

Coal Combustion Product Type

Fly Ash

Project Name

Chandigarh International Airport Terminal

Project Location

Mohali, India

Project Participants

Larsen & Toubro, Sikka Associates Architects, Mehro Consultants, Engineering Services Consultants, Airport Authority of India

Project Completion Date

2015

Project Summary

Rapid growth in the passenger traffic at Chandigarh International Airport—from 69 million in 2004-05 to 188 million in 2014-15—necessitated the construction of a new terminal. From the outset, designers of the new building sought to create a green structure that could serve as a model for future airport construction. The completed 570,000-square-foot terminal incorporates a range of sustainable building technologies, including extensive use of fly ash as a building material, installation of motion/heat sensors to optimally and efficiently adjust air-conditioning levels, and construction of a rooftop 200-kW solar plant to meet the terminal's major power requirements.

Project Description

Trailing only the U.S. and China, India has the third-largest construction industry in the world. Moreover, the Indian government's national infrastructure plan promises sustained growth in this sector in the years to come. However, the country's construction activities come at a high environmental

cost—contributing roughly a quarter of the country's greenhouse gas (GHG) emissions. Production of red bricks alone is estimated to contribute up to 15 percent of the nation's GHG emissions.

From the very start of the project, designers sought to



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maximize the terminal's sustainability scores, as measured by the Green Rating for Integrated Habitat Assessment (GRIHA), the national rating system for green buildings established by India's Ministry of New and Renewable Energy. The rating system—India's equivalent of LEED—places outsized importance on the use of fly ash in the building structure; fully 6 points out of a possible 100 across all criteria are allotted for conserving and demonstrating efficient utilization of resources via the specification of fly ash.

The terminal ultimately incorporated 5.5 million fly ash bricks in its construction. Made from up to 60 percent fly ash, 20-30 percent sand/stone dust, 10 percent lime, and approximately 5 percent gypsum, the bricks—compared to the more commonly used red variety—save clay; do not require baking in kilns, thus saving energy and emissions; use less mortar, thus saving material and labor costs; and are lighter, meaning

they reduce dead load and save on transportation costs.

Chandigarh International Airport terminal boasts additional green features, including:

- Passive solar orientation, south-side shading to minimize heat gain, and a rooftop solar plant to generate clean power;
- Two-thirds lower water consumption compared to a GRIHA base case via the installation of low-flow features; and
- Metal and gypsum false ceiling and low-energy flooring materials—both with recycled content.

The terminal building has been awarded a four-star GRIHA rating.