoir and improvement of dykes



Order dated 14.07.2020



- OA No. 164/2018, *Ashwani Kumar Dubey vs. Union of India & Ors.*
- Constituted an Oversight Committee headed by Justice Rajesh Kumar.
- Report Submitted On 20.12.2019.
- Suggested remedial action against thermal power stations in Singrauli and Sonbhadra districts of Madhya Pradesh and Uttar Pradesh
- Pollution of Rihand Reservoir
- The tribunal directed NTPC Vindhyachal to pay an **interim compensation of Rs 10 crore** for breach of its fly ash dyke into the Rihand Reservoir.





Direction dated January 18, 2022

- Constitution of a 'Fly Ash Management and Utilisation Mission' to 'Coordinate and monitor issues relating to the handling and disposal of fly ash and associated issues.





New Notification

- Draft amendment Notification: GSR-157(E) dated 25.02.2019- **Withdrawn**
 - Provisions regarding banning clay brick industry within 300 km,
 - Conversion of clay brick industry to ash based brick industry
- New Fly Ash Utilisation Draft Notification- in supersession of all- **22nd April, 2021**
- **NEW notification S.O. 5481(E) on Ash Utilisation – 31st December, 2021 - in suppression of all earlier**





OBJECTIVE OF FLY ASH NOTIFICATION

- **Protect the Environment**
- **Conserve Top Soil-** by restricting the excavation for brick manufacture
- **Conserve Precious Land-** Prevent the Dumping and Disposal of Fly Ash on Precious Land
- **Resource Efficiency and Circular Economy - no waste - all wealth or resource - Utilise the Fly Ash rather than disposal- in manufacture of building materials and in construction activities**





Definition and Categorization of FLY ASH

- Fly Ash means and includes all coal or lignite ashes generated at the thermal power plants such as Electrostatic Precipitator(ESP) ash, Bag Filter or dry ash, bottom ash, pond ash, and mound ash.
- Fly ash was categorized as high volume low effect waste under Hazardous Wastes (Management, Handling & Tranboundary, Movement) Rules, 2008 however, now excluded in HW Waste Rules of 2016.
- Chemically, fly ash mainly consists of oxides of silica, aluminum, Iron and calcium, besides trace of elements like arsenic, beryllium, boron, cadmium, chromium, chromium VI, cobalt, lead, manganese, mercury, molybdenum etc.





The Gist- Main Provisions

- *Coal or Lignite based TPPs-Captive or Co-generating stations or both*
- *To ensure 100 per cent utilisation of ash -in three years compliance cycle- **from 1st April, 2022.***
- *Utilisation not to fall **below 80 %** in any year*
- *First Compliance cycle can be **3-5 yrs** depending on the present utilization*
- ***11** eco-friendly manner listed*





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Main Provisions

- Legacy ash to be used fully within **ten years**-over and above the utilisation targets.
- Mandatory utilization of 20%, 35, and 50% legacy waste from first, second and third to tenth year respectively.
- Stabilized ponds/dykes taken for reclamation are exempted from legacy waste subject to certification by CPCB/SPCB/PCC – **with in one year**
- **EPR for mines in 300 kms- 25%- on serving the notice**
- Committee to identify mines for backfilling
- Filling of low lying area with the approval od SPCB





EPR- THE SOLUTION

- *EPR MEANS - Companies who make or sell a product have the responsibility of their products till the end- **‘End-of-Life’**.*
- *Responsibility of Producers is extended beyond the manufacturing and distribution - Beyond the Factory Gates.*
- *Responsibility of **‘Post-Consumer-Product’**- its environment friendly disposal.*
- **A TOOL FOR ENVIRONMENT PROTECTION FROM WASTE**





POLLUTER-PAYS-PRINCIPLE

- ❑ In India, in 1996 in Writ Petition no. 967 of 1989.
- ❑ Justice Dalveer Bhandari -imposed a fine of Rs 38.385 Crores to Hindustan Agro-Chemicals Limited (HACL) for the remediation of 350 acres of land in Bichri, Udaipur.
- ❑ Now the principle underpins most of the regulation of pollution in almost all the countries.
- ❑ EPR – the offshoot of this principle.
- ❑ Increasing the amount and degree of product recovery and minimising environmental impact of waste materials also becomes the responsibility of producers.
- ❑ It is also an effective means of achieving higher environmental standards in product design for environment and a driving force behind the adoption of remanufacturing initiatives and discouraging use of toxic materials.





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Products under EPR World Wide

- Auto, Tyres
- Batteries
- Oil products
- Packaging materials (paper, plastic, aluminum, glass, etc.)
- Beverage containers (bottles, cans),
- Electronic and electric equipment (EEE)
- Mercury containing devices
- Paints etc.
- ***FLY ASH – EPR for Mines located within 300 Km radius of thermal power plant, to undertake backfilling of ash in mine voids or mixing of ash with external Overburden dumps,***





Main Provisions

- Only emergency Ash pond allowed- **0.1 ha/mw**. Annual Certification.
- Silos for dry fly ash storage for **16 hrs** .
- Real time data .
- Construction activities including buildings within 300km to use fly ash/products.
- TPP to provide ash free of charge and transportation too or mutually agreed basis.





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Main Provisions

- TPPs or manufacturers of Ash bricks, tiles or sintered aggregated to serve written notices.
- CPCB/SPCBs – enforcing and monitoring authorities
- CPCB to make portal- **within six months**
- DM also.
- TPPs and User Agencies to submit Annual Report- **by 30th April**
- Compliance audit by external auditors approved by CPCB





Main Provisions

Environmental Compensation

- Rs 1000 /ton of unutilized ash- if not achieved 80%. For legacy waste too.
- Transporters to pay Rs 1500/ ton.
- Rs 1500/ton for purchaser /user agency
- For building construction- Rs 75/sqf
- Amount shall be returned after fulfilling
- EC to be deposited in a fund with CPCB- to be used for safe disposal and R&D





Comparison of Main Provisions-Fly Ash Notifications

Subject	1999 Notification	2021 Notification
Current Flyash generation - 100% utilisation target	Existing plants: 05 years (graded 50%, 60%, 75%, 90%, 100%) New plants: 04 years (graded 50%, 70%, 90%, 100%)	Three year cycle 1 st cycle: 5 year: TPPs below 60% 4 year: TPPs 60-80% 3 years: TPPs above 80% 2 nd cycle onwards: 3 years for all Each year : minimum utilisation of 80% (exempted for 1 st cycle)
Legacy Ash- 100% utilisation target	Not available	10 years 1 st year: equivalent 20% of annual capacity. 2 nd year: equivalent 35% of annual capacity. 3 rd -10 th year: 50% of annual capacity. Reclaimed ash ponds exempted with SPCB certification

Eco-Friendly Utilisation of Fly Ash

Earlier Notifications till 2016

- Construction activities like making of fly ash based building products,
- Portland pozzolana cement
- Construction of roads/highways/flyovers,
- Reclamation of low lying areas
- Back filling and stowing of mines
- Waste land development
- Construction of Roller Compacted concrete dams etc.

Notification, December 2021

- Fly ash based products viz. bricks, blocks, tiles, fibre cement sheets, pipes, boards, panels;
- Cement manufacturing, ready mix concrete;
- Construction of road and fly over embankment, Ash and Geo-polymer based construction material;
- Construction of dam;
- Filling up of low lying area;
- Filling of mine voids;
- Manufacturing of sintered or cold bonded ash aggregate;
- Agriculture in a controlled manner based on soil testing;
- Construction of shoreline protection structures in coastal districts;
- Export of ash to other countries;
- Any other eco-friendly purpose as notified from time to time.



Comparison

Subject	1999 Notification	2021 Notification
Obligations on TPP Supply of Pond ash	Pond ash- free of charge to Flyash Brick manufacturer/ Central & State Construction agencies/ CPWD/Mines	TPPs serves notice: free of cost to roads/ dams/ flyover/ shore protection structures. Otherwise : Supply and transport cost on mutually agreed terms
Supply of Fly ash	Free supply of 20% dry ESP Flyash to Brick industry (exempt for 100% compliant TPPs)	
Transportation cost	road/ash bricks/agriculture Free: within 100 km Share 50% each: 100-300 km. Free: all Govt. construction in 300 km	



Comparison

Subject	1999 Notification	2021 Notification
Revenue collection from sale of ash	TPPs to use for promotion of flyash facilities (exempt for 100% compliant)	-
Upload stock position by TPP	Monthly	Real time data
Install dedicated ash storage silos	Yes	Minimum storage for 16 hours
TPPs to set up flyash based units	Yes	Nil
Action plans in 6 months Annual reporting	CPCB/SPCB/RO-MoEF	Annual reporting/Audit



Comparison

Subject	1999 Notification	2021 Notification
Emergency Ash pond	-	0.1 ha per MW
Existing ash ponds	-	Ash ponds stabilized with green cover with certification from SPCB with in one year will not be counted for utilization.





Comparison- Committees

Subject	1999 Notification	2021 Notification
Central Apex Monitoring Committee	Chaired by Secretary-MoEF	Chaired by Chairman, CPCB
Notification of Eco-Friendly Ash Utilisation	-	Chairman CPCB and others
State Level Monitoring Committee (Dispute redressal, monitoring, waivers, facilitation)	Secretary, Env, State Govt. with other members	Chairman SPCB and others
Dispute Settlement Committee (TPP & Brick industry)	Yes	--
Expert Committee for identification of mines, guidance on backfilling and stowing	M/o Coal to constitute Committee.	Committee chaired by CPCB to identify mines



Comparison- Mines

Subject	Flyash Notification, 1999	Notification 2021
Coal/lignite/all metal mines (opencast and Underground) (Government & Private)	Mines within 50 km radius of TPP Minimum 25% flyash use in underground stowing Overburden dumps	Mines within 300 km radius of TPP Minimum 25% flyash use in backfilling/mixing with overburden dumps
Expert Committee for guidance on backfilling and stowing	M/o Coal to constitute committee. Members from MoEF, MoP, MoM, DST, CIMFR, DGMS	Committee chaired by CPCB to identify mines
Incorporation of flyash dumping in mine closure plan and Environmental Clearance	No	Yes



Comparison- construction industry

Subject	Flyash Notification, 1999	Notification 2021
Building construction industry	Mandatory use of flyash based products within 300 km (cement-15%, ash based bricks-25%, Blocks/tiles/mortar-15%)	Mandatory use of based products within 300 km (minimum flyash content is to be inline with BIS, IRC standards, etc.)
Construction projects (roads, flyover embankments, shoreline protection)	Mandatory use in 300 km	Mandatory use in 300 km provided it is delivered at free of cost by TPP.
Reclamation of low lying areas	Mandatory in 100 km	Allowed for approved projects



Comparison- Brick industry

Subject	Flyash Notification, 1999	Notification 2021
Brick plants	Mandatory mixing of minimum 25% flyash in clay bricks, in 100 km	300 Km
Flyash based brick plants	Consent to be granted by SPCB in 30 days	-
In case, non-compliance by brick industry	Consent cancellation	EC, if not used after serving notice by TPP to take ash.
In case of non-availability in 300 km	Waiver by State Level committee	-
Enforcement	SPCB	SPCB



Comparison- Penalties

Subject	Notification, 1999	Notification 2020
Thermal Power Plants Non-compliance to 100% utilisation target	Nil	Rs.1000 per tonne/year for current generation Rs.1000 per tonne/year for legacy ash generation.
User agency (mines, construction industry, transporters, purchaser)	Nil	Rs.1500 per tonne if ash is not accepted from TPP after serving notice
Serving Notices by TPP to users	In case of non-availability, waiver issued	Obligation starts once notice served.
Monitoring agency	SPCB	SPCB
Fine collecting agency	Nil	Deposit with CPCB. Use for safe disposal of ash



Actions Taken for inclusion of Notification

- Guidelines for utilization of Fly Ash in low lying and mines voids- issues by CPCB.
- OM issued on 28th August, 2019 for change in the conditions of EC for TPPs and Coal Mines in line with the Fly Ash Notification.
- Constitution of Fly Ash Management and Utilization Mission – 9th March, 2022 in compliance with NGT order dated 18th January, 2022
- Country wide mobile app where daily generation, place of generation, takers in the vicinity and type of material etc. are given.





Guidelines to be Issued under the Notification

- **Technical specifications of ash ponds or dykes – by CPCB - in consultation with CEA**
 - shall also lay down a procedure for annual certification of the ash pond or dyke on its safety, environmental pollution, available volume, mode of disposal, water consumption or conservation in disposal, ash water recycling and greenbelt, etc., and shall be put in place within three months from the date of publication of this notification.
- Utilisation of Ash in the said activities shall be carried out in accordance with **specifications and guidelines laid down by the Bureau of Indian Standards, Indian Road Congress, Central Building Research Institute, Roorkee, Central Road Research Institute, Delhi, Central Public Works Department, State Public Works Departments and other Central and State Government Agencies.**





Guidelines to be Issued under the Notification

- Mine filling /stowing – as per the guidelines of the Director General of Mines Safety (DGMS).
- Utilisation of ash in the said activities shall be carried out in accordance with guidelines laid down by the CPCB , DGMS and Indian Bureau of Mines.
- Further, from time to time to facilitate ash disposal in mine voids and mixing with overburden dumps- and it shall be the responsibility of mine owners to get the necessary amendments or modifications in the permissions issued by various regulatory authorities within one year from the date of identification of such mines.



Guidelines to be Issued under the Notification



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- CPCB after engaging relevant stakeholders, shall put in place the guidelines **within one year** for all types of activities envisaged under this notification including putting in place time bound **online application process** for the grant permission by SPCBs or PCCs.
- Manufacturing of ash based products and use of ash in such products shall be in accordance with specifications and guidelines laid down by the Bureau of Indian Standards, Indian Road Congress, and Central Pollution Control Board.





New Innovative usage in Future

- Fly Ash in Nano Concrete Aggregates
- Production of Artificial Sand
- Gypsum fly ash plaster
- Recovery of Value added mineral products
- Zeolites
- Geo-polymers pavement using 100% fly ash
- Mechanical Activation/reduction of Size
- Fly Ash Geo-Polymer Concrete with micro Silica and Steel Fiber





New Areas of Utilisation

- Railways Embankments
- Pre-stressed Railways Concrete Sleepers
- Ash based Bituminous Roads
- Flux bonded Bricks/Tiles
- HDPE Products
- Ready mix concrete plants
- Geo-Polymers
- Extraction of Minerals and micro nutrients





Issues in New Notification

- No modous operandi provided for the Funds to be used by CPCB
- No modous operandi provided for the Funds to be used by the Mission
- **Asbestos Cement product Manufacturing Industry may be added in to end user list.**
- **BIS certification for Fly Ash brick products**
- Fly ash based products manufactures to be declared as Green Industry
- Tax rebate for fly ash bricks
- **Non availability of special Rail wagons/bulkers or covered trucks transportation of ash to avoid fugitive emissions are not available. – To be made mandatory.**
- Kind of Stock Exchange for Fly Ash







Rules available on <http://envfor.nic.in/>,
<http://www.moef.nic.in/>

THANK YOU

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