Overview on brick kiln: pollution, technology and where we need to go?

Centre for Science and Environment

March 11, 2015

ANIL AGARWAL DIALOGUE 2015

‘Under-construction’ agenda

• Massive “Under-Construction” agenda for countries of the south.

• 70 percent of India is yet to be built.

• Homes, offices and factories require large quantities of building material.

• Cheapest building material so far has been – BRICKS!

• Standard practice
  - Dig clay/mud from the field
  - Mould them into bricks
  - Fire them in inefficient furnaces using different fuel source

•Kilns operate from China to Peru, burning anything cheap.

CSE

ANIL AGARWAL DIALOGUE 2015

Global brick production: 1.5 trillion bricks/annum

Country	Production %	No. Billion P.A.
China	66.67%	1,000
India	13.33%	200
Pakistan	3.00%	45
Vietnam	1.67%	25
Bangladesh	1.13%	17
Nepal	0.40%	6
Rest of Asia	0.47%	7
Total Asia	**86.67%**	**1,300**
USA	0.53%	8
UK	0.37%	4
Australia	0.13%	2
Rest of World	12.40%	186
Total Rest of World	**13.33%**	**200**
Total World Production	100.00%	1,500

CSE

ANIL AGARWAL DIALOGUE 2015

Resource intensive sector

- **Major fuel**: Coal, firewood, heavy oil
- Coal Consumption by Asian Brick Kilns - 110 million tonnes/ year
- Highest consumer – China (50 million tonnes/year)
- Kilns have huge variation in efficiency
- Coal consumption varies between 11-70 tonnes coal per 100,000 bricks.
- Clay consumption:
  - China: 1 billion m^3
  - India: 350 million tonnes
  - Bangladesh: 45 million tonnes

CSE

ANIL AGARWAL DIALOGUE 2015

Brick sector in India

- **Second largest producer – India** (200 billion bricks/year).
- 65% of these made by burning fertile alluvial Indo-Gangetic plains.

FCBTK	6500 (N), 17000 (E), 400 (C) 7500 (W) and 1000 (S)
Zigzag	15 (E)
High Draft	50 (N), 2000 (E)
Hoffman	500 (S)

- Huge environmental cost associated with this BM:
  - Black carbon emissions
  - Local air pollution
  - Loss of fertile top soil
- Black carbon emissions: as high as 9% of the India's annual black carbon emission total.

CSE

ANIL AGARWAL DIALOGUE 2015

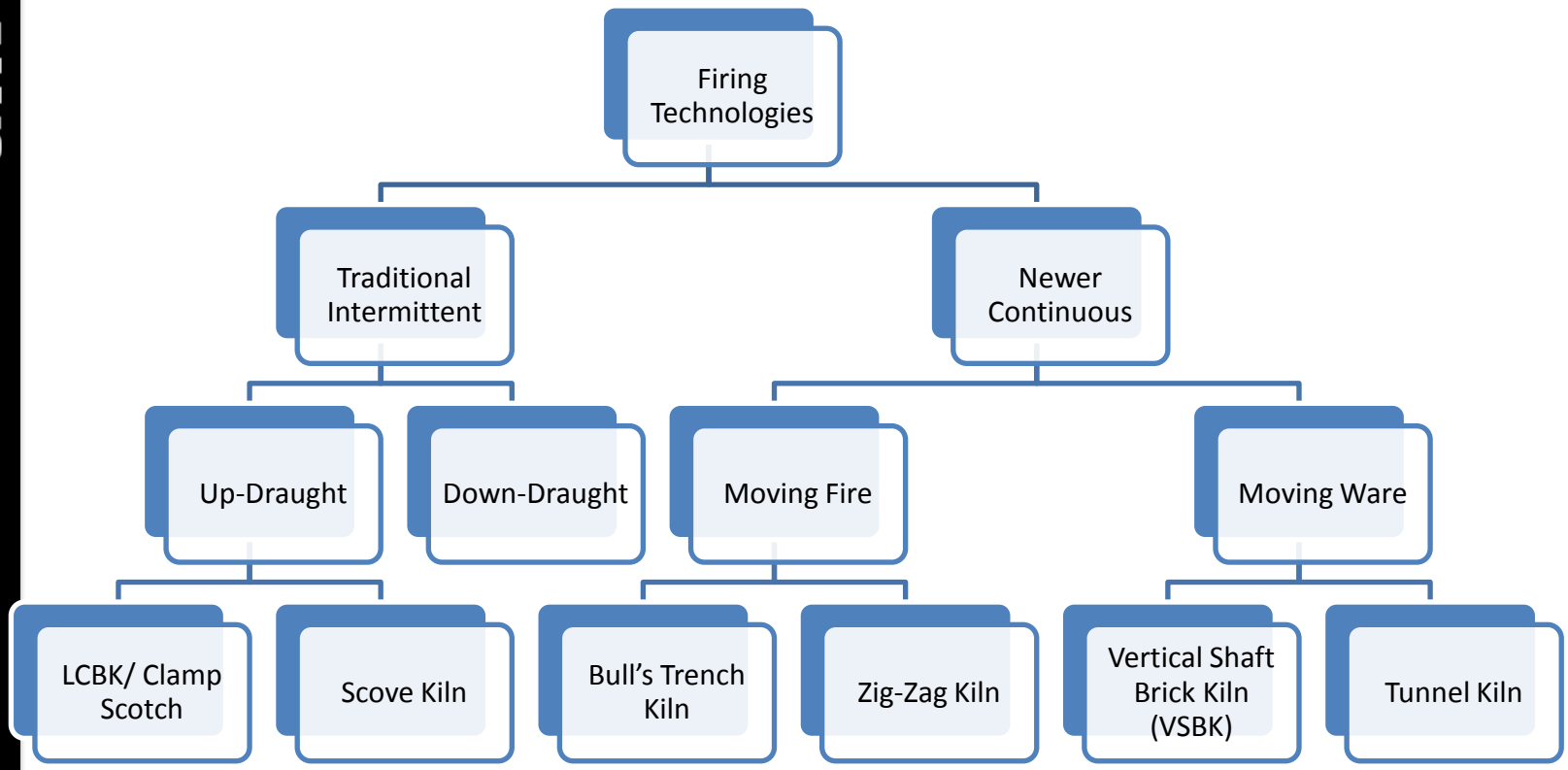
Brick sector in India: Labor issues

- Employs 10 million laborers: unacceptable working conditions
  - Migratory workers
  - Seasonal employment
  - Wages on the basis of number of bricks produced
  - Occupational hazards – no PPE
  - Child labor
  - Non-implementation of Factories Act provision

CSE

ANIL AGARWAL DIALOGUE 2015

Technology: Varied & Outdated!



CSE

ANIL AGARWAL DIALOGUE 2015

Technology vs workforce

Country	Type of Kiln	No. of Kiln	No. of Bricks Produced (in billion/year)	No. of People employed	No. of Bricks produced per employee
China	Hoffman Kiln & Tunnel Kiln	80,000	1,000	5 million	200,000
India	FCBTKs, Clamp	>100,000	200	10 million	20,000
Pakistan	Clamps & MCBTKs	12,000	45	9 million	5,000
Vietnam	Tunnel & VSBKs	10,000	25	-	
Bangladesh	FCBTKs, zigzag	8,000	17	1 million	17,000
Nepal	Clamps & BTKs	700	6	140,000	42,857

ANIL AGARWAL DIALOGUE 2015

Technology: Varied & Outdated!

- Clamp technology is equally polluting but without the initial setting up cost (due to no fixed structure).

- That also makes regulation enforcement difficult for these moveable kiln.

- Zigzag kilns are better than FCBTK.

- Air travels in a zigzag path resulting in the reduction of pollutants and black carbon, and is more energy efficient.

- PM emissons: **FCBTK – 250 to 1250 mg/Nm3**
  Zigzag - Less than 250 mg/Nm3

CSE

ANIL AGARWAL DIALOGUE 2015

Energy efficient technology

• Vertical Shaft Brick Kiln is even a better technology.

• Tunnel Kiln is much more expensive to set up but requires less man power compared to FCBTK & Zigzag.

• Best technology available so far for large scale production for brick production in industrialized country.

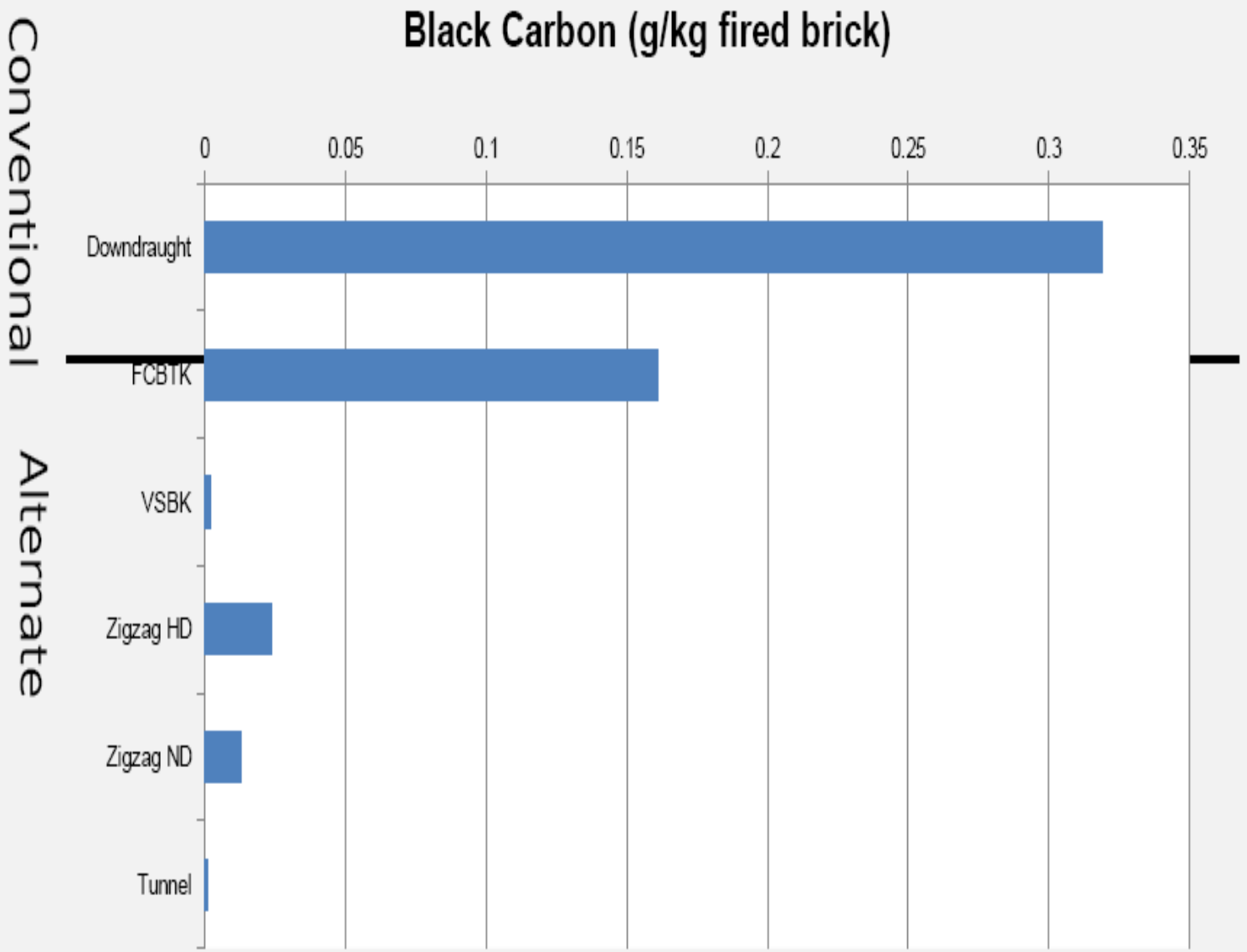
• The advantages of using Tunnel Kiln are:

- It can fire a wide variety of products.
- Good control over the firing process.
- Ease of mechanization, thus reducing the labor requirement.
- Has large production volume.

CSE

ANIL AGARWAL DIALOGUE 2015

Technology comparison



ANIL AGARWAL DIALOGUE 2015

Anil Agarwal Dialogue Issues

- How should the local environment and livelihood costs of brick kilns inform national-global policy?
- What are the best practices in regulations and enforcement for brick kilns in different countries? What is working and what can be done?
- What is the technology roadmap for efficient and clean brick kiln manufacturing in the world? What can countries learn from experiences on the ground?
- Is improvement in technology enough or should the world move towards alternative materials for building?
- How will alternative material be affordable and sustainable?

CSE