

SGP Energy Efficient Brick Kiln



Environmental Hazards of Traditional Brick Kilns

Pakistan is the third largest brick producing country of Asia after China and India, producing 45 billion bricks per year. There are 7000 brick kilns scattered across the country's four provinces where more than 100,000 people are working. Primary fuels being used in the traditional brick kilns are coal, local biomass and any available low-cost fuel or scavenged fuel (i.e., waste oil, tires, battery cases, animal dung, etc.). Traditional brick kilns emit thick black smoke containing several air pollutants (carbon monoxide, carbon dioxide, sulfur dioxide, nitrogen oxides) and fine particulate matter (coal fines, dust particles, organic matter), which cause serious health hazards to communities living around them. Air pollution in the brick kiln-affected area is about three times higher than the normal.

UNDP-GEF Energy Efficient Brick Kiln

UNDP- GEF SGP Pakistan has developed an energy efficient brick kiln prototype by modifying and remodeling Hoffman Brick Kiln technology. It conserves 18 percent heat, lowers air pollution to 40 percent and substantially reduces heat emission. Contrary to the soot coming from the ordinary brick kiln chimneys, emission of white smoke from the chimney of energy efficient brick kilns ensures that there are no carbon particulates emitted in the air. Multi-molds are used for making of sun dried bricks and use of one percent coal dust in the center of the brick ensures complete burning of bricks to improve the compressive strength of the bricks. The brick kiln has four openings in order to utilize the heat efficiently.

Salient Features of UNDP-GEF SGP Energy Efficient Brick Kiln

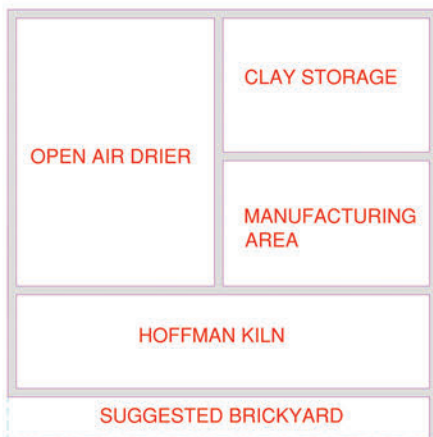
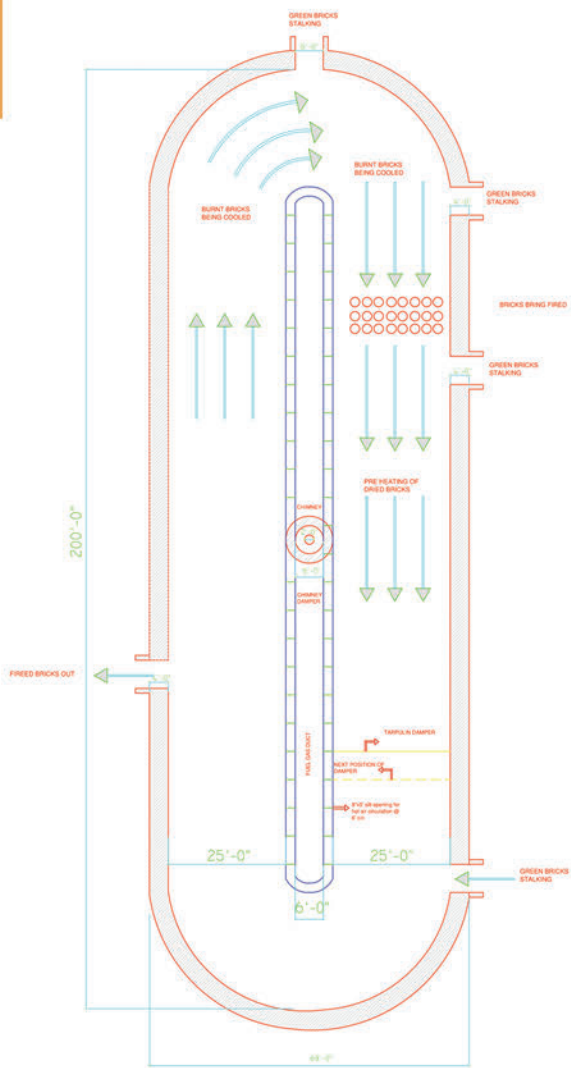
- Reduction in air pollution and land pollution. Reduction in carbon foot print, carbon dioxide (CO₂), sulphur dioxide (SO₂) and hydrogen chloride.
- Emission of white smoke from the chimney testifying that there are no carbon particulates emitted in air.
- Monthly production of 100,000 bricks of uniform quality from top to bottom
- 40 percent fuelwood reduction makes it energy efficient brick kiln.
- Use of multi molds for manufacturing of sun dried bricks of proper quality.
- One percent coal dust is mixed with mud for the proper quality management, as to bake the center of the bricks to improve their compressive strength.
- Special material has been used for insulation i.e. fly ashes from Lakhra Power Plant and stone dust from crusher.
- Specially designed steel damper has been provided in the base of chimney to control the heat loss.
- Surrounding agriculture land shall be protected against thermal pollution from the brick kiln.
- Wall of brick kiln is insulated by using stone dust from threshing plant; therefore the heat losses are minimized. The brick kiln has four openings in order to utilize the heat energy efficiently.
- External wall temperature of SGP energy efficient brick kiln is 50 °C, while in the case of conventional brick kiln the temperature goes up to 240 °C which is not user and environment friendly.

Comparison between Traditional and SGP Energy Efficient Brick Kiln

■ Traditional Brick Kiln

■ SGP Energy Efficient Brick Kiln

Bakes bricks by burning 80 to 120 kg of fuelwood.	Has energy efficient property and reduces 30 percent fuelwood consumption.
Large amount of smoke consisted of gases is emitted from the chimney.	Reduction in green house gases up to 40 percent.
Ratio of energy loss is alarming due to the traditional kiln design, construction and operation.	Increased fire travel rate is the key to energy conservation in fixed chimney brick kiln.
Cleaning and reuse of waste material is not possible due to lack of access inside the kiln.	Specially designed chimney door to clean the kiln and reuse the material. Damper and insulated lid to conserve heat and control heat loss.
The surface and structure heat loss per day is not constant and usually high. It affects the fire travel rate and results in reduced production rate.	The surface and structure heat loss per day is very less (almost zero) and it is almost independent of the fire travel rate or production rate of the kiln.
The center of the brick is not properly backed, as a result a number of bricks become non-productive due to non-uniform heat.	One percent coal dust is mixed with mud for the proper quality management, as to bake the center of the brick to improve its strength.
Single mold used to manufacture sun dried bricks. Manufacturing of bricks takes a long time.	Specially designed multi mold for manufacturing of sun dried bricks which takes less time. Artesian can manufacture six bricks at a time.
The compressive strength of the traditional brick is as low as 700-900 psi.	Use of coal dust at the center of sun dried brick in order to bake it properly which increases its compressive strength up to 1500 psi.
It manufactures ordinary bricks; however the cost is as high as Rs. 7 per brick.	Manufactures improved and quality bricks, however the cost is as low as Rs. 5 per brick.
The smoke may harm agriculture land.	It does not harm agriculture land.
Chimney smoke is black.	Chimney smoke is white in color.
Heat loss is more than 500°C.	Heat loss is less than 70°C.
Rainwater can stop bricks manufacturing process.	Slope in floor drains rainwater out through lines.



SGP Energy Efficient Brick Kiln Plant Designs



UNDP - GEF SMALL GRANTS PROGRAMME PAKISTAN

House #144, Defense Officers Housing Society, Phase -1,
Near Defense Park Hyderabad Sindh

Telephone: +92-22-2108073 | Fax: +92-22-2108074

Email: masood.lohar@undp.org | Website: www.sgppakistan.org

facebook.com/GEF.SGP.Pakistan