TRAINING REPORT

Training on Cleaner Fired Clay Brick Production Practices

Janakpur, Dhanusa

7-9 May, 2016

Prepared by:

Federation Nepal Brick Industries

MinErgy Pvt. Ltd.

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Contents

1. Introduction

Federation of Nepal Brick Industries (FNBI) in association with MinErgy Pvt. Ltd. Nepal, with support from Climate and Clean Air Coalition (CCAC) and International Centre for Integrated Mountain Development (ICIMOD), organized a training programme entitled "Training on Cleaner Fired Clay Brick Production Practices" from May 7-9, 2016 in Janakpurdham, Dhanusa. The training programme is a part of CCAC brick kiln initiative aimed at achieving substantial reductions of black carbon and other emissions from brick kilns through employing a range of technology and policy approaches. This training is the third of four training programmes, which are scheduled to be organized at four different locations across the nation.

2. Objectives

Overall Objective

- To achieve reductions in black carbon and CO_2 emissions with their related co-benefits on development and health

Specific Objectives

- Establish training and technology nodes in Nepal to increase the rate of adoption of cleaner technologies through trainings and technical assistance explicitly aimed at building technical capacity in the region to move to lower emitting brick kilns
- Enhanced capacity of entrepreneurs and workers on the cleaner brick firing practices

3. Location and Training Period

The training was organized at Hotel Sitasharan in Janakpurdham, Dhanusa between 7-9 May, 2016. The theoretical part of the training was organized at the hotel, whereas the practical sessions were carried out at brick kiln, namely:

i. Shib Itta Udhyog, Janakpur

Eight resource persons (annex 1) were engaged in training delivery. Training included ten modules covering different aspects of brick production practices. Altogether, fifty trainees participated in the training. The participants were from Dhanusa, Mahottari, Parsa, Bara and Sarlahi districts. The list of participants is attached in the annex 2. The training schedule is attached in the annex 3.

4. Training

4.1 Opening ceremony

Notables from ICIMOD, FNBI, MinErgy and Janakpur Brick Industry Association inaugurated the programme with words of welcome, appreciation and encouragement. Speaking first on the occasion, central member of FNBI, Mr. Lalbabu Yadav welcomed guests, participants and technical team. He hoped that all the participants gained technical knowledge in modern brick production practices, through the training.

Program Director of MinErgy Pvt. Ltd., Mr. Suyesh Prajapati welcomed everyone on behalf of MinErgy and provided background of the training programme. He told that motto of the programme is to help reduce pollution from brick industries, and also to provide technical knowledge on improved brick kiln design to brick kiln owners. He talked about the co-operation between MinErgy, FNBI, ICIMOD and CCAC for preparation of brick kiln design manual, outreach programs concerning new brick production technology, implementation of the design manual, preparation of training manuals and organization of nationwide training programmes to brick kiln owners. He hoped that participants learn different aspects about improved brick production practices, and implement them in their kilns. Energy Expert and consultant of ICIMOD/FNBI, Mr. Bhishma Pandit welcomed everyone, and described the role of ICIMOD in improving brick kiln sector. He highlighted the change that has occurred in brick kilns in Kathmandu valley. He expressed the motto of the training as economical brick production and pollution reduction, and gave an overview of the training program curriculum. He emphasized the importance of implementation of improved technology in brick kilns, and requested the participants to implement the knowledge gained through the training in their kilns.

Speaking on the occasion, President of FNBI, Mr. Mahendra Bahadur Chitrakar, welcomed participants, technical team and guests to the training program on behalf of FNBI. He described brick-making process and emphasized the importance of soil quality and coal quality in brick making. He epitomized the aim of the training programme as reduction in emissions and reduction in fuel consumption. He talked about change in emission standards in China and India, and about the possible change in emission standards by Ministry of Population and Environment (MoPE) in Nepal. He also talked about emission measurement by MoPE in several brick kilns in Kathmandu, and future plans for measurement in brick kilns all over Nepal. Mr. Chitrakar stressed that brick kiln owners should improve their kilns and be prepared for future challenges. He highlighted benefits of zigzag technology such as up to 30% coal consumption reduction, emissions reduction for environmental benefits and up to 90% A-class bricks production. Mr. Chitrakar talked about works of FNBI, MinErgy, ICIMOD and CCAC for implementation of improved brick production technology. Finally, he requested participants to gain as much

knowledge as possible through the training program, and implement them as well as share with those not attending the program.

President of Janakpur Brick Industry Association, and Chairperson of opening ceremony, Mr. Binay Kumar Yadav, welcomed participants, organizers and representatives of different organizations. He urged participants for active participation and keen interest in the training. He acknowledged that the training is organized for benefits of brick kiln owners themselves. Mr. Yadav described the role of FNBI for improvement of brick kiln sector, and acknowledged the lack of technical knowledge for economical brick production in brick kiln owners.

4.2. First day

The first day of training program started with presentation on Soil Preparation by Mr. Suyesh Prajapati. He presented on brick making process, types of soil, soil quality, soil testing and soil preparation, and highlighted the importance of soil selection and soil preparation for good quality of fired bricks. The subjects of discussion during the session were:

- Ways to increase clay content in soil
- Mixing of alumina in soil for better strength and metallic sound
- Mixing of salt in soil for producing white coated bricks

Mr. Bhishma Pandit presented on Brick Firing, Fuel and Combustion. He explained about brick firing process, fuels used in brick kilns, fuel characteristics and combustion process. He also explained about fuel management and heat balance for energy efficient firing and pollution reduction. Mr. Pandit highlighted that improved combustion results in up to 25-30 % reduction in fuel consumption. He discussed about the importance of shed in brick kilns and its advantages such as ground heat loss minimization, prevention of abruption in firing due to rain, greater production, etc. During the session, Mr. Mahendra Bahadur Chitrakar shared his experience of using sugarcane husk as fuel in his kiln. He emphasized on adoption of improved technology, knowledge sharing among brick kiln owners and preparation of supervisors for implementation of improved brick production technology. He talked about importance of keeping knowledge by brick kiln owners themselves to optimize their production.

The major subjects of discussion during the session were:

- Calorific value of different types of fuel
- Time required for heating, soaking and cooling in firing process
- Transformation process of straight line FCBTK into zigzag FCBTK
- Trial of zigzag stacking and firing in operating straight line FCBTK

The owner of Baba Itta Udhyog, Kalaiya, Mr. Sitaram Upadhyaya shared his experience on adoption and implementation of zigzag technology. He told the participants about his learning of zigzag technology from trainings in India and Nepal, and that he has been operating natural draught zigzag kiln since 3 years. Mr. Upadhyaya shared about initial difficulties in adoption, labor issues and benefits of zigzag kiln. He told the participants that he got involved in the training program for further exploration of technical knowledge on improved brick production practices, and also shared about use of sugarcane husk as fuel in his kiln.

Similarly, owner of Anil Itta Udhyog, Dhanusa, Mr. Anil Kr. Yadav described about the benefits of zigzag technology to the participants.

Mr. Bhishma Pandit then presented on Best Practices in Operation (Straight Line and Zigzag). He explained about the best practices in brick kilns that can be adopted for better performance of the kiln, which included brick setting, fuel mix and firing in zigzag kilns, reduction of leakages and heat losses, maintaining chimney draught, proper fuel feeding patterns in straight line and zigzag stacking, coal storage, etc.

The interaction during the session included following subjects:

- Chimney size required for proper functioning of kiln
- Measures to be adopted in case chimney draught is not sufficient
- Ways to regulate chimney draught- reducing losses in chimney, walls, rabish; changing stacking
- Cooling zone required for proper cooling of fired bricks

The next session included presentation on Mechanization by Mr. Suyesh Prajapati. He highlighted potential mechanization options at different brick production processes. He explained about the availability of various machines used in kilns for different purposes in Nepal, and shared briefly the history of development of green brick machine by Innovative Machineries Nepal Pvt. Ltd. He also conveyed to the participants through his presentation that brick kilns abroad are fully mechanized, which has enhanced the production capacity of those kilns.

Some of the queries presented by participants during the session were:

- Production capacity and cost of brick making machine in Nepal
- Extent of cost reduction in green brick making by the use of machine
- Crack problems in bricks produced by brick making machine

4.3. Second day

The second day of the training programme started with presentation on Zigzag Stacking by Mr. Santosh Gautam. The presentation focused on difference between straight line stacking and

zigzag stacking, and contrasted between natural draught zigzag stacking and induced draught zigzag stacking. Mr. Gautam highlighted the advantages of zigzag stacking on proper combustion, fuel consumption reduction, emission reduction and quality bricks production. He discussed ways of changing stacking pattern such as area of openings, *paya* size, etc. as per requirements to control the quality of fired bricks.

The session was made interactive and many queries of brick kiln entrepreneurs were discussed. Some of the subjects that were discussed during the session were:

- Choice of chamber size (6 feet or 9 feet) in natural draught and induced draught zigzag kilns
- *Paya* sizes in zigzag stacking
- No. of *Paya* (rows of bricks) and no. of *Tawa* (feedholes) in 6 feet and 9 feet chambers
- Thickness of *rabish* required for proper insulation and ways to improve quality of *Paatan* (bricks on topmost surface)
- Chimney dimensions required for natural draught zigzag kiln

During the session, brick entrepreneurs Mr. Sitaram Upadhyaya and Mr. Devendra Maharjan shared their experience on operating zigzag kiln. Mr. Upadhyaya shared about construction phase of his brick kiln, technical support received from FNBI/ TRDC, and his active involvement in operation of his kiln, which has helped him achieve cost-effective and quality brick production.

Similarly, Mr. Maharjan stressed on importance of knowledge assimilation on improved production practices by brick kiln owners themselves. He shared his own experience of hardship during implementation of zigzag technology due to limited technical knowledge in him and his partners, also the benefits received from zigzag technology after proper implementation and operation.

The module on Zigzag Stacking was followed by module on Zigzag Firing by Mr. Santosh Gautam. The presentation included firing zone, temperature profile of firing subzones, types and quantity of fuel fed for different subzones, calculation of fuel consumption, heat losses, fuel feeding pattern and firing report.

Discussion was held on single man, continuous, Z-pattern fuel feeding; its benefits on proper fuel combustion, fuel consumption and emissions reduction; and challenges of implementing it in practice. Mr. Mahendra Bahadur Chitrakar shared his experience of initial challenges faced on implementation of single man, continuous, Z-pattern fuel feeding in his kiln, and also about co-ordination and co-operation with workers for its effective implementation.

The subjects of discussion during the session were:

- Determining whether draught is sufficient during firing or not
- Position of fire in various firing subzones

- Quantity of fuel feeding in different firing subzones
- Importance of large firing zone
- Methods of reducing heat losses

After the module on Zigzag Firing, Mr. Nabin Chaudhary, the Managing Director of Yours' Technology Pvt. Ltd. (YT) presented on Brick Management System (BMS) software. He presented about various features of the software, its application for easy and efficient brick kiln management and about the collaboration of YT and TRDC/FNBI for the development, trial and distribution of the software among various brick kilns in Nepal. He also talked about employee identification device (RFID machine) that can be used along with the software. He explained about modifications in the software that can be done as per requirements of individual kiln.

Price and features of the software, installation and commissioning service, RFID card and machine durability were some of the queries presented by participants during the presentation.

Mr. Arjun Kumar Mandal, the Section Chief of the Office of Cottage and Small Industries (OCSI), Dhanusa also attended second day's training program. He gave a short presentation to the participants about organization structure and work areas of OCSI, classification of industries, registration process of brick kilns, Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA), renewal process, consumer acts and rights, etc.

Rules and duties to be adopted by brick kilns and consequences upon violation of regulations, steps for taking permission of Office of Forestry for setting up brick kiln, etc. were some of the subjects of discussion during the presentation.

Afterwards, the participants were taken to Shib Itta Udhyog, Janakpur, a natural draught zigzag kiln, for practical demonstration of zigzag stacking and firing processes. The participants were handed stacking sheets to help them for clear visualization of stacking process. Mr. Santosh Gautam helped them understand the components of stacking such as *paya, jhiri, jodi, bandhan, jali, tawa, gates*, etc., and components of firing such as firing subzones, temperature profile of firing zone, fuel types for different subzones, cooling and pre-heating zones, heat losses, leakages, etc.

Some of the highlights of the practical session were:

- Participants learned to stack bricks as per sheet provided
- Better understanding about the position of *bandhan, jodi, jhiri* and their importance to the brick production
- The participants learned about the position of fire in the firing zone, fire movement pattern and distribution of heat in different zones of the kiln including preheating and cooling zone.
- The temperatures of different subzones of firing zone were taken by the use of thermocouple device and radiation gun.

- The participants were explained about increasing or decreasing the rate of fire movement in the kiln so as to control heat for better production.
- The use of fuel, its type and feeding patterns for heat movement and heat control were also explained in the kiln.

4.4. Third day

Third day of the training programme started with presentation on Kiln Management by Mr. Tonil Maharjan. He explained about infrastructure and physical planning, administrative management, operational and financial management. He highlighted the importance of kiln management for better efficiency and better economy of brick kilns. Mr. Maharjan advocated on the importance of new improved technology and good kiln management for economical and energy efficient production of better quality bricks and pollution reduction from kilns.

Some of the subjects of discussion during the session were:

- Cost of installation of shed in kiln
- Use of safety procedures and danger signs in kiln
- Child labor and labor management

The module on Occupational Health and Safety (OHS) and Environment was presented by Mr. Sagar Adhikari. He explained about the importance of occupational health and safety in brick kilns and environmental issues associated with brick kilns. Mr. Adhikari stated that improvement in occupational health and safety in kilns would result in greater efficiency in production and lower hazard costs, which directly benefit the brick kiln owners. He also conveyed about the environmental emission standards that are set by the government for all types of brick kilns in Nepal.

Some of the subjects of discussion during the session were:

- Personal protective equipments (PPEs) and their costs
- Child care centers and schooling of children in brick kilns
- Position of porthole in chimney for emission measurements
- Child labour and its impact on child development and child rights
- Benefits of occupational health and safety

The final module on Design and Construction of Improved Fixed Chimney Bull's Trench Kiln was presented by Mr. Tonil Maharjan. He highlighted different aspects of new design of natural draught and induced draught kilns and processes followed to develop new kiln design. Mr. Maharjan explained about dug size, chimney design, *miyana* design, outer wall design, dug floor construction and centrifugal fan.

Some of the subjects discussed during the session were:

- Structural aspects and dimensions of chimney
- Chimney designs- RCC and composite
- Miyana dimensions and construction process
- Flue gas inlet design and dimensions
- Infill method in outer wall
- Type and capacity of motor used in induced fan
- Power consumption and cost of induced fan, and sources of power for its operation

4.5. Closing ceremony

At the end of the training programme, a training evaluation form, attached in annex 4, was distributed to the trainees to collect their feedback and response.

The participants were handed with training certificate and training material in a pen drive, to appreciate their presence in the training programme.

At last, a short, formal closing ceremony was conducted to mark the termination of the training. Speaking on the closing ceremony, the Vice-President of Bara Parsa Brick Industry Association, Mr. Sitaram Upadhyaya hailed the training as beneficial and knowledge-enhancing. He thanked organizers and team of trainers for organizing such a nationwide training programme. He requested to include more video-based materials in the training, and suggested trainers to use simple, understandable language as much as possible.

The President of Sarlahi Brick Industry Association, Mr. Nagendra Prasad Das expressed happiness on gaining technical knowledge from the training. He suggested that such training should be organized by FNBI from district to district. Mr. Das sought help from government for development and modernization of brick kilns. He labelled the knowledge of coal consumption reduction and emissions reduction as major learnings from the training.

Speaking on behalf of FNBI, Mr. Tonil Maharjan thanked participants for active participation in the training programme. He promised more video-based materials in future trainings, and thanked the participants for their feedbacks. Mr. Maharjan told that involvement of technical people in brick sector indicated bright future and continuous development of the sector, and appreciated the works of technical personnel for advancement of brick kiln sector. He hoped training directed everyone towards improved brick production practices, and asked participants to call FNBI for any technical assistance required.

The chairperson of the closing ceremony, and President of Janakpur Brick Industry Association, Mr. Binay Kumar Yadav thanked FNBI for organizing a knowledge-intensive training

programme. He acknowledged that many brick kiln owners are still not aware of improved practices in brick production. He told that coal consumption reduction, economical brick production and reduced emissions can be achieved through improved practice, and described the importance of single man feeding, larger firing zone and kiln management. Mr. Yadav criticized limited participation of brick kiln owners in the training, and called for seriousness of brick entrepreneurs on such matters. He appreciated new technologies in brick industry such as mechanization and brick management system. He urged for strengthening of district brick kiln associations and FNBI, and called for co-operation among brick kiln owners for everyone's betterment. Mr. Yadav wrapped up the closing ceremony by urging for industrialization and modernized operation of brick kilns throughout the nation.

5. Training Evaluation

Training evaluation was done by the trainees based on training evaluation sheet distributed just before the closing session. The participants expressed overall satisfaction on the training programme. The major feedbacks in the evaluation sheets are as follows:

a. The course content of the training programme was adequate and useful but some participants felt that duration of the training was short.

b. The trainees acknowledged that weaknesses in traditional brick production practice were identified and steps to improve several aspects in brick kilns were learned.

c. The practical demonstrations were helpful in clear visualization of theoretical aspects.

d. The quality of instruction of the trainers and practicality of the contents in presentations were good.

e. There was adequate interactions and discussions among the trainers and trainees.

f. The logistic arrangements were satisfactory.

g. Trainees were satisfied with the training program and most of them expressed eagerness and confidence to adopt new knowhow and skills in their kilns.

h. The major learnings of the trainees included coal selection, reduction of fuel consumption, soil preparation, reduction of emissions, increased productivity and quality, single man feeding, kiln design, heat losses and leakage control, occupational health and safety, risk management, zigzag technology and centrifugal fan.

i. Suggestions were made to use simpler, more understandable language as much as possible, and provide more video-based training materials.

j. Suggestions were made for time to time organization of such training programs, and establishment of training centres in every district.

k. Suggestions were made for establishment of showcase kiln in each district, and monitoring and inspection in brick kilns for their improvement.

l. Suggestions were made for preparation of supervisors for zigzag technology, training for staffs and workers, more practical sessions, and for organization of interaction and experience-sharing programmes among brick kiln owners all over Nepal.

m. The participants sought technical personnel and resources allocation from FNBI in each district associations for smooth transfer of improved brick production technology.

n. Participants felt they require more understanding on accounting and brick management system, zigzag stacking and firing, chimney and *miyana* design, emissions and energy consumption reduction.

o. The participants expressed their interest in mechanization including green brick machine, centrifugal fan, coal crushers, pug mills, as well as in temperature measurement devices and kiln security system.

The average ratings of participants on various training aspects are presented below:

Sections		Average rating
A. Curriculum		
1	The course content was relevant and adequate	4.54
2	The materials distributed were adequate and useful.	4.32
3	The course was organized in a logical manner	4.38
4	I will be able to apply what I learned.	4.24
5	Did the field visit support the course objectives?	4.65
6	Duration of training	3.92
B. Resource Persons		
7	Overall quality of instruction	4.58

8	The presentations were interesting and practical	4.16
9	Participation and interactions were encouraged	4.19
10	Adequate time was provided for questions and clarifications	4.31
C. Logistical Arrangement		
11	Organization of the training/workshop	4.44
12	Accommodation	4.58
13	Travel arrangement to the Field	4.04
14	Food Arrangement	4.62
D. Training/workshop specific questions		
15	How do you rate the training/workshop overall?	4.54
16	The training/workshop is useful to me and I will apply the learnings and will share with staff back home	4.76

Annex 1: Team of Trainers

Name of Trainer	Organization	Module
Bhishma Pandit	Consultant/ICIMOD	Brick Firing, Fuel and Combustion Best Practices in Operation (Straight Line and Zigzag)
Suyesh Prajapati	MinErgy	Soil Preparation, Drying and Brick Size Mechanization
Tonil Maharjan	TRDC, FNBI	Kiln Design, Layout, Retrofitting and Planning Kiln Management

Sagar Adhikari	MinErgy	Occupational Health Safety and Environment
Santosh Gautam	TRDC, FNBI	Zigzag Stacking Pattern(Natural and Induced) Zigzag Firing
Nabin Chaudhary	Your's Technology	Software and Data Management
Devendra Maharjan	Brick Entrepreneur/ TRDC	Zigzag Stacking Pattern(Natural and Induced) Zigzag Firing
Sitaram Upadhyaya	Brick Entrepreneur	Zigzag Stacking Pattern(Natural and Induced) Zigzag Firing

Annex 2: List of Participants

S.N.	Name of Participants	Industry/ Address	Phone No.
1	Mahendra Bahadur Chitrakar	FNBI	9851033467
2	Bhishma Pandit	Consultant/ICIMOD	9851088900
3	Tonil Maharjan	TRDC/FNBI	9841516676
4	Binay Kumar Yadav	Jankpur Brick Industry Association	9854021616
5	Santosh Gautam	FNBI	9842411406
6	Suyesh Prajapati	MinErgy	9849977784
7	Badri Karki	FNBI	9841374925
8	Devendra Maharjan	Kathmandu Brick Industry Association	9851038812
9	Sagar Adhikari	MinErgy	9841824956
10	Ganesh Pachhera	FNBI	9813758925
11	Gopal Maharjan	FNBI	9841677726

12	Nabin Chaudhary	Yours' Technology	9851158091
13	Arjun Kumar Mandal	CSIO, Janakpur	9807725404
14	Surya Nath Yadav	Bikas Itta Udhyog, Dhanusa	041-522742
15	Bijay Kumar Shah	Jay Maa Itta Udhyog, Dhanusa	9844026268
16	Sitaram Prasad Upadhyaya	Baba Itta Udhyog, Bara	9845022009
17	Pradeep Yadav	New Sonu Itta Udhyog	9855025720
18	Ram Dayal Shah	New Sonu Itta Udhyog	9855028723
19	Nawadeep Das	Amar Itta Udhyog, Sarlahi	9854037872
20	Nagendra Prasad Das	Amar Itta Udhyog, Sarlahi	9854035773
21	Birendra Prasad Shah	ABS Itta Udhyog, Bara	9855026653
22	Suresh Kumar Chauhan	Neha Itta Udhyog, Parsa	9855033068
23	Janki Ram Shah	Maa Itta Udhyog, Janakpur	9854021474
24	Anil Kumar yadav	Prabhu Ram Itta Udhyog, Dhanusa	9813007065
25	Lal Babu Yadav	ACC Itta Udhyog	9844031415
26	Vijay Singh		
27	Dipesh Ray	Yours' Technology	9844433742
28	Saroj Kumar Yadav	Yadav Itta Udhyog, Parsa	9845428054
29	Sanjeev Mandal	Vivek Itta Udhyog	9854026656
30	Firoj Khan	Bara Parsa Brick Industry Asso.	
31	Phulchand Sarod	New Royal Brick Factpry, Mahottari	98158217018
32	Prabhu Shah	Shree Ram Itta Udhyog, Dhanusa	9854023746
33	Iliyakat Hussain	Royal Itta Udhyog, Mahottari	9854028586
34	Manoj Kumar Mahato	Manoj Itta Udhyog, Mahottari	9854021092
35	Ram Prasad Mahato	Krishna Fixed Itta Udhyog	9844271919
36	Sukha Ram Chaudhary	Jay Durga Itta Udhyog, Dhanusa	9844324030
37	Vaidhnath Shah	Labh Adhunik Fix Itta Udhyog, Dhanusa	9854024418
38	Jiwachha Shah	Ganesh Itta Udhyog, Dhausa	9854020840

39	Binod Shah	Namaste labh Itta Udhyog	9854028354
40	Ram Nath Raut	Ganga Fix Utta Udhyog	9854026000
41	Nawal Kishor Shah	Janta Itta Udhyog	9854052522
42	Manoj Kumar Mahato	TGFC Brick Factory	9854026971
43	Jogeshor Yadav	Dhanusa	9807645810
44	Sanjeev Chaudhary	Jaya Durga Itta Udhyog, Dhanusa	9844454819
45	Shiv Chandra Shah	Shiva Itta Udhyog, Mahottari	9854021962
46	Mohd. Azam Mansoor	Bhagwati Fixed Itta Udhyog, Dhanusa	9854027252
47	Hiralal Mahato	Roshan Itta Udhyog	9844031714
48	Mohd. Rawani Reza	New Royal Itta Udhyog, Mahottari	9845827018
49	Anil Kumar Yadav	Maharani Itta Udhyog, Dhanusa	9854026765
50	Mahendra Prasad Yadav	Jay Bhawani Itta Udhyog, Dhanusa	9854021615

Annex 3: Programme Schedule

Training on Cleaner Fired Clay Brick Production Practices

Programme Schedule

Day 1	**9.00 - 10.00**	**10.00 - 10.30**	**10.30 - 11.30**	**11.30 - 13.00**	**13.00 - 14.00**	**14.00 - 15.00**	**15.00 – 15.30**	**15.30-16.30**
	Inauguration	Tea break	M1: Brick Firing, Fuel and Combustion (BP)	M3: Clay Preparation, Drying and Brick Size (SP)	Lunch	M4: Best Practices in Operation (Straight Line and Zigzag) (BP)	Tea break	M9: Mechanization (SP)
Day2	**9.00 - 10.30**		**10.30 - 11.00**	**11.30 - 13.00**	**13.00 - 14.00**	**14.00 - 15.00**	**15.00 - 15.30**	**16.00 – 20.00**
	M2: Zigzag Stacking Pattern(Natural and Induced) (SG)		Tea break	M5: Firing Theory (SG)	Lunch	M10: Policy (OCSI)	M10: Software and Data Management (NC)	M2 & M5: **Practical** - Zigzag Stacking Pattern (Natural and Induced) & Firing (SG)
Day 3	**9.00 - 10.00**	**10.00 - 11.00**	**11.00 - 11.30**	**11.30 - 12.30**	**12.30 - 13.30**			
	M6: Kiln design, Layout, Retrofitting and Planning (TM)	M8: Occupational Health Safety and Environment (SA)	Tea break	M7: Kiln Management (TM)	Lunch			

BP: Bhishma Pandit; SP: Suyesh Prajapati; TM: Tonil Maharjan; SA: Sagar Adhikary; SG: Santosh Gautam; NC: Nabin Chaudha; DM: Devendra Maharja; SPU: Sitaram Prasad Upadhyaya

Annex 4: Evaluation Form

तालिम/कार्यशाला मुल्याङ्कन फारम

विषय	सफा इटा उत्पादनका लागि अभ्यास तालिम
मिति	फागुन २९- चैत्र १, २०७२
आयोजक	नेपाल इटा उद्योग महासंघ र मिनर्जी प्रा लि

कृपया तल प्रस्तुत गरिएका सुचीहरुमा आफूलाई उपयुक्त लागेको अंकलाई गोलो घेरा लगाईदिनुहोला । ५ अंकले सबै भन्दा उत्तम र १ अंकले कम/खराब भन्ने जनाउँछ ।

पाठ्यक्रम		कम				बढी/राम्रो/अतिराम्रो
1.	प्रस्तुतीहरुको सान्दर्भिकता र पर्याप्तता	1	2	3	4	5
2.	वितरित तालिमका सामग्रीहरुको पर्याप्तता र उपयोगिता	1	2	3	4	5
3.	तालिम कोर्सको उपयुक्त ब्यवस्थापन	1	2	3	4	5
4.	तालिममा सिकेका ज्ञान सिप र अवधारणालाई व्यवहारमा प्रयोग गर्न सक्ने क्षमता	1	2	3	4	5
5.	स्थलगत भ्रमणले तालिमको उदेश्य पुर्ति गर्न कत्तिको सहयोग भयो ?	1	2	3	4	5
6.	तालिमको अवधि	1	2	3	4	5
स्रोत ब्यक्ति (Resource Person)		कम				बढी/राम्रो/अतिराम्रो
7.	समग्र प्रस्तुति र प्रस्तुतकर्ताको गुणस्तरियता	1	2	3	4	5

8.	प्रस्तुतिहरुमा रोचकता र प्रयोगात्मक पक्ष	1	2	3	4	5
9.	तालिममा उपस्थित ब्यक्ति र प्रस्तुतकर्तासंगको प्रश्नोत्तर सहभागिता र उत्साहजनक सहभागिता	1	2	3	4	5
10.	प्रश्नोत्तरका लागि छुट्याईएको समयको पर्याप्तता र प्राप्त जवाफमा स्पष्टता	1	2	3	4	5

		कम			बढी/राम्रो/अतिराम्रो	
	कार्यक्रम व्यवस्थापन					
11.	तालिम/कार्यशाला संचालन	1	2	3	4	5
12.	बासको प्रबन्ध	1	2	3	4	5
13.	स्थलगत भ्रमणको लागी यातायातको सुविधा	1	2	3	4	5
14.	खानाको प्रबन्ध	1	2	3	4	5

	तालिम संग मात्र सम्बन्धित प्रश्नहरु	कम			बढी/राम्रो/अतिराम्रो	
15.	समग्रमा यो तालिमलाई कसरी मुल्याङ्कन गर्नुहुन्छ ?	1	2	3	4	5
16.	यो तालिम मेरोलागि उपयोगी छ र म यहाा बाट फर्केपछि तालिममा सिकेका ज्ञान र सिप मेरा कर्मचारीहरुसंग सह कार्य गरेर प्रयोगमा ल्याउाछु ।	1	2	3	4	5

थप टिप्पणी

1. यो तालिमले तपाईको अपेक्षा पुर्ति भयो ? भयो भने या भएन भने कसरी ? कृपया उल्लेख गर्नुहोला ।

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2. यो तालिमबाट तपाईले के प्राप्त गर्नुभयो ? कुनै ३ मुख्य उपलब्धिहरु सुचिबद्ध गरिदिनुहोस ।

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3. यस तालिमबाट तपाईलाई कुन पक्ष सबैभन्दा बढी उपलब्धिमुलक लाग्यो ? र कुन पक्ष कम उपलब्धिमुलक लाग्यो ?

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4. यस तालिमलाई अझ सशक्त बनाउन के कुरा थप वा परिवर्तन गर्नुपर्ला ?

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5. तपाईलाई तालिमको कुन पक्ष/पाठ्यक्रम / प्रसङ्ग मा अझ बढी जानकारी चाहिन्छ ?

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6. आफ्नो उद्योगमा कुन पक्ष यान्त्रिकरण गर्न चाहनुहुन्छ ?

7. अन्य केही टिप्पणी / विचार

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Annex 5: Some Photographs

Photograph 1: Inauguration of the training programme

Photograph 2: Participants of the training programme

Photograph 3: Discussion session during the training

Photograph 4: Practical demonstration of zigzag stacking

Photograph 5: Temperature measurement of firing zone

Photograph 6: Certificate distribution to participant

Photograph 7: Closing ceremony