BRICKS KILN IMPACT 3D SOLUTION & ENVIRONMENTAL SUSTAINABILITY (AGRICULTURES, ATMOSPHERE)

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ABSTRACT: A large part of the global brick-making industry has grown from knowledge that has been passed down from generation to generation without ever having established a consistent scientific approach. The purpose of this research is to contribute by discussing modern art and future trends in bricks. The proposed approach to this study is based on systematic literature reviews where the big question is: What research is available in a brick kiln? Based on the results of this review, it is recommended that flue gases react with SCR such as urea or Calcium Carbonate Solution Injection at outlet of blower or vent showing by appropriate 3D automatic process &smooth formation of bricks kilnintroduced at Traditional & advance approach, which will release gases less harmful to atmospheric pollution (Environment & Agricultural Impact).

Key Words: Clean Combustion & Mechanism, NSCR OR SCR Approach, Flue Gases, automation.

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INTRODUCTION

In Pakistan almost 20,000 bricks Kiln. Mostly are found in the urban areas of Pakistan that significantly contribute to the air pollution. The bricks sector of Pakistan is less regulated and merges that accounts 1.5% of the domestic product of Pakistan. These facilities use coal, wood, tires and fuel in the furnace as fuel, which produces carbon dioxide CO2, NO2 and SO2 (NWFP EPA , 2004). These gasses contribute more in the global warming and climate changes. Fuel are used in this first time and each fire consumes 90 to 180 tons of coal and the portion of wood is 10 to 15 tons on the other side it consumes 4 to 6 ton of rubber in one month.

Contaminations also escort with the high concentrations of heavy metals in the environment such as Cadmium (Cd) and the Chromium (Cr).In the process of bricks based pollution the health of people effect badly like in Peshawar and it is nearly 107.935 million in days that lost due to bad health of the effected poulation (Rafiq and Khan, 2014). The visual and air pollution arise due to the lead of bricks, without the safety and health issue of the surrounding facility. Due to extinction of green house gases it is a serious hazard for the worth of nature and the value of natural Pakistan.Due to the widespread coal use in the bricks it is significantly increase the release of carbon dioxide (CO_2) gas, particulate matters (Pm) along with the black carbon (Bc), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and lastly the carbon monoxide (CO). Pollution not only has a detrimental cause of the workers health, people of local, and plants, and also cause of the global warming. In the year of 2011 and 2012 it was monitored. According to the study of 2011 that was available in detailed report form on the United Nations Environment Program (UNEP) website.Old rubber tires, type's low-grade coal, wood and used oil / waste, greasy mud etc. is used in these facilities such as fuel. The use of these fuels, combined with an inefficient fire system, produces large quantities of harmful gases that damage the health of public Community, Ecosystem and stove workers. Efforts are under way to combat the pollution caused by the burning of agriculture, polluted factories, brick kilns and cars. When the air is full of dust and dirt that can cause health problems including asthma, lung injuries, bronchial infections and heart problems.

Tabel-1: Emission rate at ZIGZAG (g/s).

Batch	CO	NO	CO2			NOX	SO2	PM10-2.5
			FCK	BTK	Z/H			
1	2.454	0.009	3.182	0.383	0.068	0.009	0.085	0.014
2	0.203	0.005	1.852	0.783	0.257	0.005	0.030	0.006
3	0.744	0.005	3.452	0.133	0.051	0.005	0.029	0.011
4	0.125	0.005	1.432	0.216	0.119	0.005	0.025	0.010
5	0.649	0.007	0.496	0.083	0.059	0.007	0.054	0.007
6	302000 t/y		1.8 million Tons of CO2				15500 t/y	23300 ton

Testing the energy-saving capacity of brick kilns, is considered appropriate first to evaluate current act of the most admired system of the bricks baking. In the traditional methods the BTK is the well trendy method, except that it does not work well in Energy, the guzzler of the coal that uses per brick120 grams of the coal. The brick industry as a whole is unregistered in our industrial economy and therefore is disturbing, fragmented and unaware of modern and advanced processes. The institutional framework that supports the development of the brick industry is not yet in place. Brick construction projects have no engineering. The laws, in the construction of fire, the quality standards of the bricks, the output standards specific to the bricks are non-existent. So theCourt in 2017 to look at fog drivers and find ways to reduce them.

Brick eat up a large amount of coal are the main cause of the pollution in the country. In the process of bricks making the large amount of energy is used but we should to give more preference on the energy conservation and controlled the pollution that arises from the bricks kiln system in the Pakistan industries. However the existing technology does not use electricity on the other side the latest technology is not admired in Pakistan due to its high cost during the initial investment. If these approaches are replaced there is a need to make changes between the old and proposed strategies.

In this new method only the 70gm is required to bake one brick in comparison with the previous one 90 to 100gm. This will increase the fire performance and the production of bricks doubled in result and the grade of bricks 'A' has rises up to 90%.due to this workers have less contact to dirt and dust. In the provincial and national level the different types of laws and regulations are made. The Department of Environmental Affairs and changes in the climate on the provincial and national level, the government imposes the policies. However mutually legal and enforceable degrees are not in line with international best practice. Existing provincially and local, the government policies will be evaluate and compared with the bricks standards on the international level particularly in South Asian countries like Nepal and India. The main advantage of using the Zigzag center is the high percentage production (80% -90%) of bricks of class 1 compared to that of FCBTK (50% to 60%). A rise in the average product rate leads to rise in the income of the owner of bricks and it is a great encouragement for owner.

Tabel-2 Efficiency Comparison.

Technology	**Coal Consumption T /100,000 bricks**	**Particulates SPM (Mg/M3)**	**CO2 Emission T /100,000 bricks**	**CO2 Emission Reduction in percentage**
FCK	20-22	1,000	50	N.A
IFCK (Improved Fixed Chimney Kiln)	16-18	<500	40	20
ZIGZAG	16-18	270-300	40	20
HHK(Hybrid Hoffman Kiln)	12-14	20.3	30	40
VSBK(vertical shaft brick kiln)	10-12	78-187	25	50

Tabel-3.

Serial	**Energy efficient Technology/measurer**	**Annually savings of coal (tons)**	**Annual saving of energy (tera-joules)**	**Saved amount (Rs in millions)**
a	Adoption of smart methods and procedures	122	2.8	1.22
b	Mod BTK (15%)	184	4.221	1.84
c	VSBK (20%)	245	5.678	2.45
d	Hoffman Kiln (15%)	184	4.221	1.84
F	Tunnel Kiln (30%)	368	8.431	3.68
g	ZIGZAG Kiln	Data NA	Data NA	Data NA

Tabel-4Emission standards for brick kilns by MoEF.

Table 7 Emission standards for brick kilns by MoEF	
Technology and dimension	**SPM emission standard** -suspended particulate matter (SPM)
Fixed Chimney Bulls Trench Kiln (FCBTK) Large and medium size (production >15,000 bricks/day) Small size (production	<750 mg/Nm3 <1000 mg/Nm3
Vertical ray of the Brick Kiln (VSBK)	<250 mg/Nm3
Down draft kiln	<1200 mg/Nm3

Source: Ministry of Environment and Forests, India Gazette, Part II, Section 3, Sub-section (i) and 22 July 2009 Renewable resources are less explored to be more expensive than numerous other disputes. Approximately 90% of the energy is come from the non renewable resources like gas and coal. In the latest technologies of the future, the main focus is on the efficiency of the energy that's speed up the use of existing energy systems. The least expensive energy we can search for and can be obtained by using energy-efficient methods within the system. Technological advances in the brick industry vary from SAARC (South Asian Association for Regional Cooperation) to India leading the way that followed by the Bangladesh and Nepal.

Pakistan and Afghanistan are found in the bottom of the list of the poorest condition of the bricks production.

Tabel-5 World Major City AQI Ranking.

Serial	Dirtiest Country	Air Quality Index (AQI)&PM2.5	Cleanest Country	Air Quality Index (AQI)
1	Karachi Pakistan	362-156	Bahamas	14
2	Dhaka Bangladesh	338-165	Virgin Islands	15
3	Delhi India	240-152	Iceland	23
4	Hanoi Vietnam	226	Finland	23
5	Ulaanbaatar Mongolia	208-154	Estonia	25
6	Lahore Pakistan	205	Sweden	27
7	Kolkata India	191	Norway	28
8	Guangzhou China	191	New Zealand	31
9	Chengdu China	184	Canada	32
10	Kabul Afghanistan	181-153	Australia	33

Source: AQI Map

STUDY BACK-GROUND

The rise in the prices of energy leads to theory of intelligent technology that needs to be embraced immediately. The process of technology transfer is not dangerous at the moment it is timely dependent challenge due to a range of factors such as lack ,of electricity-based regulation, non compliance with standards of quality, ineffectiveness of governance and all above mentioned points indifference to change to older, under development and out dated of the infrastructure. A shift towards the new technologies of the energy saving techniques it is possible when the political will and this thought becomes an integral part of the policies and the national energy security plans. The industry of bricks uses only two materials that are Petrol and soil.

Apart from this point different types of coal are used to make bricks, but the study just focus on the one type of coal that recommended and officially accepted for the use of the coal. Bricks that made from the raw soil must be heated between 850C to 1000C in a fire; this is the temperature at which the soil is form. The required temperature is determined through the soil of the elements. The process is verified when the required temperature will be obtained through the fire fighting technologies that divide into the two phases intermittent and continuous shooting fluids. The Intermittent Kiln is completed to work on each load on that the bricks are filled, put in the new fire, the baked process of bricks, the fire is forced to extinguish, as soon as it has dropped the bricks are burdened. A new phase is being initiated, with new fire and bricks with the new phase the more energy are used in the infrastructure heating. The hot gases that go into the air are left unused. Continuous Kilns are very efficient due to continuous fire; the structure of the fire is burned only once, in the different parts of fire the heat is found that used well before it escapes into the space. The hot gases is used in the burning of the green bricks, on the other hand the heat obtained by newly installed bricks is used to heat the air passing through these before entering the shooting room helps fire energy and energy saving. All modern technology is a form of continuous energy use and will therefore be discussed in the following sections to assess their energy efficiency, pre-cost, payment time and convenience with the purpose of recommending the most suitable technology within the context of the Pakistan.

The technology gap consider and evaluate the picture of energy conservation potential that are available in Pakistan brick sector (TGA) Techno Green Associates. The annually savings in the coal by adoption of the efficient energy technologies and actions are taken against on one BTK are tabularize below.

Scope of Work: Study concentrate the Economic, industrial situation, Social, Environmental Impact, Design of active Participants technology providers and analyze the barriers in Bricks Kiln Sector. Approach adapted to take a look at the entire brick industry in Pakistan to recommend quick steps to be taken, Evaluate modern energy-efficient brick technology that leads to

sustainable energy saving process and commenting on renewable resources that can be incorporated to lessen the pressure on the natural resources.

Table-6. Comparative State of Kiln Technologies.

TRADITIONAL FCBTK	MODIFIED FCBTK	HOFFMAN	VSBK	ZIGZAG	TUNNEL KILN
1.local markets expertise	**1**.high rate of production	**1**. continuous and regular selling of bricks	**1**. develop as CDM project	**1**.less wastage compare to the traditional FCBTK	**1** easily control Firing temperature
2.less intensive capital	**2**.require more A" grade bricks in comparison of traditional FCBTK	**2**.Pre heating the bricks that done through hot gases before escape into the environment	**2 t**aking less fuel per 100,000 bricks	**2**.require less capital	**2**.automatically controls temperature
3. low quality bricks are available in the markets	**3**.new cycle of bricks are ready to sale within 15 days in comparison to the old one	**3**. low Fuel consumption and emission of stack	**3** 13% less space as compared to BTK	**3**.availibilty of more days compare to traditional FCBTK	**3**. kiln Technically operated to whole year with zero weather effects
4.no trainings	**4**. develop locally	**4**. great quality of the bricks	**4**. not effected with weather conditions		**4**.require less manpower
5. employ to un skill labors	**5**.more environment friendly less emission of co_2	**5**. control the Height of the and less emission of the particulates and gasses	**5**. Sales of bricks in short time period.		**5**eco friendly
6.less number or technical person requires	**6**. less expose to heat of labor compared to traditional FCBTK.	**6**. Kiln is operational in whole year	**6**. Variable capacity increased by more shafts		**6**. different size and shapes of the bricks
7.no completion of trainings	7. no requirement of trainings	**7**. High quality of bricks of grade A as compared to conventional FCBTK.	**7**. less SPM emissions		
		8. Operational whole year	**8**. workers faces not adverse conditions		
			9. less payback period		
			10. operational whole year		
			11 high yielding of A grade bricks		

Table-7 Performance Comparison between Two Fixed Chimney Brick Kilns by TERI India.

General specific	Traditional Kiln with Traditional Operation	Modified BTK with Improved Operation
surplus Air		
During feeding of the coal	No excess air	100-150%
During non feeding of coal	100-150%	200-300%
every day Production	20,000 bricks/day	27000 bricks/day
consumption of the Specific fuel	24-25 ton/lakh bricks	18-20 ton/lakh bricks
consumption of the Specific energy	1.35MJ/Kg	1.1MJ/Kg

Converted BTK assist save about 5 tons of the energy coal by one hundred thousand bricks savings are very important when converted to an annual profit. Large-scale firefighting, which produces about 6 lakh bricks in a single phase, saves coal by the 30 tons of which also brings additional benefits to entrepreneurs. Reduced coal consumption and improved performance reduce significant pollution that will take BTK within the confines of National Disposal Quality Standards as defined Environment Protection Agency of the Pakistan.

Monitoring and Control of the Temperature

Gauge of the Temperature and a heat gun are used to measure the temperature and compared to those who are more appropriate for soil and coal as used following illustration examination of the fire officer. Each hole temperature was recorded three times are the following in the stack starting, in the middle where the temperature is attain that is annex B of the table. Then the amount of coal and the temperature of flue gases escaping from the chimney were recorded with the heat power return.

"Annexure A"

Tabel-8 Brick Factory Temperature Log.

Date	Line No			Charging Hole No				Coal (line)	Reading time
22 Feb	1	TEMPERATURE	I	713	812	717	619	567KG	7.0AM
2021			M	938	986	931	814		9.0AM
			F	997	1031	1044	1003		11.0AM
		Ring		M	M	M	M		
		Color		Y	Y	Y	Y		

Ring (1) M-Metallic Sound, D-Dull Sound **Color** (1) R-Red, Y-Yellow **Temperature**: I-Initial, M-Middle, F-Final

"Annexure B"

Tabel-9 Energy Audit.

General	Type of Kiln	Bricks making		Bricks Quality		Average production	
	BTK FCK IFCK HHF ZIGZAG VSBK	Manual	yes	Class A Class B Class C	84 12 4	Daily Cycle Yearly	yes
SOIL	**TEST Results**	**Verification Type**		**Moisture Content**		**Total weight**	
	Calcium% 11.1 Ferrous% 6.3 **Grain size** a-clay 64% b-Silt 21% c-Sand 15%	High temp >1000C Mid temp 950-1000C Low temp<950C The temperature at which top of the cone incline in oven.		Avge Wet Wt Kg: Avge Dry Wt Kg: Total MC Kg:	2.98 2.74 0.15		
Fuel	**TEST Results**	**Energy Used**		**Specific firing energy-1**			
	GCV KJ/Kg 23202 VM% 41.76 FIXED CARBON% 32.15 MOISTURE% 4.85 SULFURE% 2.38	Wt of Fuel: Kg (Int+Ext) Total Energy: KJ Specific Drying Engy: Drying energy: Firing energy:	34789 788953711 3,010 82151118 695644810	Wt. of a Fired Brk: No of Fired Brks Wt of Total Frd Bks Specific firing energy	2.87 199945 499786 1425.654		

The survey of energy is conducted under the case studies that are mentioned above and it is confirmed that traditional BTK system has 4.221 TJ per year saving capacity but on the other side in the savings of the coal 184.2 tons of coal per oven saves per year. This would be suggested to include investors in the starting of the mentioned strategies only for the soft material.

This is suggested for immediate implementation with a high probability of success in which the structural changes are not required, investment were not measured,

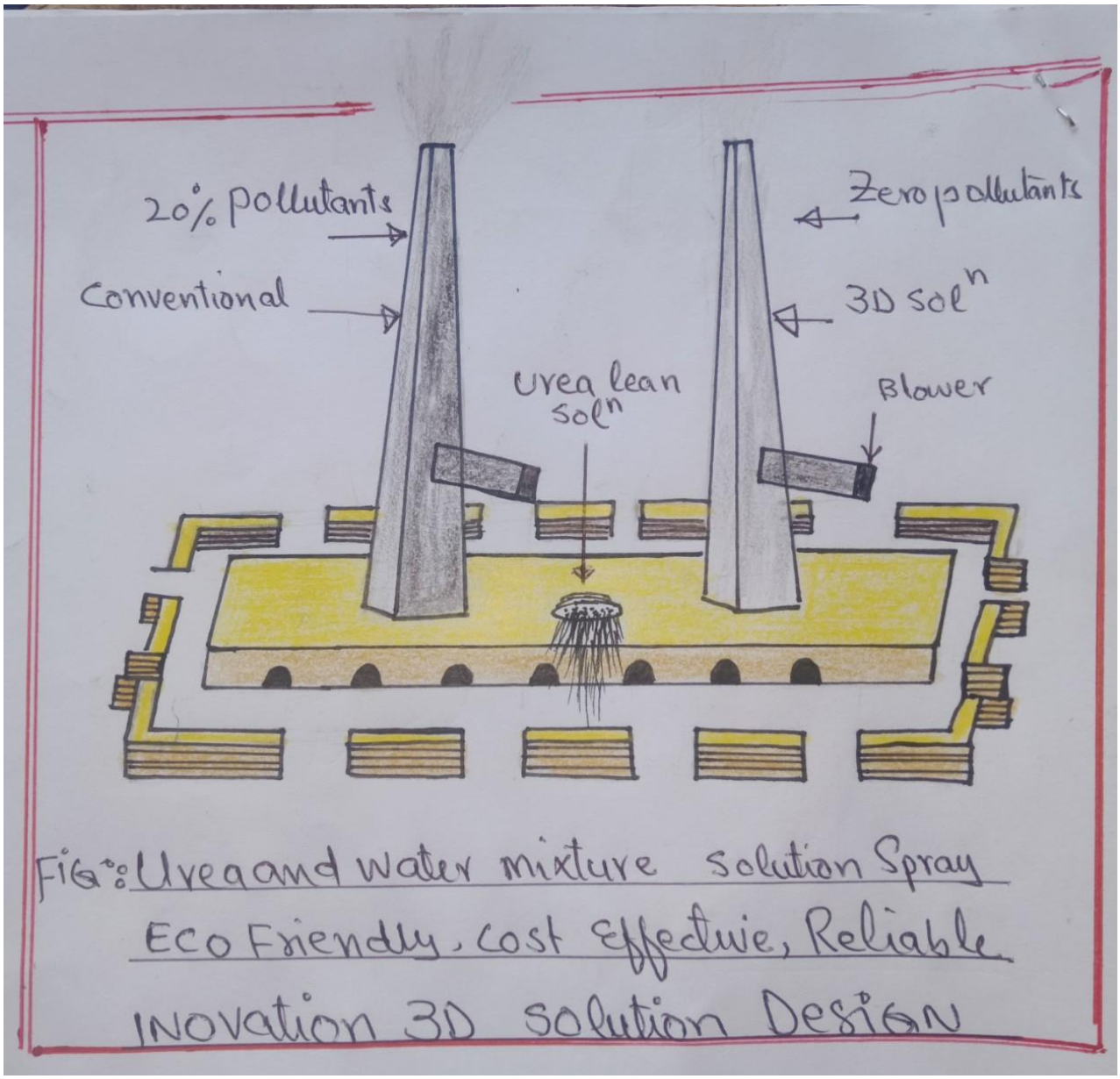
stone brick building training and on the site fire master can be pointed.

Power can only be tested if basic parameters are established by existing expertise and practice. An "Energy Audit Performa" was developed to keep the records and compare the output of the result the results that attain after the involvement to keep the equipment the same, using only clean techniques and drill within the limits of science. The Energy Audit Performa is in Appendix B

METHODOLOGY

a. Basic Data Collection:
The data is collected from one hundred and ten kilns that spread between the three provinces in the specification of the Pakistan.

b. Secondary Data Collection:
The data is collected from the textbooks of the secondary and tertiary education of the same subjects and / or study of environment that conducted in region. The other information Is obtained from the documents of the Techno Green Associates (TGA) from its previous Project of Brick Energy (EEBP 2008-2011).



Social & Environmental Impacts.

Fixed Chimney Bull's Trench Kilns is the major cause of the pollution in the production of bricks and these lead to the air pollution, changes in the climate zone, increases the respiratory diseases, excessive use of land and deforestation. Due various types of fires and flammable oils it is difficult to identify the composition of the pollutants emitted by this region in this the sulfur oxides, nitrogen dioxide, carbon monoxide, carbon dioxide (CO2), types of particulate matter (PM) includes black carbon, along with the other elements that extracted due to burning of coals and other fuels. A person who has ever seen a traditional brick machine in action may have noticed the black smoke coming out of its chimney. Smoke drawn by workers and nearby communities is accepted as one of the biggest cause of black carbon dioxide, Pakistan is functioning with the Climate and Clean Air Coalition (CCAC).

Haji Parvez has been in the business of bricks and mortar from the past 16 years. He has a brick furnace in Raiwind across Sue-e-Asal Road. From the time period of 14 years Parvez had a traditional brick smoke that was a kind of Fixed Chimney Bulls Trench Kiln (FCBTN) that decide to convert its system into zig zag technology.

He had his motivation for doing so. Previously, in the traditional brick kiln, Parvez improved the production of bricks. "Brick clay had a large capacity to produce 30,000 bricks. On the other hand, with smart zig-zag technology, I could easily improve the product from 30,000-50,000 bricks daily."

Parvez says, "While one of my friends, Haji Islam, was introducing the first brick bean to zig-zag technology, I saw the benefits he was reaping at a lower cost, and that encouraged me to change my nose from traditional to zig-zag technology in 2018."

According to the Parvez the cost of converting this more than two million rupees but currently the conversion costs have dropped dramatically to one million. "Costs have been reduced as owners of a brick kiln have developed and introduced a fiberglass air-conditioning system," Parvez informed.

RECOMMENDATIONS

- It is recommended by improving the laws and policies we can lessen the environmental impacts of bricks. The proposed Brick Kilns policy manual will be submitted to the provincial government for timely use. It already shared with the media and popular stakeholders to inform the public community about the environmental bricks impact.
- Depending on the data collection modules of trainings will be developed and these modules will cover both technical phase and concern in the environment of work. The technical phases generally includes the training on present and non hazardous methods of mining, effective brick production techniques etc. Other training will include health and safety training. For brick owners, automation training for brick kiln processes, energy saving, modern technology and impact of the environment of substandard fuel use will be provided.
- To capture the growth of the project an online system will be setup through which the data is collect and explore a range of ecological parameters in preferred areas. A data anthology and data analysis system that tests the performance of these brick kilns will be developed.
- Switching to the production of cleaning bricks provides great energy savings. In addition, it reduces the emissions of SPM, BC (black carbon) and CO2; the conversions of the brick business need a national guidelines framework that aim to produce the more bricks in the India. China and Vietnam are the perfect examples that bring the changes in the bricks industry is driven by a widespread national level policy to structure the materials along with bricks.

CONCLUSION

Due to energy efficiency, pollution and low productivity: existing brick technology should be improved in that case the transformation of green brick technology is the only thing that has the right to reduce air pollution and ensure sustainable brick production. The solution that has been physically, experimentally and by 3D Automation proved ideally at Traditional is more effective to save resources (cost, time) Environment & Agricultural Effects. The lean solution has no side effects at any degradation including water efficiency; the research has been specially design for those traditional approaches who don’t want to convert the conventional to environment friendly approach. Selective Regeneration method of control is more efficient as compared to ZIGZAB Technology.

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