Bihar Baseline Study

Bihar is the fourth largest brick producer in India after Punjab, Uttar Pradesh and West Bengal:

- Total number of brick kilns as per government records is 5700. However, there is a deficit of bricks in the state.
- Bihar needs over 7500 million bricks in the next five years to fulfil the rural housing gap of 1.1 million dwellings per year as a part of Indira Awaas Yojna.

Raw Materials for Brick Production

The raw materials for the brick production are as follows:

- **Fuel:** Coal is used as fuel in the state. 22 lakh tonnes/year of coal is consumed in the state. Coal is imported from Jharkhand and Assam.
- **Soil:** Source of soil is agricultural (90%) and river land (10%). Consumes 16,500,000 m$^3$ of clay/year converting 5500 acres of land into barren land.
- **Wood:** Wood utilization is leading to rampant deforestation depleting the forest cover. Currently 60,000 tonnes of wood is used per year.

Prevalent Technology

Bihar is dominated by Fixed Chimney Bull’s Trench Kiln (FC-BTK). It is the only state with the successful conversion to FC-BTK. This can be attributed to stricter enforcement by authorities and willingness of entrepreneurs to shift to newer technologies. However, it is characterized by low mechanization. Pug mill and JCB used for soil mixing and excavation respectively. Both are rented from external sources due to high capital cost.

Compared to other states, its brick quality (70-125 kg/cm$^2$) is excellent. Variation in colour is observed due to dissimilarity in soil quality.

Key Issues in the Brick Sector

- **Energy Intensive Brick Making Technology:** FC-BTK is an energy intensive technology. Its specific energy consumption is 1.59 MJ/Kg. It emits 600 tonnes of CO$_2$ per 1000 bricks in its firing process. The graph below (Figure 1) shows the emissions from various processes used in brick making technologies like soil excavation, transportation, brick making and firing.
**High Level of Pollution:** Carbon emissions, harmful gases such as sulphur-di-oxide (SO$_2$), nitrous oxide (NO$_x$), carbon monoxide (CO) and particulate matter (PM) are released into the atmosphere that is harmful for health as well as surrounding agricultural lands, orchards etc.

**No Formal Financial Regime:** There is lack of access and tailor-made financial instruments to finance modernization and upgradation of brick industry. Entrepreneurs are ignorant about the schemes by the government like PMEGP and the financial institutions/banks are reluctant to provide loans due to their rural setting. Additionally, there is a poor market for new types of bricks due to lack of awareness. Production cost of bricks is increasing due to increase in fuel costs (coal) and profitability is decreasing due to increased production costs.

**Lack of Awareness:** There is low awareness of entrepreneurs and end-users on modern technologies (machinery) and building products. The benefits from the production of resource efficient bricks - such as energy savings, reduction in top soil consumption and air pollution - are not well known to entrepreneurs. 47% of the entrepreneurs are not aware about the new technologies. Only 10% of the entrepreneurs had registered with the District Industry Centre. This is attributed to the lack of financial incentives in terms of subsidies or innovative schemes provided to entrepreneurs by DIC. However, it is surprising that they have registered with the Mining and Pollution Control Board.

**Policy:** The existing codes and specifications for building materials are based on traditional brick technologies. They need to be reviewed and modified with the advent of new technologies.
Opportunities in the Brick Sector of Bihar

- Brick sector is a high turnover business which is an attractive proposition for the financial sector.
- Scope of low energy technologies like Vertical Shaft Brick Kiln, High Draught is high.
- The scope of fly ash technology is more around the regions with power plants. There are 3 power plants in Bihar. Currently fly ash technology is being used on a pilot basis by NTPC in Kahalgaon, Bhagalpur district. These bricks are not being sold for private and public use but used by NTPC for their own construction. The availability of fly ash is shown in Figure 2.

![Figure 2: Availability of Fly Ash in Bihar](image)

- Industrial wastes like boiler ash from sugar mills can be used as internal fuel in green bricks to improve energy and resource efficiency. There are 8 sugar plants in the state that can act as potential sources for boiler ash.

![Figure 3: Potential Sources of Boiler Ash from Sugar Industries](image)

- River bed soil can be exploited for making green bricks.
- Brick sector is a major source of employment providing jobs to 10 lakh workers for various categories of work such as moulding, unloading and managerial work.
Role of Key Stakeholders

Stakeholders include entrepreneurs, brick industry associations at regional and national levels, financial institutions, technology suppliers, policy enforcement agencies, government, NGOs, private and corporate agency, corporate agency, research laboratories, international funding agency, construction industry and the end users of brick products.

- The entrepreneurs should adopt newer technologies like VSB, the use of internal fuels etc and take an active role in its dissemination. They should also make improvements in their kiln design, construction and operation which would help reduce energy consumption.

- Financial institutions should provide suitable financing mechanisms for technology upgradation and develop customized finance products to address the needs of entrepreneur. They should adopt a more flexible and innovative approach in their credit appraisal norms and encourage entrepreneurs to take insurance cover.

- Technology and equipment providers should share information and technologies with the other stakeholders and facilitate awareness creation on new, innovative and sustainable methods of brick making.

- Policy enforcement agencies should enforce regulatory measures for planned development and can greatly influence the market transformation process by providing support for resource efficient products.

- It is the government’s role to bring in financial, regulatory, institutional and legal reforms. They should prepare policy guidelines related to energy, environment, natural resource and employment and plan long term and short term programs to tackle the problems. They should also facilitate R&D activities and training workshops.

- The construction industry should use the resource efficient bricks and create awareness about it.

Due to involvement of so many stakeholders, multi-stakeholder processes for tracking of the brick sector needs to be put in place to undertake short term and long term measures for ensuring the brick sector is on a low carbon path.

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