Ash to concrete

Gains from use of flyash in cement manufacture

■ Asia, the largest continent, is by far the largest cement producer. In 2004, it accounted for 67.6 per cent of the global production

■ India is the world's second largest cement producer (6 per cent share of world cement production), after China (44 per cent), surpassing developed nations like the US (4.5 per cent) and Japan (3.2 per cent)

■ In India, the production of flyash based cement (called Portland Pozzolana Cement, or PPC) has increased dramatically over the last two years. In 2004-2005, PPC accounted for as much as 48 per cent of the total cement production

■ In 2003, India's cement production was 115.36 million tonnes. If the industry had used 35 per cent flyash by weight (as per the specifications of the Bureau of Indian Standards) in cement manufacturing, India could have saved around 57 million tonnes of limestone, 133 million Giga Joule of thermal energy and 2,241 million kWh of power. This equals the total energy released from 4.24 million kilolitres of petrol, which could meet the national power requirement for 28 days

■ Current annual world production of waste products from thermal power plants and metallurgical industries is about 650 million tonnes, of which only about 7 per cent is being used by the cement and concrete industries

■ In 2004-2005, 112 million tonnes of flyash were produced in India, of which 19 per cent (21 million tonnes) were used in cement manufacturing. The generation of flyash is expected to increase to 170 million tonnes by the end of the 11th five-year plan in 2012

High savings

On an average, the Indian cement sector saves energy equivalent to 1.24 million kilolitres of petrol every year through the use of flyash

Year	Flyash consumed in cement sector (million tonnes)	Reduction of CO_2 emission (in million tonnes)	Limestone saving (million tonnes)	Saving of thermal energy (million Giga joule)	Saving of Electrical energy (million kWh)
2000	5.3	5.3	7	17	294
2001	6.7	6.7	9	22	372
2002	9.3	9.3	13	31	516
2003	11.6	11.6	16	38	644
2004	15.68	15.68	22	52	870
2005	21.42	21.42	30	71	1189
Average	12	12	16	39	648

■ The use of flyash in cement manufacture could also enable the country to sell emission credits (equivalent to the greenhouse gas emissions saved by using this waste) to developed countries

■ There would be a reduction of 227 million tonnes of carbon dioxide (CO_2) worldwide, if 15 per cent of cement is replaced by supplementary cementing materials (SCM) including flyash. This figure would touch 750 million tonnes if 50 per cent cement is replaced by SCM, which is equal to removing one-fourth of all automobiles in the world

Solid benefits

Per tonne of flyash used in cement manufacturing

Use of 1 tonne of flyash

- Saves around 1.40 tonne of limestone
- Saves 3.30 GJ thermal energy, equivalent to that obtained from 99 litres of petrol
- Saves 1 square metre of land for disposing flyash
- Saves excavation cost (around Rs 104)
- Saves 55.5 kWh electrical energy, equivalent to that obtained from 6 litres of petrol
- Reduction of 1 tonne of CO_2, a greenhouse gas

■ According to the Oikos Green Building Source, a website based in the United States, for every tonne of flyash used in cement manufacture

- Enough energy is saved to meet the electricity needs of an average American home for 24 days
- The landfill space conserved equals 455 days of solid waste produced by the average American citizen
- The reduction in CO_2 emissions equals 2 months of emissions from an automobile