Research BRIEFS

NCAP-COALESCE

CarbOnaceous AerosoL Emissions, Source apportionment & ClimatE impacts

Understanding scientific complexities related to carbonaceous aerosols focussing on issues underlying their origin and fate, and their role as drivers of regional climate change over India.

Energy benchmarking of Indian brick manufacture: Integrating field surveys and remote sensing

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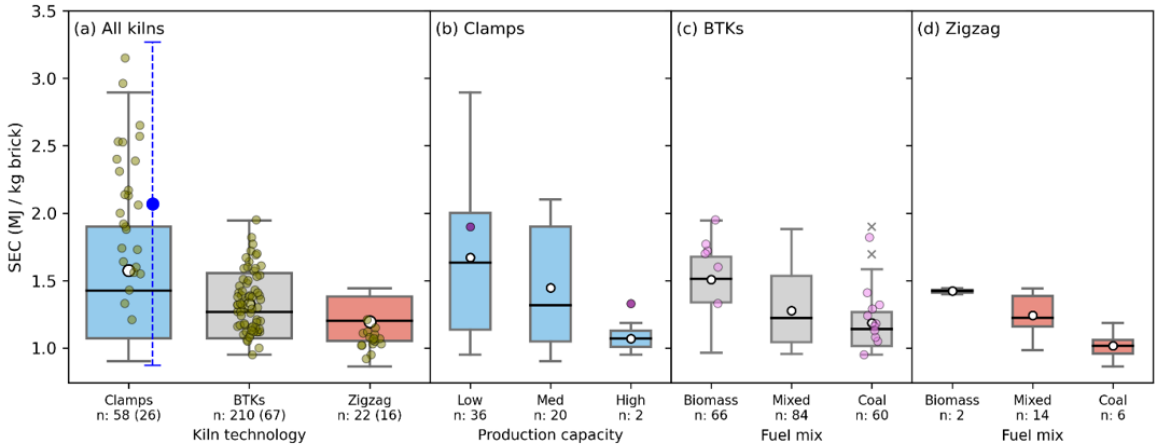

Fig. 2 | Energy performance of dominant kiln technologies in India.

Key highlights:

- Development of a framework integrating field survey and remote sensing
- Estimated national production of 233±15 billion fired-clay bricks in 2017
- 90% share of production from traditional kiln technologies – BTKs and clamps.
- Total energy consumption is estimated to be around 990±125 PJ/yr
- Nearly two folds underreporting of coal consumption in the official communication to the UNFCCC
- Identifies certain feasible interventions to decouple energy use from production

Research Summary:

Reforming brick manufacture is crucial to achieving net-zero carbon emissions from the building sector, especially in countries with major expansions in the built environment. However, widely disparate energy consumption estimates impede benchmarking its significance relative to the steel and cement industries. Here, a novel framework applied to Indian brick manufacture, integrates nation-wide questionnaire survey information on feedstock, process variables and practices with remote sensing data on kiln enumeration, accounting for regional differences.

Modelled energy performance and production, place energy consumption in the brick industry at par with that in steel and cement industries, accounting 990±125 PJ/year energy, 35±6 Mt/year coal and 25±6 Mt/year biomass with a total production of 223±15 billion bricks/year. This study identifies a large underreporting in current official estimates of energy consumption. In addition to kiln technology, production-capacity and fuel-mix crucially influence overall energy performance, suggesting actionable energy-saving practices, along with more capital-intensive technology reform.

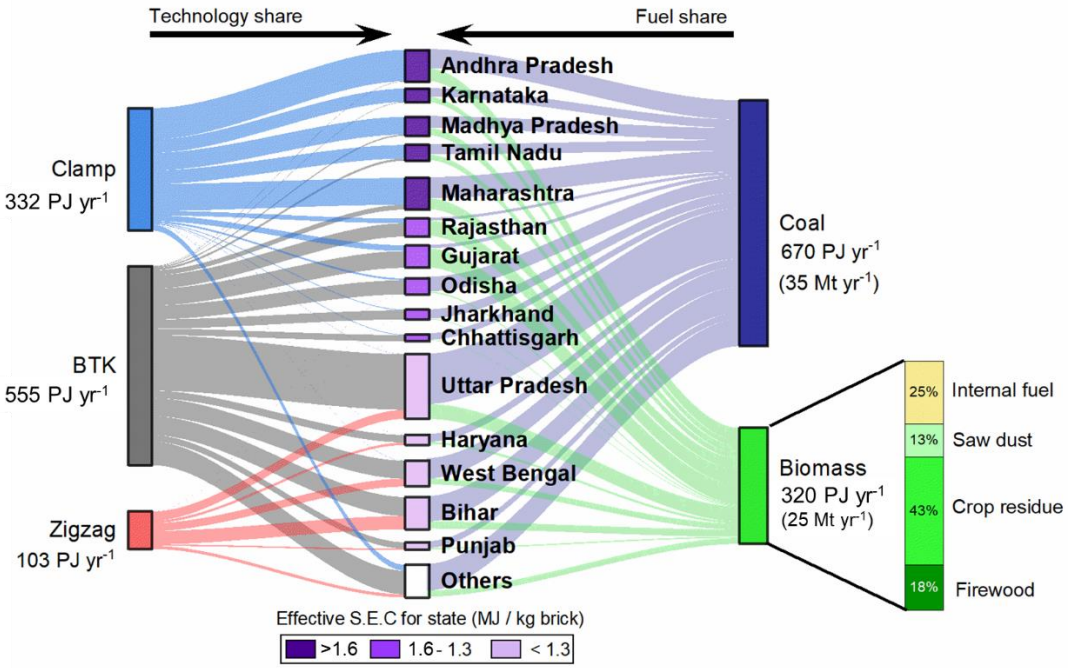

Fig. 1 | Energy and fuel consumption in brick industry (2017). Total energy consumption for brick production in India for 2017 is distributed by kiln technology and fuel type. States are arranged by effective specific energy consumption. Share of kiln technology and fuel mix to total production in the state is also shown.

Take away/conclusion :

- The methodology developed here improves the accuracy of energy and fuel consumption estimates in the Indian brick industry by supplying the missing data on sub-national activity and accounting for differences in sub-national operating practices
- Regression model developed as part of the framework estimated production of around 233±15 billion fired-clay bricks in 2017 with nearly 90% contribution from traditional kiln technologies – BTKs and clamps.
- The total energy consumption is estimated to be around 990±125 PJ/yr, with 35±6 Mt/yr of coal and 26±6 Mt/yr of biomass.
- This study finds a significant underreporting (~two orders of magnitude) of coal consumption reported in the official communication to the UNFCCC for brick industry along with the misreporting of a significant share of biomass fuels (~30%).
- The sub-national level analysis presented here helps to identify certain feasible interventions to decouple energy use from production.

Research Article

Citation

Tibrewal, K., et al., Energy benchmarking of Indian brick manufacture: Integrating field surveys and remote sensing. Nature Sustainability, submitted.

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