



# NATIONAL WASTE MANAGEMENT



**SUMMIT AND AWARDS 2025**

With a special emphasis on Fly Ash &  
Gypsum Utilization

**CURRENT STATUS & FUTURE ROAD  
MAP FOR THERMAL POWER PLANTS**

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# Fly Ash Utilisation : Current Status & Future Road Map for Thermal Power Plants

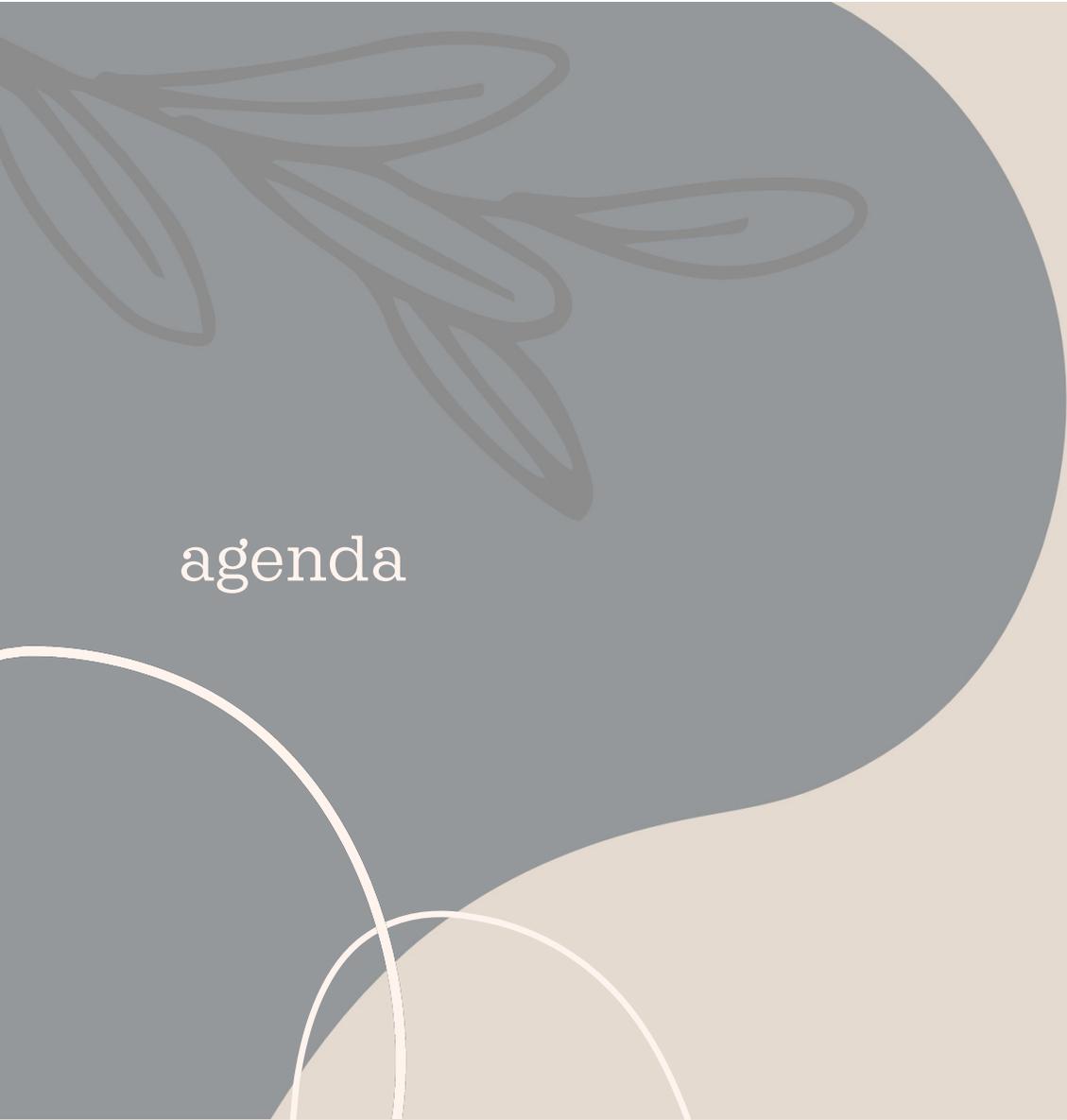


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agenda

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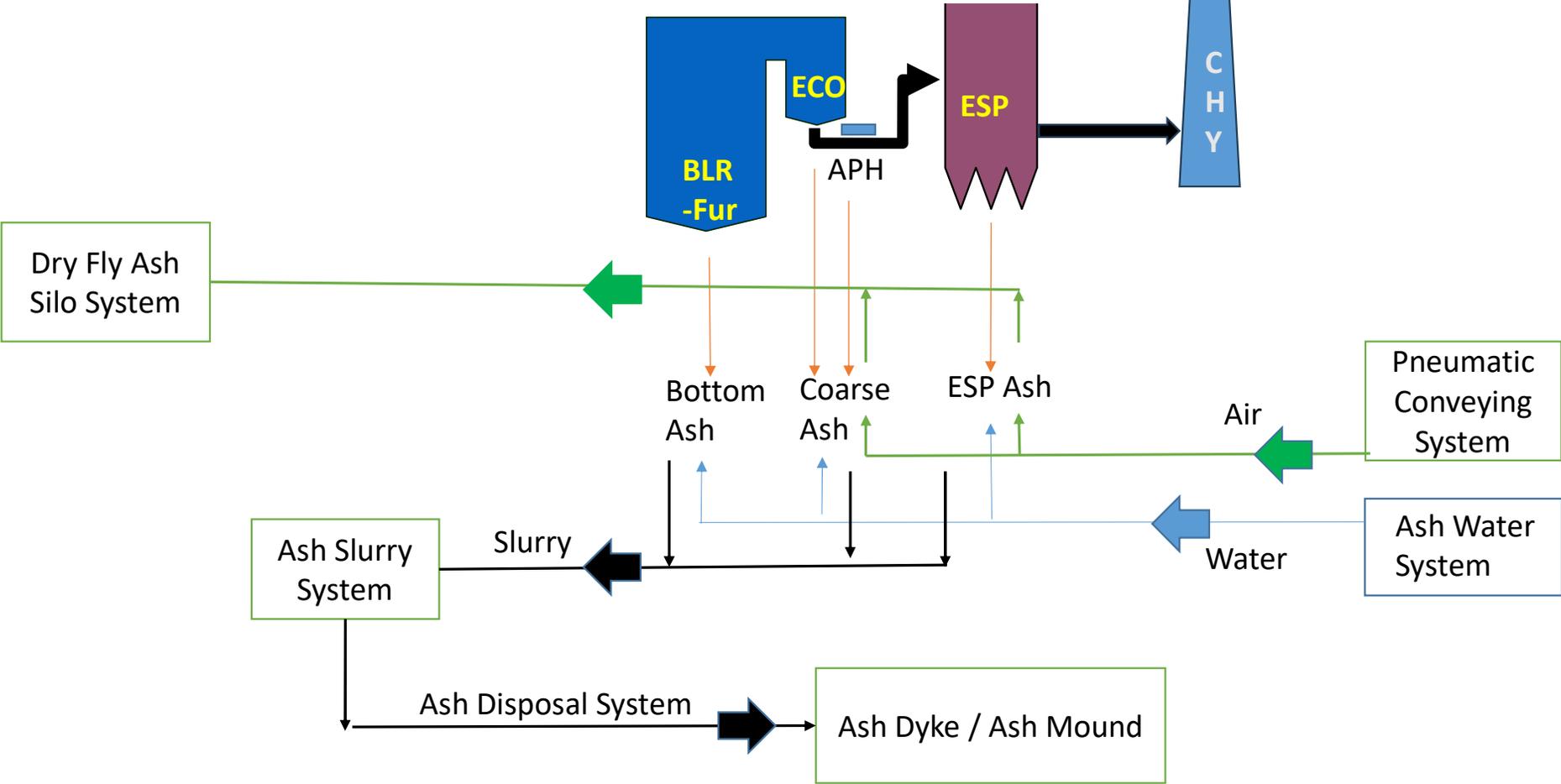
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## **Introduction : What is Fly Ash & Why it Matters**

- Fly Ash – By product of coal based thermal power plant.
- Categories – Bottom Ash, Fly Ash, Pond Ash
- Risks : Air / Water pollution, Land use
- Opportunity : Pozzolanic material, Key for cement, roads, bricks

# Ash Handling System in Power Plant (Line Diag)



# Why 100% Fly Ash Utilisation Became Non-Negotiable



Massive volumes (>300 Mt/yr) – land requirement for ash ponds unsustainable



Groundwater & air pollution risks – leaching of heavy metals, fugitive dust



Public opposition & NGT/CPCB pressure – polluter-pays principle enforced



Accidents & pond breaches – environmental disasters, liability for utilities



Economic potential – cement/clinker substitution, roads, bricks, resource saving



Climate goals – reduces CO<sub>2</sub> footprint, part of circular economy strategy

## Tracing History of Fly Ash Notification :

- In 1999, fly ash generation in India was approximately 74 Million Tons as per CEA data.
- Utilisation rates were quite low, with only about 8.9 Million Tons (12%) of the generated ash being utilised.
- Rest of the ash generated were accumulating in ash ponds and land fills near power plants.
- This sizeable output, combined with poor utilisation, was a major factor necessitating 1999 notification, first of its kind, for management and utilisation of fly ash.

## Regulatory Journey ( 1999 – 2024 )

### 1999 : First MOEF Notification on Fly Ash

- Applied to TPPs within 50 km of cities & large projects.
- Prescribed **progressive targets for fly ash utilisation** (50-100% within 5 years).
- Banned topsoil for bricks, mandated **use of ash-based bricks/blocks/tiles** in construction near TPPs.
- Required TPPs to supply pond ash and 20% fly ash free of cost to users.

## Regulatory Journey ( 1999 – 2024 ) Contd

### 2003 : Amendment

- Extended provisions to all **government construction agencies (CPWD, PWD, NHAI, etc)** for compulsory use of ash products.
- Set deadlines for including fly ash items in **Schedule of Rates**.
- Allowed free transport of fly ash upto a certain distance (100 km)

## Regulatory Journey ( 1999 – 2024 ) Contd

### 2009 : Second Major Amendment

- Expanded definition of ' fly ash ' to include **ESP ash, pond ash & bottom ash.**
- Increased the **mandatory radius from 50 km to 100 km** around TPPs.
- Required cement plants within this radius to **mandatorily use fly ash.**
- Strengthened timelines for brick/tile manufacturers.

## Regulatory Journey ( 1999 – 2024 ) Contd

### 2016 : Comprehensive Amendment

- **Mandatory utilisation radius increased to 300 km** for cement & construction.
- Specified that **all road construction agencies** (NHAI, State Highways, rural roads) must use fly ash in embankments and sub-base.
- Banned dumping of ash in low-lying areas unless scientifically engineered
- Directed TPPs to **submit ash utilisation plans** annually to SPCB/CPCB.

## Regulatory Journey ( 1999 – 2024 ) Contd

### 2021 : Superseding Notification

- Replaced all earlier notifications.
- Introduced **100 % utilisation obligation** for all coal/lignite based plants.
- Compliance in **3 year cycles**, shortfall of one cycle to be made up in next cycle.
- Obligated TPPs to excavate and utilise **legacy ash ponds**.
- Required **online reporting** to CPCB.

## Regulatory Journey (1999 – 2024 ) Contd

### 2022 : Amendment

- Extended free supply obligations.
- Clarified **transport-sharing mechanisms** with end-users ( roads, govt projects ).
- Expanded ash utilisation options ( mine back filling, agriculture under strict conditions )
- Provided for Solar plant/ Wind Power Plant on the reclaimed Ash Dyke

## Regulatory Journey ( 1999 – 2024 ) Contd

### 2024 : Amendment

- Reinforced **300 km mandatory radius**.
- Strengthened provisions on **transport cost sharing** between TPPs and users.
- Tightened penalties for non-compliance, including **environmental compensation** as per NGT/CPCB guidelines.

## Regulatory Journey ( 1999 – 2024 ) Contd

### Overall Trend

- 1999 – Awareness and voluntary targets.
- 2003-2009 – Expansion of users & mandatory inclusion in govt projects.
- 2016 – Wider radius, stronger compliance.
- 2021-2024 – **100 % obligation, online monitoring, penalties and legacy pond ash clearance.**

# Ash Utilisation Trends

Last Ten Years Trend :

2015-16 : Generation – 176.74 MT ; Ash Utilisation – 105.8 MT ; Utilisation – 59.81 %

2018-19 : Generation – 217.04 MT ; Ash Utilisation – 168.4 MT ; Utilisation – 77.59 %

2019-20 : Generation – 226.0 MT ; Ash Utilisation – 105.8 MT ; Utilisation – 83 %

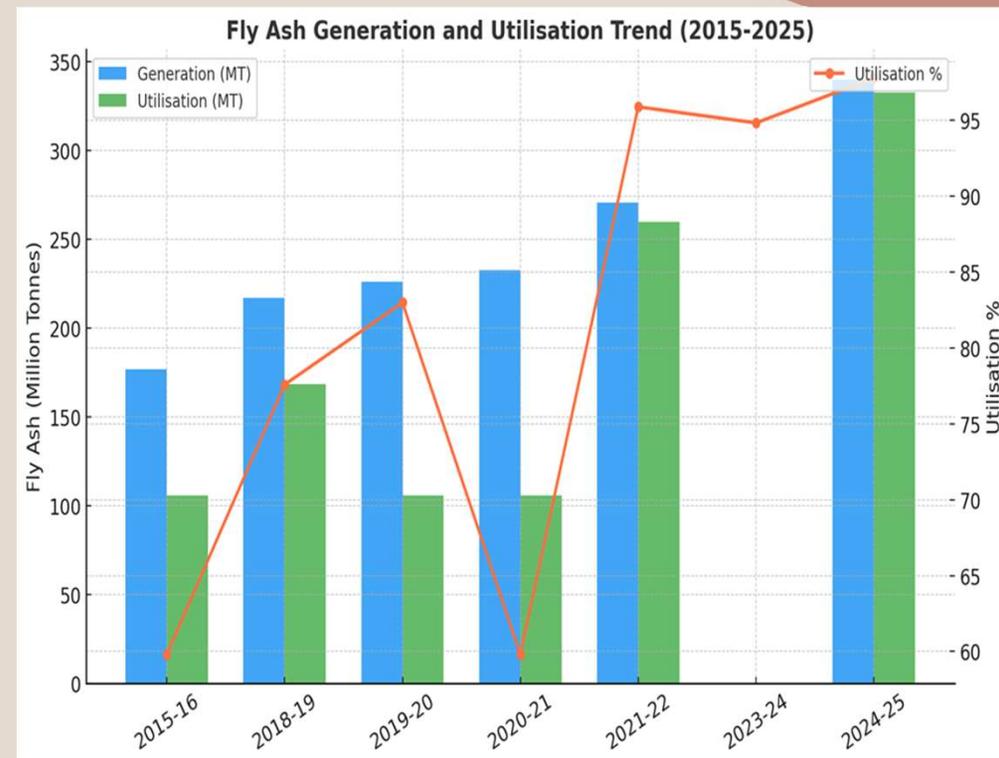
2020-21 : Generation – 232.56 MT ; Ash Utilisation – 105.8 MT ; Utilisation – 59.81 %

2021-22 : Generation – 270.82 MT ; Ash Utilisation – 259.86 MT ; Utilisation – 95.9 %

2022-23 :

2023-24 : Generation – MT ; Ash Utilisation – MT ; Utilisation – 94.84 % ( MOEF stated)

2024 -25 : Generation – 340.11 MT ; Ash Utilisation – 332.63 MT ; Utilisation – 97.8 %

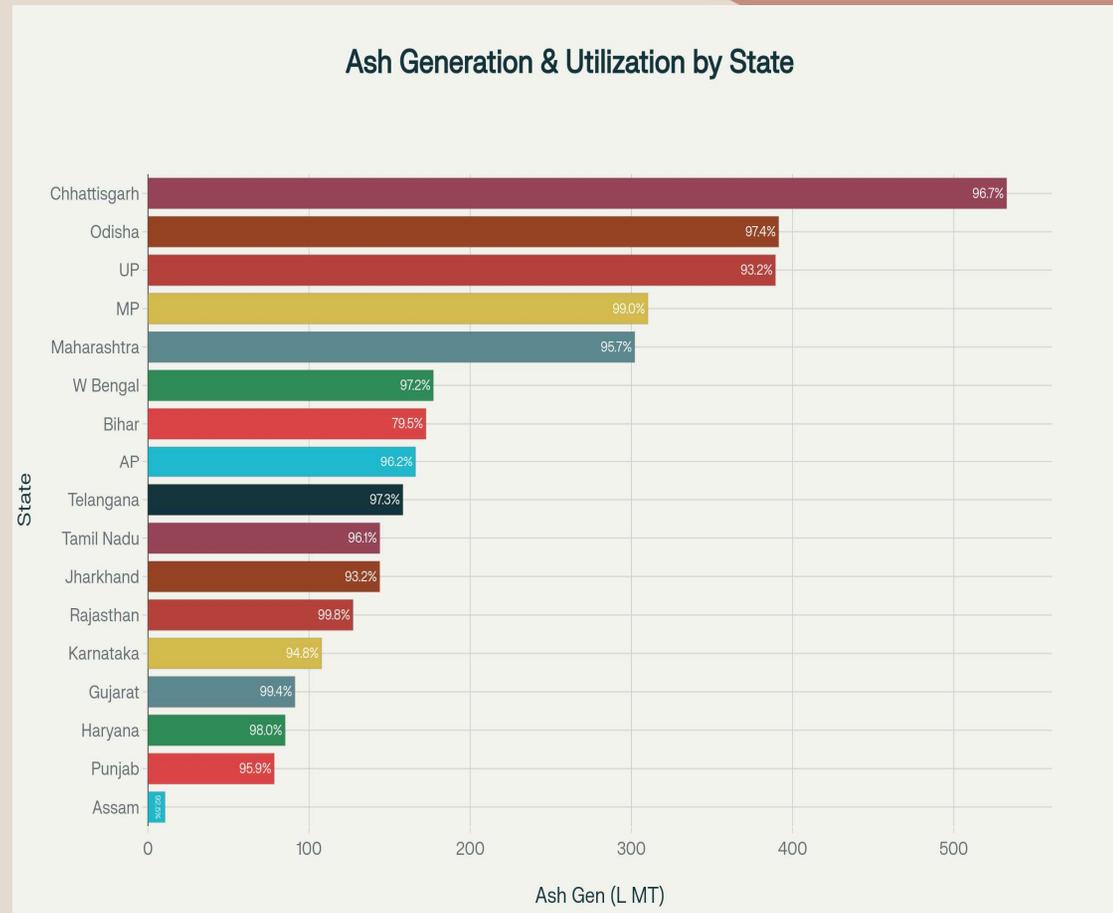


# Current Status : India's Fly Ash Snapshot (2024-25)

Generation: **340.11 MT**

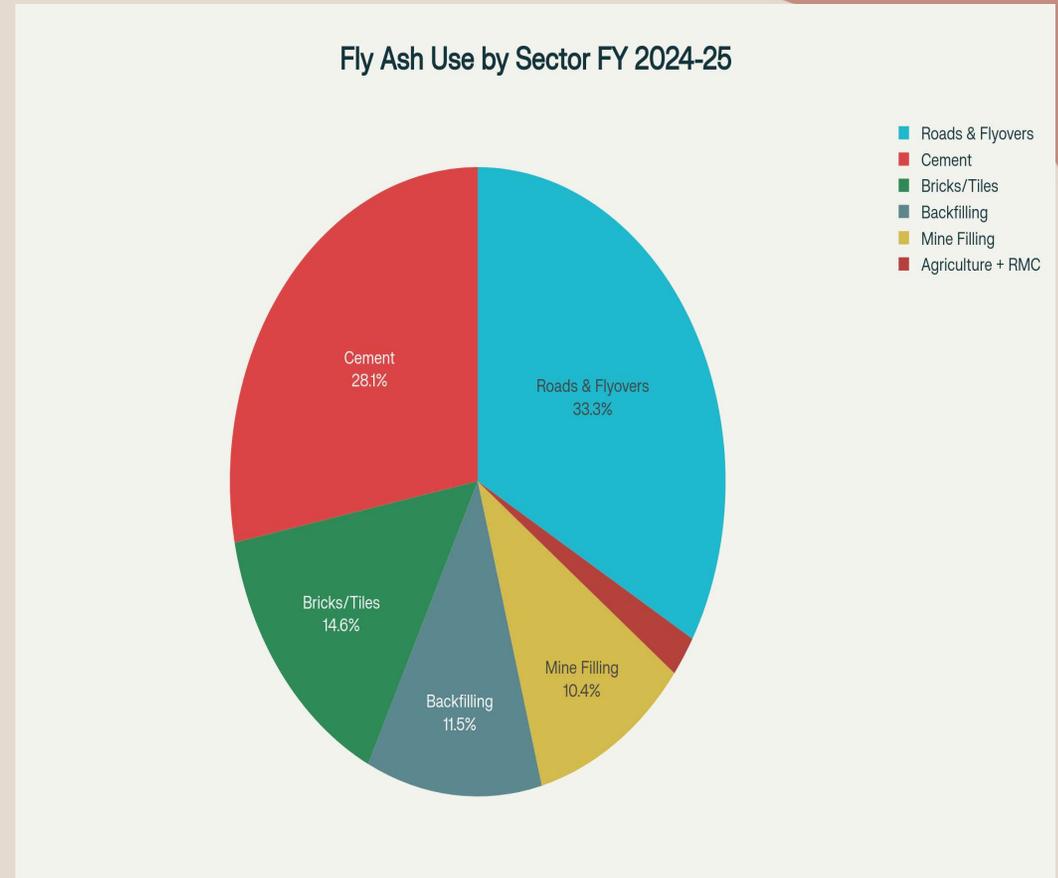
Utilisation: **332.63 MT (~98%)**

Unutilised: **~7.5 MT (2%)**



## Key Utilisation Sectors ( 2024-25 )

- Cement industry: 27% (89.8 million tonnes)
- Road construction and flyovers: 32% (106.9 million tonnes)
- Bricks and tiles manufacturing: 14% (46.6 million tonnes)
- Mine backfilling: 11% (36.6 million tonnes)
- Land reclamation: 10% (33.3 million tonnes)
- Agriculture: 1.2% (4 million tonnes)
- Ready-mix concrete: 1-2%



# Success of Fly Ash Utilisation :

## 1. Policy & Regulation

- MoEF&CC Notifications (1999 → 2021 amendments): Progressive mandates for 100% fly ash utilisation by thermal power plants.
- CPCB & State PCBs: Monitoring and compliance reporting.
- NHAI & MoRTH Directives: Mandatory use of fly ash in road embankments and highway projects.
- Mines & Power Ministries: Mandated fly ash for mine backfilling and reclamation.
- GST relief (5%) and rail freight concessions → promoted transportation.

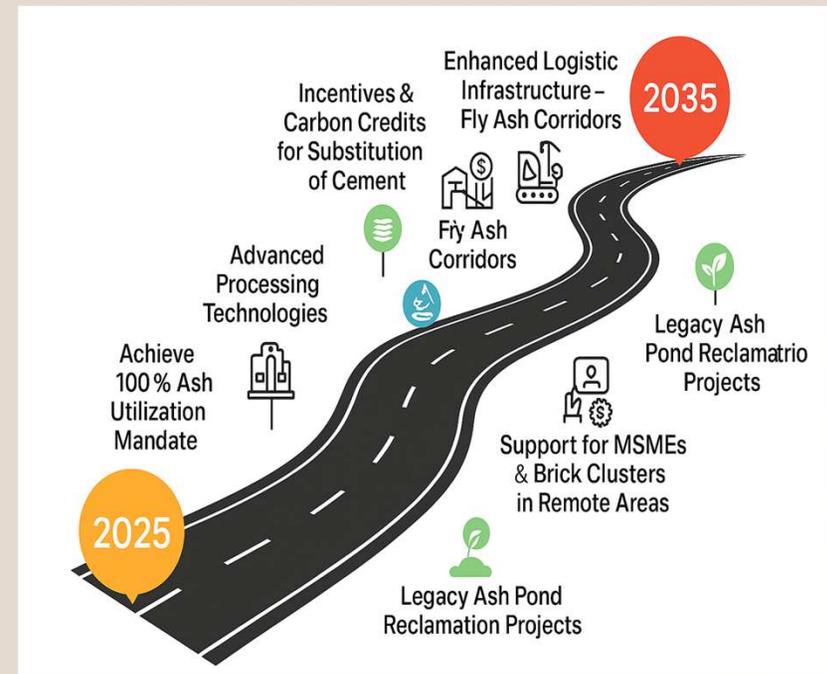
## Success of Fly Ash Utilisation (Contd)

### 2. Other Factors :

- Policy push + penalties → forced plants to find end-users.
- Whole hearted efforts by TPPs for compliance of Notifications.
- Cement industry tie-up → largest consumer of fly ash.
- Infrastructure push (highways, smart cities, housing) → created large demand for bricks, blocks, embankments.
- Technology demonstrations (fly ash bricks, geopolymers trials).
- Public–Private Partnerships → e.g. NHAI collaboration with TPPs.

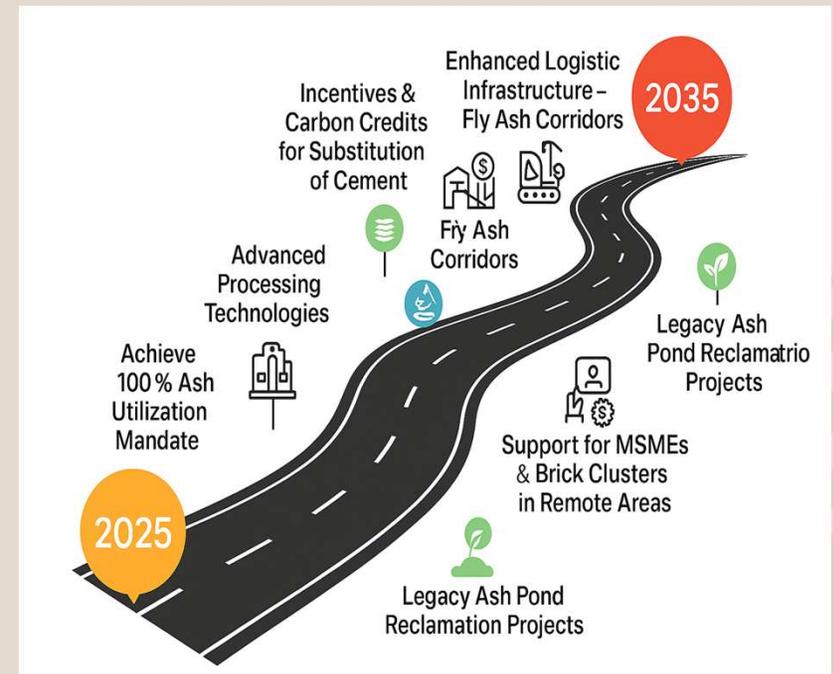
## Way Forward (2025-2035) :

1. Achieve 100% ash utilization mandate compliance
2. Incentives & carbon credits for substitution of cement
3. Enhanced logistic Infrastructure -Fly ash corridors (rail/barges for bulk transport)
4. Advanced Processing Technologies : Installing/upgrading Ash Handling Systems for efficient collection & distribution of fly ash.



## Way Forward (2025-2035) : Contd

5. Training & Skill development in handling Dry Ash System in Power Plants.
6. Support for MSMEs & brick clusters in remote areas.
7. Scale up geopolymers, high-end composites, tiles & advanced uses
8. Legacy ash pond reclamation projects



# Challenges in Ash Utilisation Beyond 2035

- Ash utilisation of > 90% has been achieved largely through NHAI roads, embankments, landfilling/ low-lying area reclamation which consumes large volumes quickly but they are one-time project-specific demands. ( Current estimate is 5-7 yrs of road building momentum)
- To sustain 100% utilisation in the long run, we must move from volume-based utilisation ( roads, fills ) to value based utilisation and industrial applications.



## **Avenues for long term ash utilisation :**

- Cement & Concrete Industry : Investment in Dry fly ash handling quality control and logistics integration with cement plants.
- Bricks, blocks, tiles, geopolymers etc : Needs policy incentives ( eg mandatory % use in Govt/Pvt buildings )
- Agriculture & Soil Amendment : Hard core research work in this field to improve safe and significant use of ash.
- Emerging High- Value Uses : Geopolymer concrete and cement. Explore extraction of rare earths & alumina.
- Policy & Planning : Inter-state ash transfer mechanisms eg High generation states like Chattisgarh to high demand states like Maharashtra / Gujrat.
- Encourage R&D and market development for non-conventional uses.

## References & Disclaimer

- CPCB (2025). "Fly Ash Management and Utilization Report" [Central Pollution Control Board].
- Ministry of Environment, Forest and Climate Change (MoEFCC), India – Notifications 1999, 2016, 2021, 2024.
- CEA (Central Electricity Authority) Fly Ash Generation and Utilization Statistics, various years.
- PIB Press Releases: Fly Ash Utilization and Management, NTPC/Ministry of Railways, August 2025.
- :Guide lines from MOP for TPPs to utilise ash by providing it to the User Agencies as stipulated under the MOEF&CC notification dated 31.12.2021 and its subsequent amendments.

**Disclaimer** : Data as of September 2025. Users should verify from official sources.



thank you

Any Question ?