

## Skilling the Workforce for Brick Sector Transformation in India

### 1. Introduction

India is the world's second largest manufacturer of clay fired bricks. The annual production is estimated to be around 250 billion bricks/ year. The manufacturing of bricks is decentralised, and the industry is spread across the country. Bricks are produced in more than 150,000 small and informal enterprises. These enterprises play an important role in the local and national economy and provide employment to around 10 million rural workers.

Production of bricks is resource-intensive. Brick industry uses around 30 million tonnes of coal and around 10 million tonnes of biomass annually for firing of burnt clay bricks, making it as one of the largest energy consuming industry as well as one of the largest industrial sources of CO<sub>2</sub> emission. About 66–84 million tonnes of CO<sub>2</sub> emissions is generated from brick kilns annually. Over 100,000 tonnes of black carbon emissions is generated in a year from brick kilns<sup>1</sup>. The combustion of fuel also gives rise to local air pollution. The main air pollutants from the brick sector are particulate matter and sulphur dioxide, which have adverse impact on human health and vegetation.

In recent years both central and the state governments in India have initiated actions to control air pollution from brick kilns. Following up on December 2015 directive by the Central Pollution Control Board (CPCB) under Section 18 (1) (b) of the Air Act 1981, issued to State Pollution Control Boards (SPCBs) of states, several SPCBs have directed brick kilns in their jurisdiction to shift from Fixed Chimney Bull's Trench Kiln (FCBTK) to zig-zag kiln technology. As a result of these measures around 8,000 FCBTKs<sup>2</sup> have converted to zig-zag technology till mid-2020. Ministry of Environment Forest and Climate Change (MoEFCC) has launched the National Clean Air Programme (NCAP) in January 2019. Under the measures to control emissions from industries, NCAP recommends brick kilns to shift to zig-zag kiln technology.

A study was carried out by Greentech Knowledge Solutions in Bihar to find effectiveness of the kiln conversions from FCBTK to zig-zag kiln technology<sup>3</sup> during 2017-18. Another study by Centre for Science and Environment<sup>4</sup> looked at effectiveness of kiln conversions in the National Capital Region. Both the

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<sup>1</sup> Most of the brick industry data is taken from the publication GKSPL (2017): Roadmap for promoting resource efficient bricks in India: A 2032 strategy. <https://shaktifoundation.in/report/roadmap-promoting-resource-efficient-bricks-india-2032-strategy-full-report/>

<sup>2</sup> Based on the information compiled from Government of Bihar and from brick kiln associations.

<sup>3</sup> Kumar, S., Rana, S., Maithel, S (2018): Learnings from Bihar's Experience of Implementing Cleaner Brick Kiln Directive: A Case Study, Greentech Knowledge Solutions, New Delhi. Accessed from <https://www.gkspl.in/wp-content/uploads/2019/01/Learnings-from-Bihar-Experience-of-Implementing-Cleaner-Brick-Kiln-Directive-A-Case-Study.pdf>

<sup>4</sup> Rahul Kumar and Nivit Kumar Yadav (2018), MAKEOVER: Conversion of brick kilns in Delhi-NCR to a cleaner technology—A status report, Centre for Science and Environment, New Delhi

studies concluded that the performance of the zigzag kiln and the effectiveness of the kiln conversion is primarily influenced by three parameters:

- Design of the kiln
- Quality of construction
- Kiln operation and skill of operators

The Bihar study reported that at the end of the first season of operation, 43% of the surveyed kilns were unable to realise the full benefits of transition (fuel saving, quality improvement, etc). Lack of trained workers for construction and operation of zig-zag kilns was found to be an important reason. It is to be noted that India does not have a vocational training programme for training of brick industry workers.

India has around 60,000 FCBTK kilns, out of which around 8,000 brick kilns have adopted zig-zag kiln technology so far. Most of these conversions have taken place during last four years and remaining 50,000 kilns are expected to adopt zig-zag kiln technology over next 3-5 years. The total number of workers which are involved in the operation of 60,000 zig-zag kilns (firemasters and brick stackers) is estimated to exceed 1 million. A massive training initiative is needed to train such a large number of workers in a limited period of time to ensure realization of air pollution and black carbon mitigation potential through the kiln conversions.

The National Skill Development Mission (NSDM) launched by the Government of India envisions skilling at scale with speed and standards (quality) with focus on strengthening institutional training, infrastructure, convergence, training of trainers, sustainable livelihoods and leveraging public infrastructure<sup>5</sup>. The National Policy for Skill development and Entrepreneurship 2015<sup>6</sup> provides an enabling framework to realize the vision. The National Policy targets to skill and reskill about 400 million persons between 2015 and 2022.

Barring two states, where pilot initiatives on brick workers training have been undertaken, training of brick industry workers is not on agenda of skill development programmes, so far. National and State Skill Development programmes provide an opportunity to undertake training of 1 million brick workers for the operation of zig-zag brick kilns. This proposal is aimed to harness this opportunity which will be crucial to realize the full benefits of reduction in air pollution and black carbon emissions from brick kilns in India.

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<sup>5</sup> <https://www.msde.gov.in/nationalskillmission.html>

<sup>6</sup> <https://www.msde.gov.in/National-Policy-2015.html>

## **2. Objectives**

To leverage the National and State government sponsored skill development programmes to skill 1 million brick kiln workers who are engaged/likely to be engaged in the operation of around 60,000 zig-zag kilns in India over next 5 years. The training initiative will ensure that all of the zig-zag kilns in India are supervised and operated by formally trained workers/supervisors and intended black carbon, energy savings, carbon reduction and air pollution reductions are realised. Bringing brick sector skill training under the National and State Skill Missions will ensure a variety of new skill training programme related with brick industry to be added in future and will pave the way for further modernisation and further deep cuts in emissions from brick industry in India.

## **3. Impacts**

It is estimated that on an average the conversion from FCBTK to zig-zag kiln can result in around 20 -25% reduction in specific energy consumption and around 50% reduction in black carbon emissions and particulate matter pollution.

If we assume that

- In the business as usual scenario, with no provisions of skill training and zig-zag kilns being operated by untrained workers, only about half or 50% of energy, black carbon and particulate matter emissions benefits are realised (assumption based on Bihar and NCR survey as quoted in section 1).
- When all zig-zag kilns are operated by workers and supervisors who have undergone skill training, 100% of energy, black carbon and particulate matter emissions benefits are realised.

Using these assumptions, the expected impacts of the skill training activities for 60,000 zig-zag kilns are estimated to result in reduction of around 4 -6 million tons of coal and biomass per year and reduction of around 25,000 tonnes of black carbon emissions per year.

## **4. The rationale for CCAC involvement**

India is a member of the CCAC. The proposed project provides a strategic opportunity to CCAC to work closely with the Government of India in two of its focus areas. The proposed project would help Government of India in the implementation of its two key policy initiatives -- National Clean Air Plan (2019-2024) for the reduction in air pollution, and National Policy for Skill development and Entrepreneurship 2015 for skilling 400 million workers. The project aims at leveraging the skill development programmes for the reduction of air pollution from brick industry.

The proposed project builds on the training activities undertaken under CCAC support in previous years in India. The past CCAC support was aimed at training/orienting brick kiln owners on zig-zag conversions. Five training programmes were conducted by Greentech Knowledge Solutions in India during 2015 and 2016. The training programmes resulted in several brick kiln owners adopting zig-zag kilns on a voluntary basis. Now with regulations in place in which brick kilns have to mandatorily shift to zig-zag, the priority

is to ensure that the converted zig-zag kilns are properly constructed and operated. The training material for brick kiln owners developed with CCAC support is one of the inputs which will be used for the development of the skill training modules for brick kiln workers. The proposed project aims at mainstreaming skill training for workers operating zig-zag technology. The CCAC funds will be utilised to leverage the funds available with the Central and State governments in India for skill development.

### **5. Replicability, Scaling-up and Sustainability**

As stated above Government of India has set large targets for skill training. The National Policy targets to skill and reskill about 400 million persons between 2015 and 2022. An elaborate institutional set-up consisting of state skill development missions, sector skill development councils, training partners, assessing agencies, etc. exists in the country. The proposed skilling initiative for zig-zag kiln workers in India is aimed at integrating it with the activities of the National Skill Development Mission through the “Skill Council for Green Jobs” and leveraging upon the resources available with the National and State Governments for undertaking skill development.

### **6. Activity Plan (2020-2022)**

The project envisages five activities. This section provides a brief description of the proposed activities:

- **Development of National Occupational Standards and Qualifications Pack for zig-zag kiln operators:** National Occupational Standards (NOS) specify the standard of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Each NOS describes a) a specific work activity b) knowledge and skills required to perform the activity in a competent manner. NOS are used to develop curriculum for the delivery of training; and to develop assessment instruments and tools for the assessment and certification of learners. A Qualification Pack (QP) defines the set of NOS which are aligned to one Job Role. The various steps involved in the development and approval of NOS-QP are :
  - Preparing an industry profile
  - Preparing occupational map and carrying out functional analysis
  - Preparing draft NOS-QP
  - Validation of NOS-QP through industry networks
  - Presentation and approval by the Qualifications Registration Committee (QRC) approval.

GKSPL will be working closely with the Skill Council for Green Jobs (SCGJ) and provide all necessary technical support to SCGJ for developing the NOS-QP, mobilising industry network, etc.

- **Development of Model Curriculum:** This activity is aimed at developing the model curriculum for the training of brick setters and fire masters based on the NOS & QP.



- **Orientation/capacity building of potential Training Providers (TPs) and Assessing Agencies (AAs):** For delivering the skill training a group of Training Providers (TPs) having capacities to deliver brick worker training in different states are required. Similarly, to evaluate the outcome of the training independent third party Assessment Agencies (AAs) are required. GKSPL and SCGJ will work together to conduct orientation and capacity building (Training of Trainers) programme for potential TPs and AAs. This activity will also result in various TPs and AAs affiliating themselves with the SCGJ for skilling of zig-zag kiln workers.
- **Orientation and mobilisation of skill development missions of states for delivering skill training to zig-zag kiln workers:** Through one-to-one meetings, major states (through state skill missions) having zig-zag brick kilns e.g. Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal, etc. will be mobilised for offering zig-zag kiln workers training in their states. Efforts will be made to mobilise at least 2 states to launch the skill training programme.
- **Conduct of pilot skill development programmes for zig-zag kiln workers by states:** The aim would be that the state skill development missions support 50 training programmes over a period of 1 years, resulting in the training of 1500 workers and benefitting around 500 brick kilns.

## 8. About Greentech Knowledge Solutions

The project will be implemented by Greentech Knowledge Solutions Pvt Ltd (GKSPL). GKSPL is a Research and Advisory firm which offer services and solutions for improving energy efficiency in buildings, improving resource efficiency in the production of building materials and deployment of decentralized renewable energy systems. GKSPL was founded in December 2006. It has a core team of professionals and it collaborates with several Associates specializing in the fields of clean technologies, product design, sustainable architecture, policy, market, economics, etc.

GKSPL is acknowledged as one of the leading groups in the developing world in the field of cleaner brick production. Over last 10 years it has been involved in several brick sector projects ranging from monitoring energy and environment performance of brick kilns, developing and conducting technical training packages for brick kiln owners and workers, carrying out policy studies and advocacy, outreach programmes for brick industry, etc. GKSPL hosts a dedicated web portal Brickguru (<https://www.brickguru.in/>) to provide technical information and advice to brick industry. GKSPL has been contributing to the CCAC brick initiative since its inception in 2013. Dr Sameer Maithel (Director, GKSPL), has over 25 years of work experience in the brick sector and is the recipient of the CCAC award for individual achievement for the year 2017.