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CHALLENGES AND OPPORTUNITIES IN FLYASH UTILIZATION IN THE COUNTRY



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Cover Story



22

Fly ash utilisation in India – challenges and opportunities **By Indra Guha, Partner, Sustainability and Climate Change Advisory, Thinkthrough Consulting**

Special Feature



14

The formal introduction of cross border electricity in the electricity act of 2003 has opened doors for a greater alliance between India and its neighbours in South Asia for electricity trading ultimately solidifying the PM's vision for One World, One Grid, writes **Mr. Pankaj Batra, Project Director, SARI/EI, IRADe (also Ex-Chairperson, CEA).**

Sectors

34 About Coal

44 About Power

54 About Oil & Gas

66 About RE

74 About Roads



50

Sector Statistics



38, 48, 58, 70, 76

This helps organizations to better understand the movement of the industry and accordingly plan their decisions towards expansion and sustaining themselves in the present competitive market.

Recent Tenders



70, 82

Electrical Vehicle as a Threat to CNG Business in the Long Run-2020



86

FLY ASH UTILISATION IN INDIA – CHALLENGES AND OPPORTUNITIES

The following article by **Mr. Indra Guha, Partner, Sustainability and Climate Change Advisory, Thinkthrough Consulting** enumerates upon the steps taken by the government to promote Fly ash utilization, the factors which impede the 100% utilization of Fly ash and the methods for expansion in Fly ash utilization.



Electricity is crucial for the sustained economic growth of any nation. Considered as an essential commodity, this sector often attracts heavy investment for development of adequate infrastructure. Growth in its demand during the past few decades has increased across the world and India is no exception. To power increasing demand, electricity generation has also increased from 305.4 billion units in 2009-10 to 1,389.1 billion units in 2019-20. Electricity generation in India is primarily achieved through coal based thermal power plants (TPP), comprising of 62.2% of the total installed capacity.

Fly ash is the end product of combustion of coal during the process of power generation in coal based TPPs. Indian coal has high ash content (upto 45%), generating large quantities of fly ash at coal/lignite based TPPs. The generation of fly ash has increased from 68.88 million metric tons in 1996-97 to 217 million metric tons in 2018-19. The increasing quantum of ash generation and its management has been an oft discussed item between government, industries, and academia.

What efforts have been taken by the Government to limit generation and promote fly ash utilisation?

The management of surplus fly ash has become a concern in view of large area of land required for its disposal, its potential to pollute air and water and pose health risks to the nearby communities. According to a report by the Health Energy Initiatives, more than 70 coal ash pond accidents have been reported between 2010 and June 2020 leading to crop damage, water pollution, and health risks. However, it claims that many routine incidents of spills are not reported at all.

In order to limit fly ash generation, Government of India had made coal washing (beneficiation) mandatory in 2014 for supply to all TPPs more than 500 km away from mines. According to studies, coal washing reduces the overall ash content. However, the Government recently issued a notification abolishing coal washing.

Viewing fly ash as a resource rather than waste, the Ministry of Environment, Forest and Climate Change (MoEFCC) has issued various notifications. First issued in 1999, the notification prohibits the excavation of topsoil and mandates the use of fly ash in brick manufacturing. Over the years, the Ministry has amended the notifications to diversify the use of fly ash in other sectors such as cement production, road construction, mine backfilling, reclamation of low-lying areas and sea, etc. TPPs are required to provide fly ash free of cost to consumers within a radius of 100 km from their locations. Within 100-300 km, the transportation costs are to be borne equally by the TPPs and consumers.

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it proposes that TPPs should sell ash at a nominal rate of Re 1 per ton to users. However, the notification is still in a draft stage.

In response to the MoEFCC notifications, other Government agencies like the Central Public Works Department (CPWD) and Central Pollution Control Board have also issued guidelines / specifications to promote use of fly ash in different sectors. Central Electricity Authority has been monitoring the status of ash generation and its utilisation in the country. In 2018, the Ministry of Power, in collaboration with NTPC launched a Web based monitoring system and a mobile application named Ash Track. These platforms connect the TPPs and potential users – such as road contractors, cement plants, brick manufacturers, etc., enabling better management.

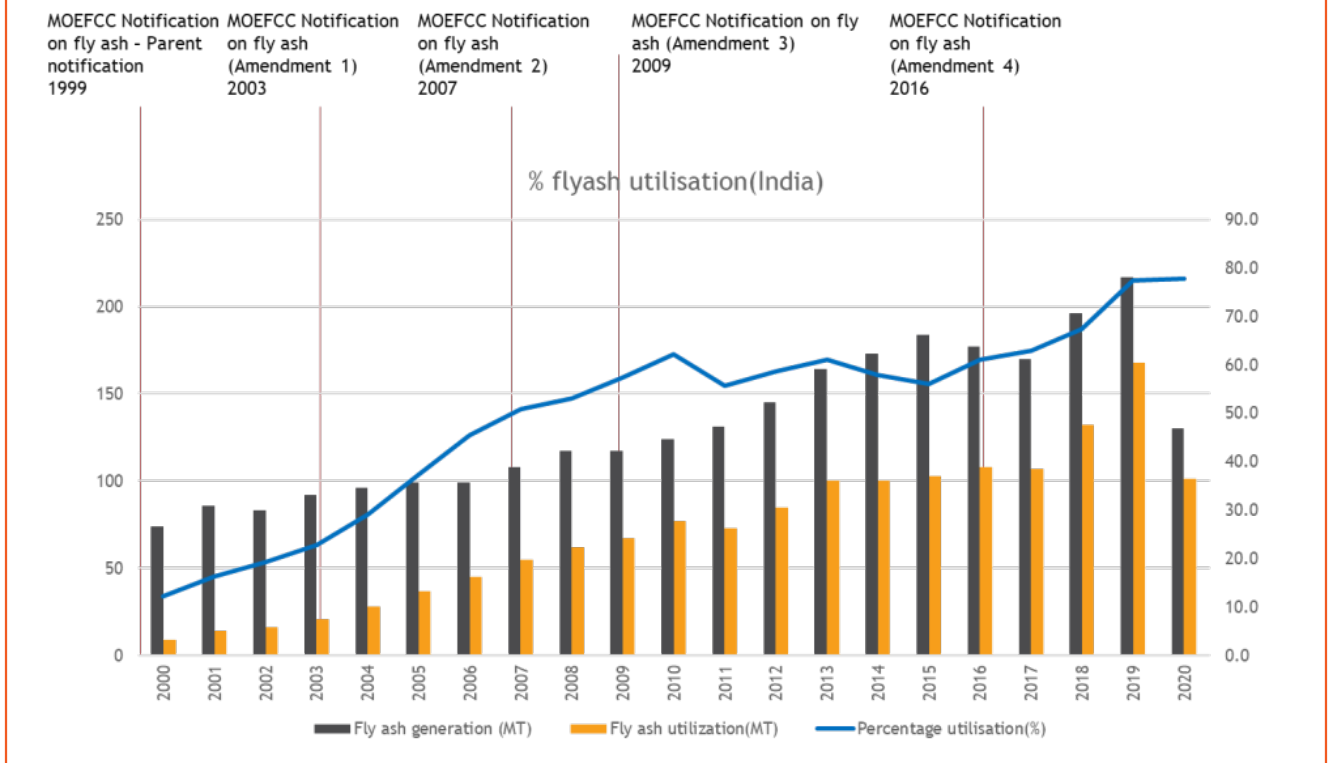
The National Green Tribunal (NGT) has also been monitoring the utilisation trends. In 2018, it directed CPCB to compute and levy fines on the TPPs which have failed utilise 100% of their fly ash. Currently, several TPPs dispose the ash by filling it in dykes. According to its directives, it may also not be viable option in the coming years.



Has fly ash utilisation increased?

The effects of policy push on utilisation trends is evident. The percentage of fly ash utilisation has increased from 9.63 percent [6.64 million metric tons] in 1996-97 to 77.59 percent [168.40 million metric tons] in 2018-19.

Figure 1: Fly ash generation and utilisation trends⁴



Note: Data for FY 2020 has been captured from April 2019 to September 2019 only

Analysing the areas of utilisation reveals that fly ash is utilised in portland pozzolona cement production, followed by use in reclamation of low-lying areas, bricks and tiles, ash dykes, mine filling, road construction and others. A substantial part [approximately a quarter of the ash generated] remained unutilised. However, the mode of utilisation varies across states. For example, fly ash is primarily used for brick manufacturing in Andhra Pradesh. On the other hand, its use in cement and roads/ highways is more prevalent in Uttar Pradesh and Maharashtra. In Chhattisgarh, it is largely utilised for reclamation of low-lying areas.

TPPs have also been adopting innovative methods to utilise ash. Some of the practices include establishment of units manufacturing ash based construction products [cement, bricks, blocks, tiles, light weight aggregates, aerated autoclave blocks, etc], creating awareness among users through workshops/ demonstrations, use of fly ash in the form of high strength geopolymer concrete in road construction, and

promoting use in agriculture and as sand. Fly ash is also being exported by the TPPs to Bangladesh and Middle-East. TPPs are also collaborating with research institutes to explore other avenues of use.

What are the challenges to 100% utilisation of fly ash? While regulations mandating 100% utilisation of fly ash are have been in place since 2003, a substantial quantum still remains unutilised, in addition to the huge quantity of inventory fly ash from previous years stored in the ash ponds. One of the key reasons for this is that the demand supply scenario varies widely across locations due to limited infrastructure development in the region. Distance of the TPPs from cement plants and manufacturing units of other construction materials also act as a deterrent due to cost considerations. Currently, the onus of utilisation lies on the TPPs. However, there are no facilitating platforms or mechanisms to coordinate collection, distribution, and management of fly ash. Bottlenecks also exist in adopting some of the practices

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recommended by the Government. Inadequate allocation of abandoned mines in proximity to the TPPs is one such example. Similarly, its use in agriculture is limited due to lack of awareness amongst farmers. Even the TPPs which are currently utilising all their fly ash anticipate challenges with respect to the sustainability of some of the measures they have been adopting. Reclamation of low-lying areas and ash dyke raising will become unviable in the future due to limited land availability and regulatory restrictions are already in place.

How can utilisation be further increased?

With the Government's thrust on renewable energy, contributions from coal-based TPPs is expected to reduce to 50% by 2025. As such, the generation of fly ash is not expected to rise in the coming years. At the same time, the infrastructure sector is witnessing heavy investments from the Government and private sector. With limited ash generation and more stringent reforms on its utilisation in construction, its demand is only expected to increase. Increasing utilisation requires mapping generation and building demand in those areas where stakeholders are currently facing or envisage challenges:

- a.** Increase the minimum permissible limit of fly ash in cement – At present, regulations only mandate the 35% use of fly by weight in cement. This limit may be increased in line with practices adopted by some of the other countries. However, it should be built on appropriate research to understand feasibility in the Indian context.
- b.** Creating an ecosystem of fly ash-based products in the country - Currently the use of fly ash in bricks and tiles is just 10% of total utilisation. Industries may collaborate to establish more fly ash-based products and encourage the use of fly ash in existing ceramic and tile industries. An array of products from fly ash like bricks, tiles, wall construction material, light weight aggregates, floor tiles, wall tiles, pavement blocks, etc should be explored. The Government policies and programmes should focus on creating the market for such products and develop enablers specifically for the areas where market mechanisms do not shape up on its own.
- c.** Increased use in agriculture – India being an agrarian economy, presents considerable scope for the utilisation of fly ash. This should be backed by research and extensive



demonstration and awareness generation by TPPs for farmers.

- d.** Increased disposal of fly ash in mine back filling – The long pending issues around allocation of abandoned mines for fly ash filling may be resolved with urgency. A committee should be established for judicious allocation of mines.

- e.** Multi-stakeholder platform: A multi-stakeholder platform may be created to facilitate structured engagement between Government departments, TPPs, research organisations, civil society, and other relevant industry associations. The platform would facilitate research and development of good practice solutions and models in different thematic areas such as construction, road development, mining, agriculture etc.