



ROADMAP

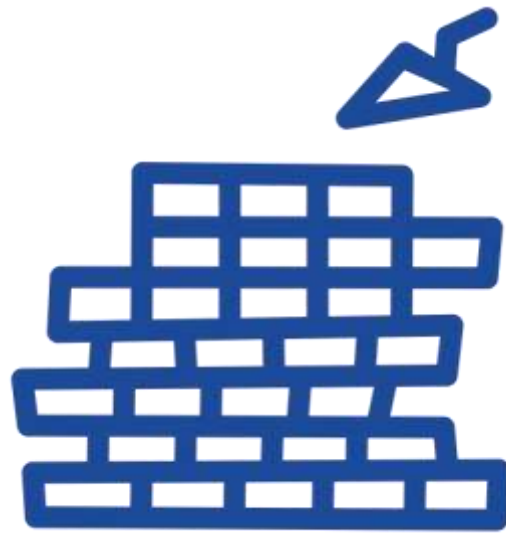
SUSTAINABLE AND ENERGY EFFICIENT BRICK PRODUCTION IN BANGLADESH 2019-2030



OUTLINE

- **CURRENT STATUS OF THE BRICK SECTOR**
- **OPPORTUNITIES FOR CLEANER PRODUCTION**
- **BARRIERS TO ACTION**
- **THE ROADMAP**

CURRENT STATUS OF THE BRICK SECTOR





Bricks are an indispensable resource for Bangladesh's infrastructure development.

However, currently...

- Production methods are highly polluting, and this has proven difficult to regulate effectively
- Valuable clay topsoil from agricultural land is used as the primary raw material
- The sector is growing at 5-10% per year; by 2030 the country may produce 60 billion bricks per year (up from 34 billion today)

Brick sector snapshot

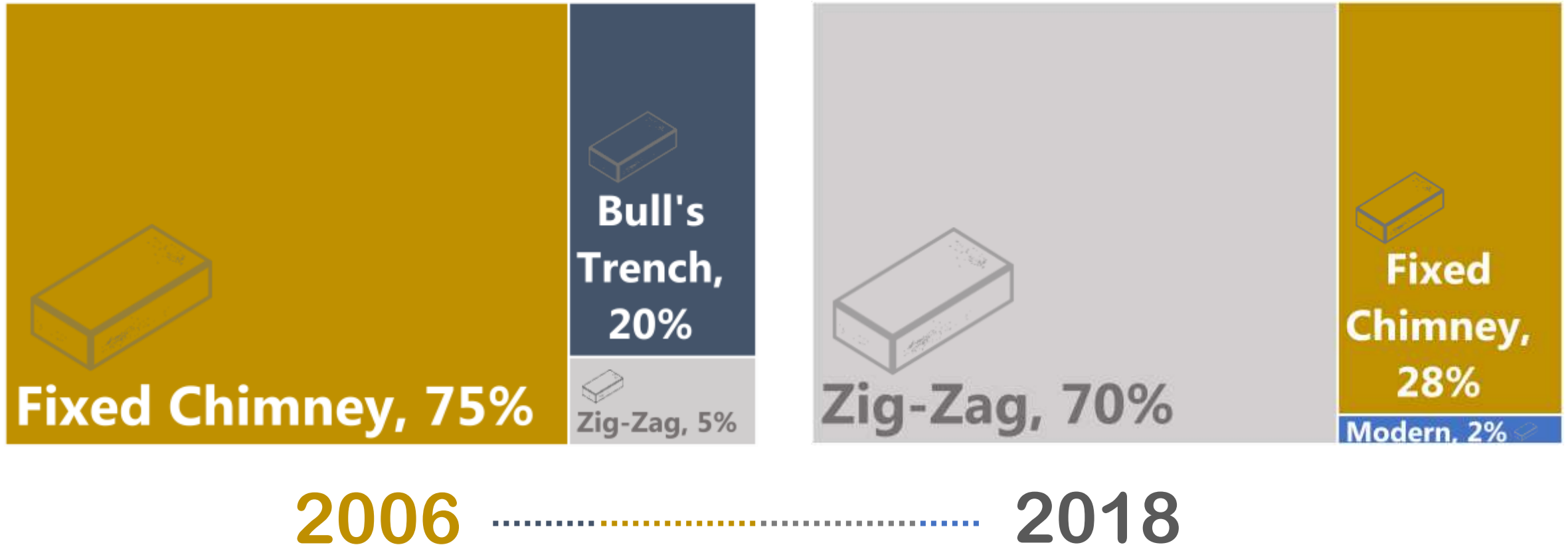


Created by Puput Nugroho
from Noun Project

- 7,873 coal fired kilns
- 6 natural gas fired kilns
- 1.3% of GDP (BDT277.5 billion)
- 7 million tonnes of coal
- 21 million tonnes of CO₂
- 3.4 billion cubic feet of clay
- 1.6 million workers
- 58% of country's PM2.5 (i.e., air pollution)

Market share of different traditional technologies

Government of Bangladesh environmental policies and lending schemes, together with donor-funded projects, have shifted brick production toward less polluting types of kilns:

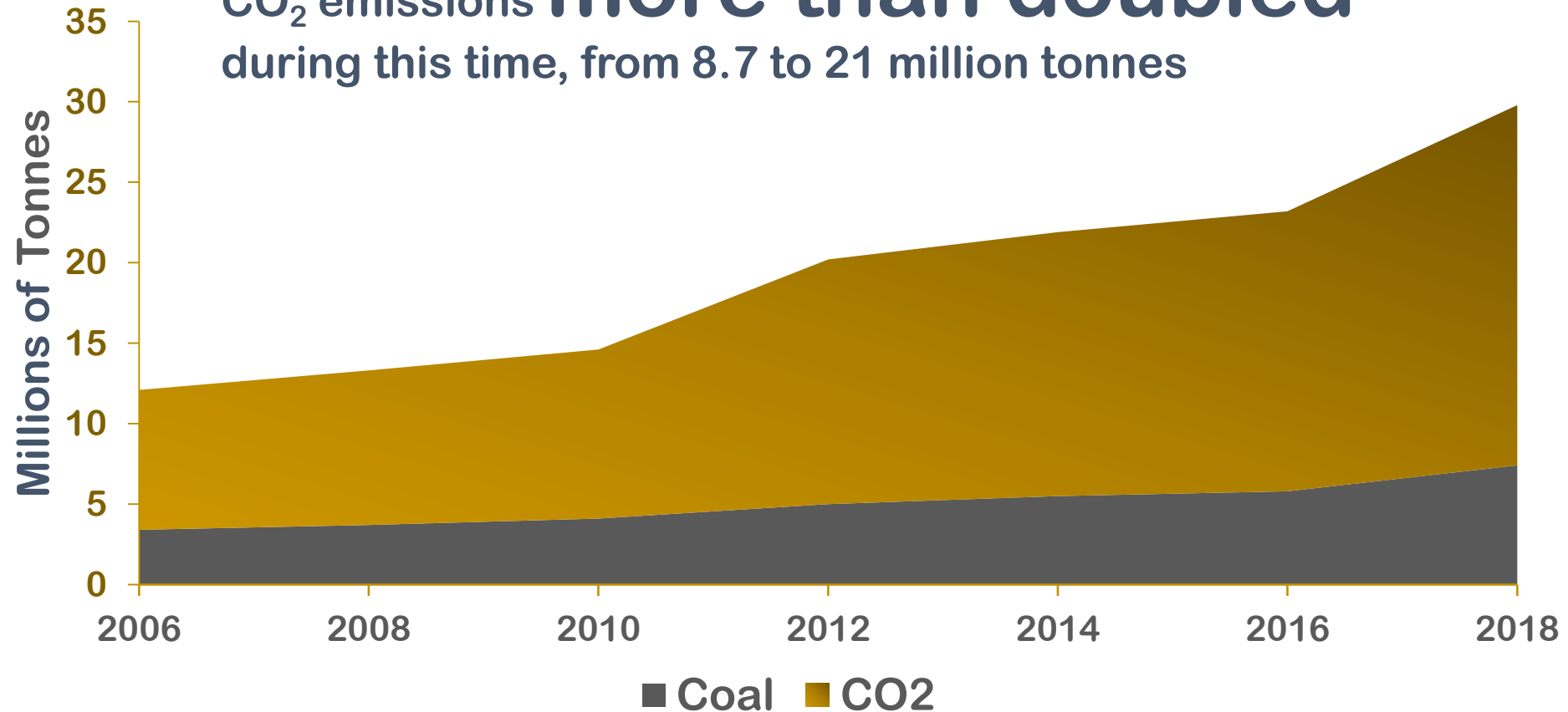


Major factors influencing change since 2006

- Directives from the Department of Environment
- Brick Manufacturing and Kiln Establishment (Control) Act 2013
- World Bank Clean Development Mechanism project
- UNDP Green Brick project
- World Bank Clean Air and Sustainable Environment project
- ADB's Financing Brick Kiln Efficiency Improvement project (loan/s)
- ADB's Supporting Brick Sector Development Program (technical assistance)

Energy and Emission Trends, 2006-2018

CO₂ emissions **more than doubled**
during this time, from 8.7 to 21 million tonnes



Air pollution is still a major problem

“Based on data from 11 continuous air quality monitoring stations in eight urban areas, the urban population-weighted annual PM2.5 concentration is estimated at 80ug/m³ for 2013-2015, more than five times the Bangladeshi standard and **eight times the World Health Organization guideline**. The source apportionment undertaken by the Department of Environment identifies vehicles and **brick kilns** among the key sources.”

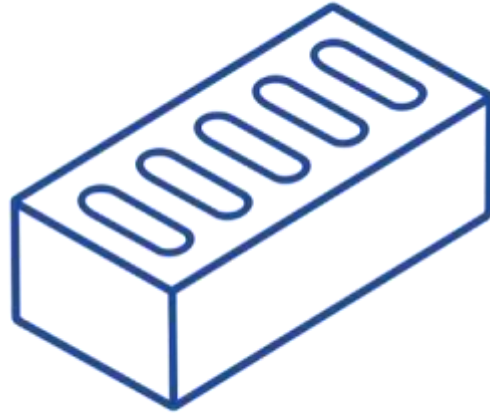
From →

ENHANCING OPPORTUNITIES FOR CLEAN AND RESILIENT GROWTH IN URBAN BANGLADESH COUNTRY ENVIRONMENTAL ANALYSIS 2018



SEPTEMBER 2018

OPPORTUNITIES FOR CLEANER PRODUCTION



Hybrid Hoffman and Tunnel Kilns

- Reduced coal usage by 40-50%
- More efficient firing processes (but this requires **skillful design, management and labor**)
- Can produce hollow/perforated bricks, which require less energy and have good insulation properties
- Instead of topsoil, less valuable types of soil are preferable (i.e., riverbed soil, riverbank soil, soil from barren/fallow land)
- Occupy less land and have greater production capacity
- Operate year round instead of seasonally
- Better wages and labor standards
- At least \$4.2 million USD upfront investment required for a single kiln



Non-fired bricks

The most sustainable and energy efficient option

- Do not require coal
- Use sand, cement, stones, pebbles and gravel as raw material
- Leadership for local design options through Housing and Building Research Institute and others (BUET, JICA etc.)

Limitations:

- limited availability of stone
- lack of standards for strength/durability etc.
- market demand and public awareness are low

BARRIERS TO ACTION



Policy/Regulatory Barriers



- Energy efficient kiln enterprises operate under the same (cumbersome) regulatory and licensing requirements as traditional kilns, yet are very different kinds of enterprises (i.e., they are larger scale, use modern/heavy infrastructure and are less polluting)
- Incongruence in the Brick Manufacturing and Kiln Establishment (Control) Act 2013 between certain clauses and ground reality related to clay sourcing, raw material and fuel transport, and coal quality monitoring
- No regulatory policy or standards for **non-fired bricks**

Finance/Investment Barriers



- High interest rates
- Inadequate knowledge of technical aspects of modern kilns among loan intermediaries makes technical and financial appraisals of new brick projects challenging
- Bangladesh Bank's Green Fund program has a cap of BDT 100 million for a single borrower; this prevents the program from funding modern kilns because the required debt financing for these kilns is higher
- No significant investments in growth of market demand for or production of **non-fired bricks**

Knowledge/Capacity Barriers



- Inadequate knowledge of appropriate design specifications and production optimization for modern/energy efficient kilns
 - This has resulted in reduced kiln productivity and efficiency, and unsatisfactory revenue and loan repayment
 - As a result, banks, non-bank financial institutions and financial intermediaries are discouraged from issuing loans for these projects
- Limited awareness among builders of importance of and options for purchasing **non-fired bricks** for construction projects

THE ROADMAP



ROADMAP GOALS



Reduce carbon dioxide (CO₂) production by 45% and air pollution (PM_{2.5}) by 90%



Minimize coal burning



Use renewable raw materials (e.g., sand, river dredge, fly ash, stones, gravel etc.) instead of clay topsoil

Strategic Objective 1: Strengthen the Policy Environment

- Declare brick production an INDUSTRY to streamline licensing and oversight
- Collect geocodes for all brick kilns to better track and enforce licensing requirements
- Amend the Brick Manufacturing and Establishment Act 2013 to 1) clarify rules for raw material sourcing and transport, 2) adjust guidelines for coal quality monitoring, and 3) institute incentives for clean technology
- Update National Building Code to encourage use of sustainable, non-polluting building materials
- Extend regulations across the value chain to incentivize environmentally friendly production

Strategic Objective 2: Enhance Energy and Resource Efficiency

- By 2030, phase out traditional brick kilns that burn coal inefficiently and rely on clay topsoil
- Develop standards for non-fired brick products to facilitate their market entry and growth
- Conduct a national mapping of raw materials for fired and non-fired bricks
- Promote and incentivize more environmentally friendly hollow bricks
- Invest in research and development on new raw materials that can replace clay

Strategic Objective 3: Facilitate Access to Finance and Incentives

- Invest in financing the development of a range of non-fired brick technologies
- Establish credit channels (for +/- \$350 million USD) to fund the establishment of new, energy efficient auto brick kilns, thus increasing their market share
- Provide seed funding to traditional brick kiln owners for livelihood alternatives
- Create financial incentives (e.g., preferential tax and/or interest rate options) for clean production

Strategic Objective 4: Capacity and Institutional Framework

- Launch a national brickmaking training center
- Increase public awareness of energy efficient and non-fired bricks, including technology and production options
- Establish a raw material testing laboratory to ensure the availability of appropriate, investment grade materials for the sector

ROADMAP SNAPSHOT

GOALS

- I Reduce carbon dioxide (CO₂) and air pollution (PM2.5)
- I Minimize coal burning
- I Use renewable raw materials instead of agricultural topsoil

\$3.9M USD for implementation of the Roadmap's essential elements

IMMEDIATE ACTIONS:

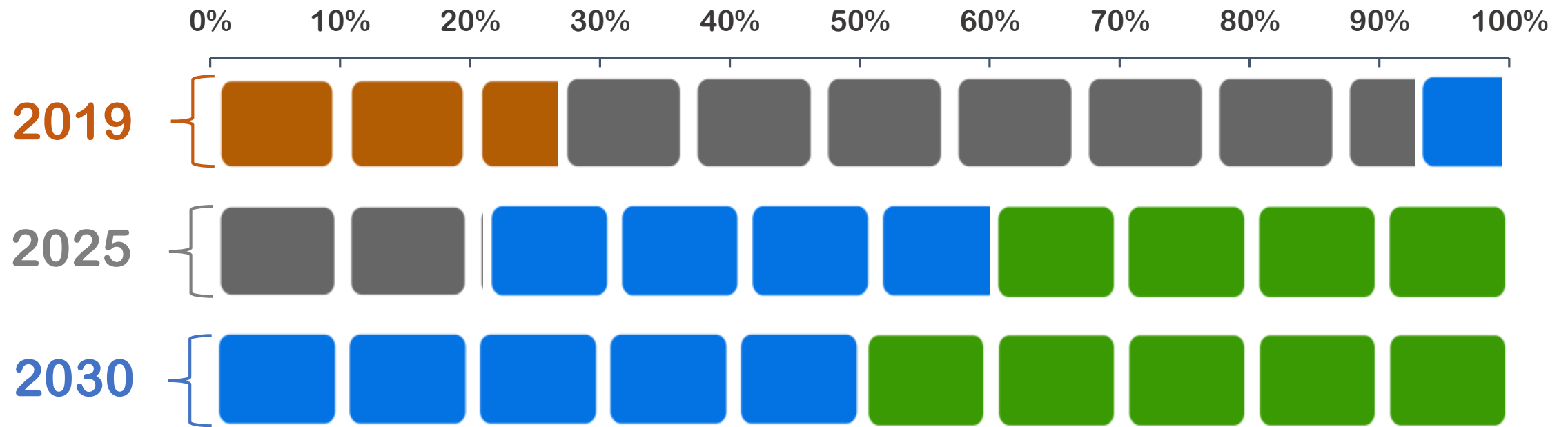
- Shut down all Fixed Chimney Kilns by the end of 2020, and 80% of Zig-Zag kilns by 2025
- Provide a new line of credit for entrepreneurs who intend to establish new Tunnel kilns
- Build investment projects for R&D, raw material mapping and market demand generation for non-fired bricks
- Begin training programs to build technical expertise among brick sector workers (from laborers to senior design technicians) and lenders

\$988M USD in credit for new, modern brick making establishments (fired and non-fired) in next five years

45% reduction in CO₂ from "Business as Usual" levels

90% reduction in PM2.5 generated from brick production

TECHNOLOGY TRANSITION TIMELINE



Highly polluting kilns

- Fixed chimney
- Zig-Zag

Energy efficient kilns

- Hybrid Hoffman
- Tunnel

Non-fired bricks

- Compressed concrete blocks
- Aerated autoclaved concrete blocks

Thank You

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