Federal Ministry
for Economic Cooperation
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Regional Dialogue - Report

Regional Dialogue on Energy Efficiency in the Brick Industry
In the frame of the GIZ Programme
"Regional Energy Efficiency Programme (REEP)"

Gesellschaft für Internationale Zusammenarbeit (GIZ)

On behalf of the Federal Ministry for Economic Cooperation and Development

Gazipur, Bangladesh, 22 to 24 May 2012

Commissioned by
GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit gGmbH)

Report prepared by
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Content

Introduction

In the South Asian region the brick-producing sector is responsible for a significant share of GHG emissions. In India for instance, according to UNDP, the total carbon dioxide emissions from brick production are estimated at 41.6 million tonnes per year or equivalent to 4.5 per cent of India's total GHG emissions. Successful climate mitigation and energy efficiency policy must therefore address the brick sector and enhance the energy efficiency (EE) of the sector.

Energy savings can be obtained by two means. First, the production processes of brick kilns can be improved energy-wise. Second, the manufacturing and usage of new, non-traditional and green types of bricks (e.g. hollow bricks) leads to significant energy savings. The manufacturing of green bricks requires less resources and energy and usage of green bricks reduces the energy consumption of the buildings sector due to better thermal insulation.

However, the construction sector in the South Asian region still mainly uses traditional construction materials, i.e. brick or stone masonry. Green bricks (e.g. hollow bricks) as construction material are used very infrequently since only limited trust is given to them with regards to the steadiness of hollow brick walls. Additionally, brick kilns in the region simply have too little experience with green bricks and therefore stick to traditional bricks. Even though there were good reasons to opt for brick masonry in earlier days when the walls were load-bearing walls and hence the focal requirements for walls were steadiness, nowadays new construction technologies use framed structures, where all the load of a building is borne by columns and beams. Also the hollow bricks technology has improved considerably and hollow brick walls meet all required safety standards.

Objective

The objective of the dialogue was to initiate a discourse and exchange of best energy efficiency practices in the brick industry. The focus was on (available) technology, political framework conditions, and awareness raising and marketing. These areas are seen as the most important challenges for increasing the energy efficiency of the sector.

Approach of the Regional Dialogue

The dialogue provided a platform for the participants to discuss important issues and to learn about recent developments in the field of EE in the brick industry. Experts with various professional backgrounds (e.g. energy efficient technologies, brick production, brick application) shared their experiences with the participants and made a contribution to the important and intended knowledge transfer. Best practice examples in the field of energy efficiency were showcased and a relevant site visit was also part of the concept. Generally, different format and methodologies have been used for the session, to offer an interesting and diversified agenda. Methods ranged from usual panel presentations to innovative learning concepts as e.g. poster presentation sessions or plenum brainstorming.

Networking

The Regional Dialogue was designed to give enough space for networking between the participants and exchange off the boardroom sessions. The participants from Bangladesh, India and Nepal were requested to interact and collaborate.

Participants

Around forty participants of relevant target institutions in Bangladesh, India, and Nepal, as well as (international) experts with project experience with regards to EE in the brick industry attended the dialogue in Gazipur. The participants represented governmental institutions, the private sector, research institutes and associations. See Annex 1 for participants list.

Regional Dialogue – Overal Findings

While the Regional Dialogue on Energy Efficiency in the Brick Industry served as an open platform for knowledge sharing, experience exchange, dialogue and discussion, and not intending to present one single solution or to formulate a common strategy, several key findings were identified during the workshop:

- Bangladesh, India, and Nepal have already put strong efforts in improving the EE of the brick industry and a number of projects have been implemented in all three target countries.
- In spite of the EE improvement efforts over the last years, there is still much potential for energy saving in the region. Especially energy efficient hollow and perforated bricks are still hardly used in the construction sector in Bangladesh, Nepal, and India.
- In order to foster the diffusion of energy efficient brick making and bricks technology, transfer of technologies alone is insufficient. A holistic approach was demanded by the participants, involving capacity development, awareness raising, and promotion of a coherent and comprehensive legal framework.
- It was emphasised that local conditions have to be encountered. Technologies which might be adequate at a certain location might not be the best solutions for other areas.
- All participants agreed that experience and knowledge exchange in all the addressed areas, namely technology, political framework, and awareness raising has been achieved.
- The Regional dialogue is seen as a first important step for knowledge and experience exchange in the region's sector. In order to continue the dialogue, the participants are requested to further cooperate. A second Regional Dialogue under REEP could be one contributor to pursue the objective of constant exchange.

Dialogue Summary

The workshop format included many group work and interactive sessions that were partly conducted in parallel. Hence it is far out of the scope of this report to present all the issues discussed during the entire two days of the event. In the following, the rough contents of the individual sessions will be presented and most crucial results highlighted. For additional information please refer to the PowerPoint presentations attached in a separate document. Further, after each group work session the participants were asked to collect the major results on pinboards and flipcharts. Pictures of the final boards and flipcharts can be found in Annex 2.

Day One: Opening Panel, Brick Technology and Poster Session

Session 1: Welcome, Opening Panel and Forming of Country Groups

Session Overview:

The opening panel set the tone for the Regional Dialogue and introduced potentials of EE in the bricks industry. The input presentations drew a first picture of developments and challenges for EE in the sector and briefly touched upon topics that were discussed in the following sessions of the event.

Key Topics of the Opening Panel:

- Energy consumption and the importance of energy efficiency in the brick industry
- Potentials for energy savings in the bricks sector
- Summary of developments and challenges of EE in the bricks producing sector

09.00 – 09.30	**Registration of Participants**
09.30 – 10.00	**Welcome by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** Mr. Otto Gomm, GIZ Bangladesh - Sustainable Energy for Development (SED), Programme Coordinator Dr. Christine Bigdon, GIZ India- Human Capacity Development, Director

The event was officially opened by a welcome speech of the host Mr. Erich Otto Gomm, the coordinator of the Sustainable Energy for Development (SED) Programme, GIZ Bangladesh. Mr. Gomm welcomed the participants to Bangladesh and thanked them for taking part in the Regional Dialogue. He stated that he expects two days of interactive discussions and experience exchange in a perfect setting.

As director of the Regional Energy Efficiency Programme (REEP), Dr. Christine Bigdon from Human Capacity Development, GIZ India, took the opportunity to welcome the participants. In addition to giving a short introduction to REEP, she particularly emphasized the energy intensity and importance of the brick industry for energy conservation in all three target countries of REEP, namely Bangladesh, India and Nepal.

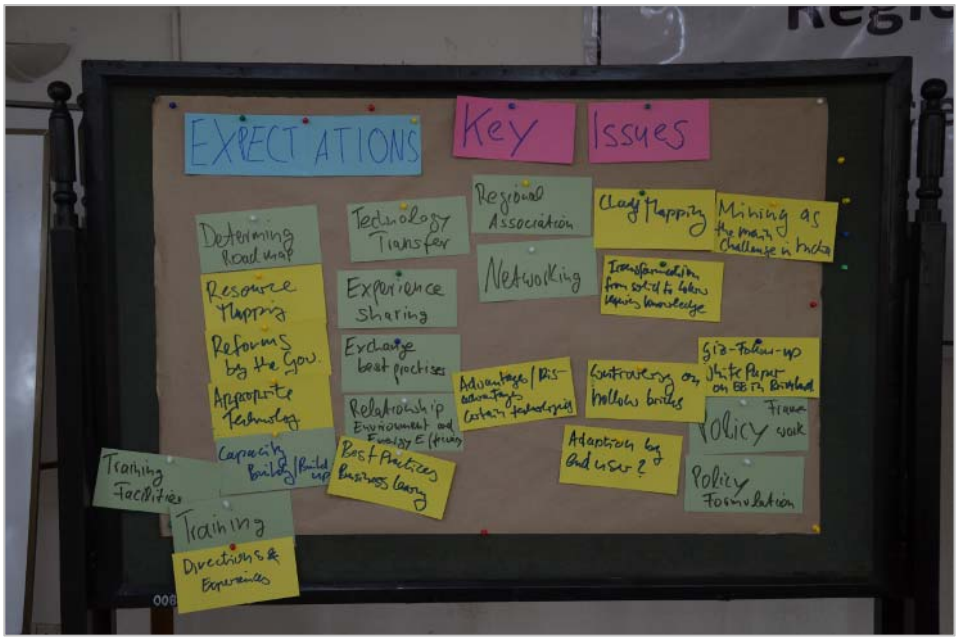
Concluding the welcoming, the moderator of the Regional Dialogue Mr. Mikael Henzler, adelphi, also addressed some opening words to the participants. He introduced to the formalities and to the approach of the event. In a brief first exercise he asked the participants to indicate, which sector they represent. It turned out that all important sectors were almost equally represented at the dialogue: entrepreneurs from the private sector, representatives from the Government, researchers, representatives from associations, and consultants active in the field.

10.00 – 10.45	**Opening Panel:** ***Current status, potentials and bottlenecks for EE in the brick industry*** Dr. Sameer Maithel, Greentech Knowledge Solutions, India Mr. Suresh Shrestha, WECS, Nepal Mr. Mahmood Hasan Khan, Department of Environment, Bangladesh

For the Opening Panel, Mr. Henzler welcomed and introduced Dr. Sameer Maithel, Greentech Knowledge Solutions, India, Mr. Suresh Shrestha, WECS, Nepal, and Mr. Mahmood Hasan Khan, Department of Environment, Bangladesh. The speakers were asked to set the tone for the event and to share their extensive experience in the brick industry and the field of energy efficiency with the participants of the Regional Dialogue. The panelists gave a brief overview of the status quo situation of the brick sector in the respective country. Dr. Maithel stressed that the Indian brick sector is among the country's biggest industrial sectors. Approximately 100,000 brick kilns in the country produce roughly 150 billion bricks per annum and provide job opportunities for around 10 million workers, mostly in rural areas. Over the last decade a total shift from bricks with moving chimneys to fixed chimneys industry was achieved that lead to around 10-15 % of energy savings. The implementation of further EE improvement measures in the sector leads to another 10-15 % of energy savings, which by today are only tapped to a small degree. Dr. Maithel also emphasized the importance to not only improve the brick kilns energy-wise, but also to promote the usage of energy efficient bricks, particularly hollow bricks, which have a market share in India of only around 0.1 %. To achieve further improvement with respect to EE in the brick sector, he mentioned that comprehensive regulations, provision of state-of-the-art technology and awareness raising are required. Mr. Suresh Shrestha shared some figures describing the Nepalese brick sector with the plenum. He mentioned that around 700 brick kilns are operating in Nepal, of which only the half is officially registered. Although many of the brick kilns in Nepal have shifted from moving to fixed

chimneys within the last years, still a few kilns operate at very low energy efficiency rates and the potential of the sector's energy savings is estimated at around 25 %. Mr. Hasan Khan stated that since early 2000, all brick kilns shifted from moving to fixed chimneys in Bangladesh. In order to further improve the EE of the brick sector, but also social working conditions, the Bangladeshi government aims to replace all fixed chimney brick kilns by more energy efficient brick kiln technologies. However, he had to admit that the enforcement of this regulation might be problematic and still technological and educational capacities have to be developed within the brick sector.

10.45 - 11.45	**Forming Country Working Groups and Expressing of Dialogue Expectations**



After the opening Panel Mr. Henzler asked to participants to sit together in country groups and discuss about the expectations towards the Regional Dialogue and the key issues that shall be dealt with during the event. After a lively exchange within the groups, country group speakers presented the results of the discussions. The results were collected on pin boards (see picture above) to enable an assessment at the end of the two days, whether the expectation could have been met.



11.45 – 12.00	**Tea Break**

Session 2: Brick Technology - Energy Efficiency in Production and Usage of Energy Efficient Bricks

Session Overview:

The session aimed to give an overview on EE technologies in the brick producing industry. Focus was not only be put on production technologies, but also on the existing variety of resource and energy efficient kilns (e.g. hollow bricks) and their scope of usage in order to increase EE in buildings.

Key Topics

- Energy efficient brick kiln technologies (VSBK, HHK etc.)
- Measures to improve the thermal performance of existing kilns
- Production and scope of usage of resource efficient bricks (hollow bricks etc.)

12.00 – 13.30	**Presentations and Plenum Discussion:** ***Best practice examples of EE brick making technologies*** Mr Sabu Hussain, Clean Energy Alternatives, Bangladesch Mr. Alex Arter, ENTEC, Switzerland ***Advantages and scope of application of resource and energy efficient bricks*** Prof Xiao, Xi'an Institute, China

After the tea break, three international experts shared their experiences on best practice examples of energy efficient brick making and brick using technologies. Mr. Sabu Hussain introduced to several brick kiln technologies existing in Bangladesh, from energy intensive traditional kilns (Fixed Chimney Kilns + Bull Trench Kilns) to more EE and state of the art technologies as Zigzag, Hybrid Hofmann and Tunnel Kilns, which are very rare in the country. Further details for this presentation as well as for all the other PPTs presented on the Regional dialogue, can be found in the attached documents. Mr. Alex Arter, ENTEC, Switzerland, presented the extensive implementation of Vertical Shaft Brick Kiln (VSBK) and Tunnel Brick Kiln technologies in Vietnam, as well as the advantages and downsides of both technologies. Both technologies have in common that they are significantly more energy efficient as traditional brick making technology. The last panelist of the session, Prof. Xiao from the Xi'an Institute in China addressed both main areas of the Regional Dialogue, the production and usage of EE bricks. He presented energy efficient hollow bricks and perforated bricks, as well as Hybrid Hofmann Kiln (HHK) and tunnel brick technologies that are used and operated in China.

The presentations were followed by many technical questions regarding the showcased technologies.

13.30 – 14.30	**Lunch Break**

Session 3: Poster Presentation of Brick Kilns and Bricks Projects

Session Overview:

The session provided the opportunity for four key experts to showcase research, marketing and implementation activities in the field of EE brick production. The format offered an interactive way to actively involve all participants in the session.

Key Topics

- Demonstration of best practice project/activities examples
- Awareness raising in the field of EE brick industry
- Emphasises of the success factors for best practice examples
- Demonstration of energy and resource efficient bricks as business case

14.30 – 16.10	**Poster Presentations of Best Practice Examples / Business Cases for EE in the Brick Industry Sector and Group Work** Mr. Pandit Bhishma, GIZ/Integration, Nepal Mr. Kundan Dhige, Wienerberger, India Ms. Shaila Jamal, Clean Energy Alternatives (CEA), Bangladesh Mr. Pritpal Singh, Punjab State Council for Science and Technology, India

In the afternoon of day one of the Regional Dialogue, a very innovative and interactive format was applied. Several weeks before the event, selected participants have been asked to present best practice projects, business cases and other best practice examples in the field of the brick industry. In cooperation with adelphi, four presenters prepared posters with standardized contents on which key information of their best practice examples were summarized (the four posters can be found in Annex 3). During the poster presentation session, the posters were presented to the participants in smaller groups, in order to provide enough room for questions to the poster presenter. To learn for their own projects and daily work, the smaller groups were asked to particularly find out about the key stakeholders, common barriers and solutions, key lesson learned, and success factors of the presented best practice examples. After the presentations, the small groups had some time to discuss on these four issues.

16.10 - 16.30	**Tea Break**

16.30 – 17.15	**Presentation of Group Results**

After the tea break, the groups were asked to briefly present their results of the group work. Following features were identified as the most important and/or common elements of the best practices presented:

Common Barriers

- *No Access to Technology*
- *Financial Barriers (lack of financing)*
- *Cultural Barriers*
- *Absence of Technology Chatrooms*
- *Capacity Building missing*
- *Lack of Standardization*
- *What comes after projects (Sustainability)?*
- *Project Duration (<5 years)*
- *Labor Conditions are neglected*
- *Lack in User-Friendliness of the product*
- *Dependence on Technology*

Key Stakeholders

- *Policy Makers*
- *Leading Entrepreneurs*
- *End-Users*
- *Media*
- *Architects*
- *Laborer*
- *Manufactures*
- *Financial Institutions*

Key Lessons

- *Know-How transfer required*
- *Social Factors are crucial*
- *Demonstration and Dissemination of utmost importance*
- *Capacity Building is needed*
- *Need for „Hand Holding“ Support to Entrepreneurs*
- *Interaction between all Stakeholders required*

Success Factors

- *Involvement and Commitment (to overcome Barriers) of Stakeholder*
- *Demonstration of Advantages of Good Quality Bricks (resource efficiency)*
- *Demonstration + Awareness among Stakeholders*
- *Clear Goals/Objectives*
- *Communication on Usage and Maintenance of Technology*
- *Long Term Experience very valuable*

Day Two: Political Framework Conditions, Awareness Raising and Final Session

9.30 – 10.00	**Recap of Day 1 by Country Groups**

Session 4: Political Framework Conditions

Session Overview

Review of country specific political conditions for brick production in Bangladesh, India and Nepal. Identification of political barriers that hinder the distribution of energy efficiency brick production technologies and broader use of energy efficient brick kilns.

Key Topics

- Certification systems for bricks
- Legislative binding regulations for brick kilns and bricks
- Identification and handling of barriers for energy efficient brick kilns
- Recommendations for implementing energy efficient brick kilns

10.00 – 11.00	**Panel Discussion** ***Which legislative conditions hinder the application of EE production technologies and production of EE bricks?*** Mr. Sachin Kumar, The Energy and Resource Institute (TERI), India Mr. Khursheed-Ul-Islam, SED/GIZ, Bangladesh Mr. Sushil Kumar Shah, Department of Cottage and Small Industries, Nepal

In order to smoothly find into the topic again, the second day started with a recap of day one of the Regional Dialogue. Three nominated speakers from the country groups presented their views of the first day. After this starting exercise, the first session of the day addressed the legal framework conditions. Panelists from all three target countries presented the legal conditions that either promote or impede the energy efficiency of the brick sector. Mr. Sachin Kumar from The Energy and Resource Institute (TERI) India started and gave an overview on the extensive set of Indian norms and regulations, which either directly or indirectly influence the energy efficiency of the brick producing sector, but also the usage of bricks for construction. He concluded his statement by mentioning areas, such as standardization, financing, training etc., in which political intervention is required to foster the EE of the sector. Mr. Kumar presentation was followed by an illustration of the legal situation in Nepal, given by Mr. Sushil Kumar Shah, Department of Cottage and Small Industries, Nepal. He mentioned that also in Nepal several environmental norms and standards with regards to technical requirements apply to the brick making industry. These standards, as well as further hurdles for more EE in the sector are listed in the attached PPT. As last speaker on the panel, Mr. Khursheed-Ul-Islam, SED/GIZ, Bangladesh, described

the efforts of the Government of Bangladesh to establish the Sustainable and Renewable Energy Development Agency (SREDA). The agency would be founded within the next weeks and in future advise the Bangladesh Government and implement energy efficiency projects in the country, among them projects in the brick sector. Mr. Kursheed-Ul-Islams presentation was complemented by some additional information from Mr. Mahmood Hasan Khan, Department of Environment, Bangladesh. He stated the above mentioned upcoming law, which bans all traditional kilns by September 2012.



11.00 – 11.30	**Tea break**

11.30 – 12.30	**Plenum brainstorming on legislative framework conditions**

After a short tea break, the methodology of an open plenum brainstorming was applied, to deeper discuss about potential legislative instrument to foster energy efficiency in the brick sector. The plenum was asked to brainstorm and collect any instruments, which would lead to an improvement of the sector. In order to improve the EE of the brick industry following instruments were proposed:

- Unified and coherent regulations, including standards for brick making and brick usage
- Emission factors and classification of industries
- Training programmes and technical assistance (to enable the selection of appropriate technology)
- Awareness raising instruments and highlighting of best practices
- (Financial) incentives as tax reduction etc. and innovative financing mechanisms

All instruments, including the advantages and downsides of political intervention at the sector, were discussed. Although the participants found that the advantages (overcoming of market failures, increasing trust and reliability of stakeholders etc.) outweigh the disadvantages, some potential negative aspects were identified, e.g. unjustified market protection for certain products, over average required efforts for small scale units to apply to standards and regulation etc. Additionally the problem of a huge variety of different products and material, as well as potential overbearing of ministries were mentioned as barriers for setting up a coherent legislation.

12.30 – 13.30	**Lunch Break**

Session 5: Awareness Raising and Marketing

Session Overview:

Review of need for awareness raising and identification of awareness raising instruments. Different groups of stakeholders were identified (kilns owners, end consumer of bricks etc.) and discussed.

Key Topics

- Identification of awareness raising instruments
- Identification of starting points
- Variety of stakeholders/target groups and different requirements

13.30 – 15.00	**Plenum Discussion and Working in Small Groups:** ***Which target groups have to be approached (producers and consumers) and what kind of awareness raising strategies/instruments can be used?***

For the second to last session, the participants were asked again to sit together in four working groups. Each group had the task to think about appropriate marketing and awareness raising instrument for one particular stakeholder group, namely brick kiln owners, policy makers, architects and developers, and end consumers. The results of the four groups clearly showed that each of the stakeholder groups under discussion has particular characteristics, different interests and specific needs. Hence marketing and awareness raising for more EE in the brick sector requires a broad range of diverse marketing and promotion instruments. Nevertheless, all four groups stressed that providing adequate and proper information is the basis for successful marketing and awareness raising and preparation of information material as studies, leaflets, brochures etc. are most crucial to move the stakeholders to take actions for fostering more EE in the

sector. The detailed group discussion results are presented in Annex 2.




15:00 – 15:15	**Tea Break**

Session 6: Final Session / Conclusion

Objective

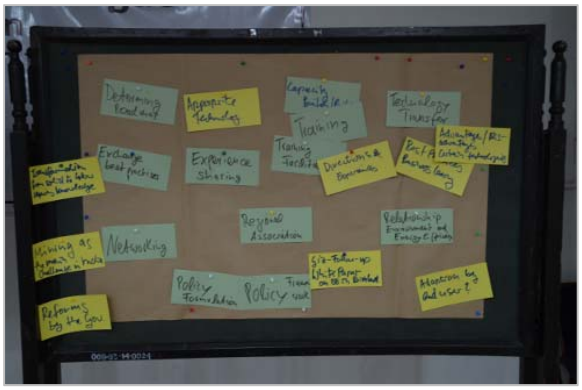
Summary of key lessons learnt of the dialogue and identify recommendation for future project/programme design and cooperation.

15.15 – 16.45	**Internal Country Groups Discussion on Potentials for Follow-ups with GIZ Representatives**

In order to increase the impact and outreach of the Regional Dialogue on Energy Efficiency in the Brick Industry, the country groups were asked a last time to sit together and to discuss together with one GIZ country office representative about the lessons learned and possible follow-up of the event. In general, all country groups came to the conclusion that some of the lessons learnt of the event could immediately be transported to the brick sector and have some impact on the daily work. Other issues are rather suited to influence the sector in the middle to long term. Several follow-up actions were proposed and can be found in Annex 2. Particularly the demand for a second Regional Dialogue on Energy Efficiency in the Brick Sector was announced from several participants.

16.45 – 17.50	**Final Discussions and Evaluation of the Dialouge**

In order to check whether the expectations of the participants towards the Regional dialogue have been met, the moderator Mr. Henzler asked the participants to come back to the "expectation and key issues" wish list that was prepared at the very beginning of the two days. Each wish/expectations was judged and the plenum asked whether the expectation was met or the topic was adequately discussed. Below the results of the rapid assessment are showed. The left, almost empty board contains the topics, which have not or not intensively enough been addressed. The right board contains all the fulfilled wishes and expectations. Summarized, the event overwhelmingly met the expectations of the participants.



Additionally, the participants were also asked to give open and anonymous feedback. Four participants shared their impressions of the workshop and all of them found the Regional Dialogue very successful. Particularly the overall organization and the mixture of different session formats were stated as important success factors for the event. Only two points

were mentioned as minor downsides of the event. First, one participant would have liked to discuss more on social issues of the brick sector. Even though, the Regional Dialogue was designed to address the EE side of the sector, social factors are of crucial importance in the brick industry as well. This should be incorporated in future events. Second, the quite remote location of the dialogue venue in the outskirts of Dhaka was regarded as small downside.

17.45 – 18.00	**Closing Remarks** Dr. Christine Bigdon, GIZ India- Human Capacity Development, Director

The director of the Regional Energy Efficiency Programme, Dr. Christine Bigdon closed the two days Regional Dialogue. She summarized the event as a real success story and found that all objectives of the dialogue, namely the intensive exchange of knowledge and experience, have been achieved. She eventually thanked all the speakers, participants, as well as the organizing staff from GIZ Bangladesh, India and Nepal, and the team from adelphi for contributing to the successful implementation of the event.

Annex

Annex 1: Participants list

No	Title	First Name	Name	Organization	Country
1	Mr.	Nawsher	Ahmed	Ministry of Finance	Bangladesh
2	Mr.	Zebun Nasker	Ahmed	Department of Architecture (BUET)	Bangladesh
3	Mr.	Johannes	Alexeew	Adelphi	Germany
4	Mr.	Alex	Arter	ENTEC, Vietnam	Vietnam
5	Mr.	Shajal	Baswash	KEL. Sylhet	Bangladesh
6	Mr.	Pandit	Bhishma	GIZ, Nepal	Nepal
7	Dr.	Christine	Bigdon	GIZ, India	India
8	Mr.	Arvinder Singh	Chamak	All India Brick & Tile Manufactures Federation (AIBTMF)	India
9	Mr.	Shankur Bahadur	Chand	Modern Research and Development in Brick Sector	Nepal
10	Mr.	Mahendra Bahadur	Chitrakar	Federation of Brick Industry Association	Nepal
11	Mr.	Hisham	Chisty	Clean Energy Alternatives (CEA)	Bangladesh
12	Mr.	Kundan	Dighe	Wienerberger Brick Industry Pvt. Ltd.	India
13	Mr.	Badlani	Dishant	Prayag Clay Products Pvt. Ltd.	India
14	Mr.	Anil Shankar	Giri	FNCCI, Environment Forum	Nepal
15	Mr.	Sanjay	Giri	FNCCI, Environment Forum	Nepal
16	Mr.	Otto	Gomm	GIZ, Bangladesh	Bangladesh
17	Mr.	Shamim	Hasan	Department of Environment (DoE)	Bangladesh
18	Mr.	Tarun	Hemrajini	Jay Jalaram Brick Works	India
19	Mr.	Mikael	Henzler	adelphi	Germany
20	Mr.	Iftikhar Sabu	Hussain	Clean Energy Alternatives (CEA)	Bangladesh
21	Dr.	Khursheedul	Islam	GIZ, Bangladesh	Bangladesh
22	Ms.	Shaila	Jamal	Clean Energy Alternatives (CEA)	Bangladesh

No	Title	First Name	Name	Organization	Country
23	Ms.	Sun	Jiz	Xi'an Institute	China
24	Mr.	Wahiduzzaman	Kallol	Clean Energy Alternatives (CEA)	Bangladesh
25	Mr.	Mahmood Hasan	Khan	Department of Environment (DoE)	Bangladesh
26	Mr.	Monayem	Khan	Bangladesh Brick Manufacturers' Association	Bangladesh
27	Mr.	Sachin	Kumar	TERI	India
28	Dr.	Uttam	Kunwar	Energy Efficiency Cell / FNCCI	Nepal
29	Mr.	Shyam	Maharjan	Modern Research and Development in Brick Sector	Nepal
30	Dr.	Sameer	Maithel	Greentech Knowledge Solutions (P) Ltd	India
31	Mr.	Muhammad Mamun	Miah	Minpur Chemie Works Ltd.	Bangladesh
32	Mr.	Najmul	Omam	BUET	Bangladesh
33	Mr.	Mustafiyn	Pah	GIZ	Bangladesh
34	Mr.	Nawaraj	Poudel	Nepal Brick Industry Association	Nepal
35	Mr.	Ronak	Prajapati	Harihar Bricks Company	India
36	Mr.	Asadur	Rahman	Bangladesh Brick Manufacturers' Association	Bangladesh
37	Dr.	Harunur	Rashid	Eco Bricks Limited	Bangladesh
38	Mr.	Rajan	Rawal	CEPT University	India
39	Mr.	Sushil Kumar	Shah Teli	Department of Cottage and Small Industries	Nepal
40	Mr.	Anita	Sharma	GIZ, India	India
41	Mr.	Sanjay Kumar	Sharma	GIZ, Nepal	Nepal
42	Mr.	Suresh	Shresta	WECS	Nepal
43	Mr.	Pritpal	Singh	Punjab State Council for Science and Technology	India
44	Mr.	Dilder Ahmed	Taufiq	GIZ, Bangladesh Office	Bangladesh
45	Mr.	Zheng	Wenheng	Xi'an Institute	China
46	Prof.	Hui	Xiao	Xi'an Institute	China

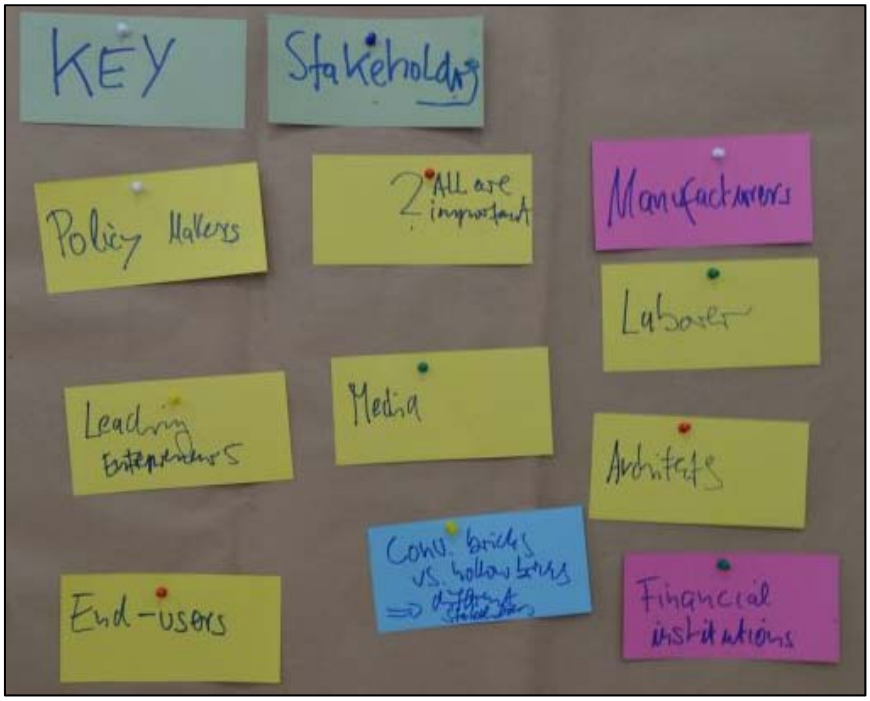
Annex 2: Pictures of group work results

Session 1: Welcome, Opening Panel and Forming of Country Groups:

Picture 1: Expectations and Key Issues

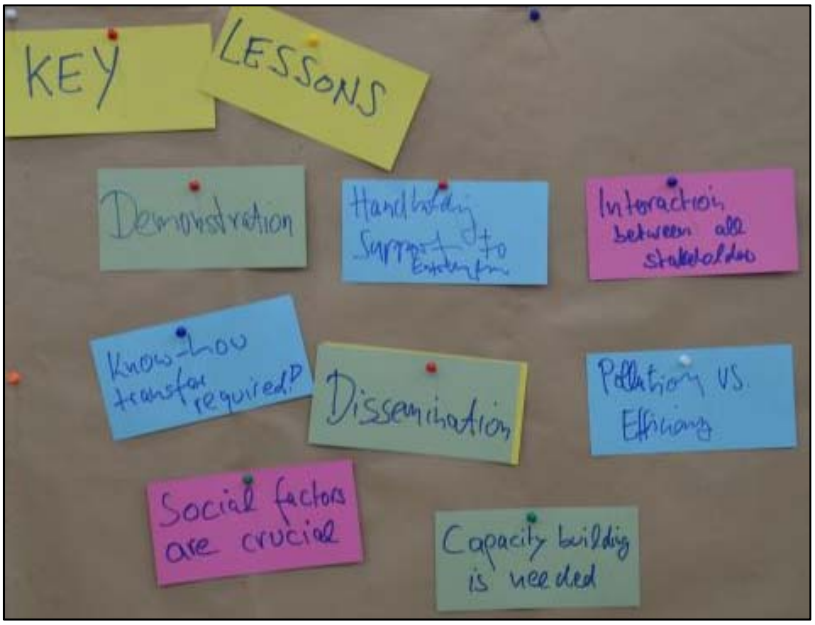
Session 3: Poster Presentation of Brick Kilns and Bricks Projects

Picture 2: Identified Key Stakeholder



Picture 3: Identified Common Barriers and Solutions

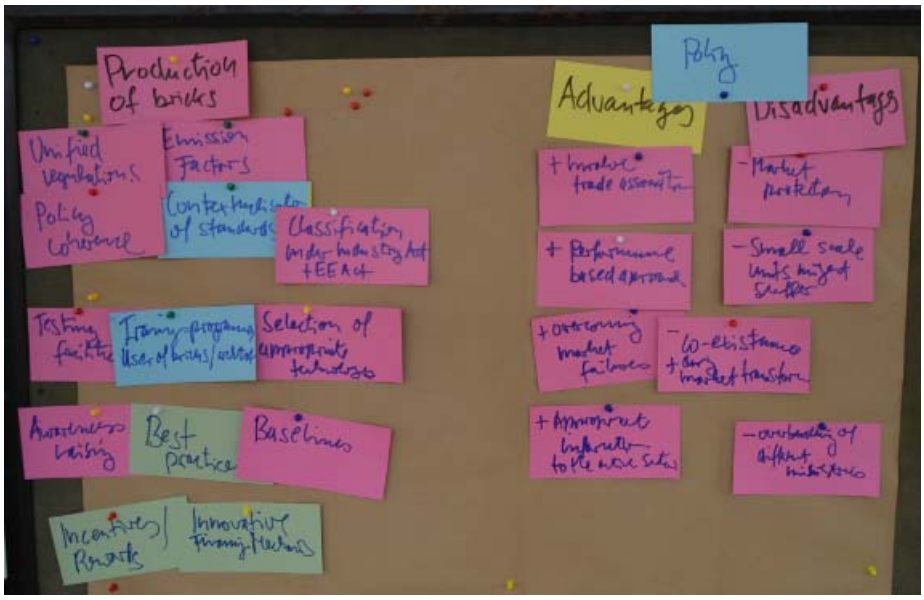
Picture 4: Identified Key Lessons



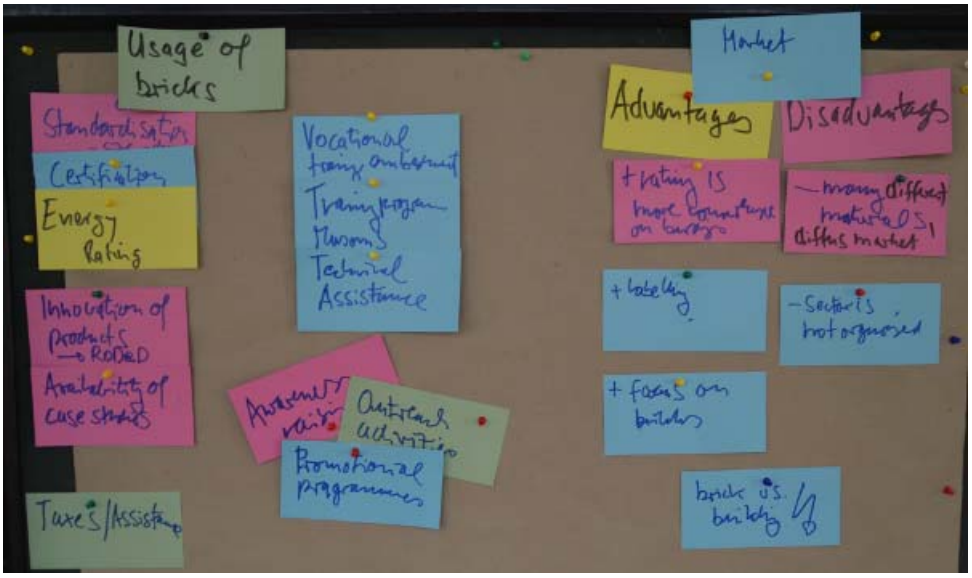
Picture 5: Identified Success Factors

Session 4: Political Framework Conditions

Picture 6: Plenum Brainstorming on legislative Framework Conditions (Production of Bricks)

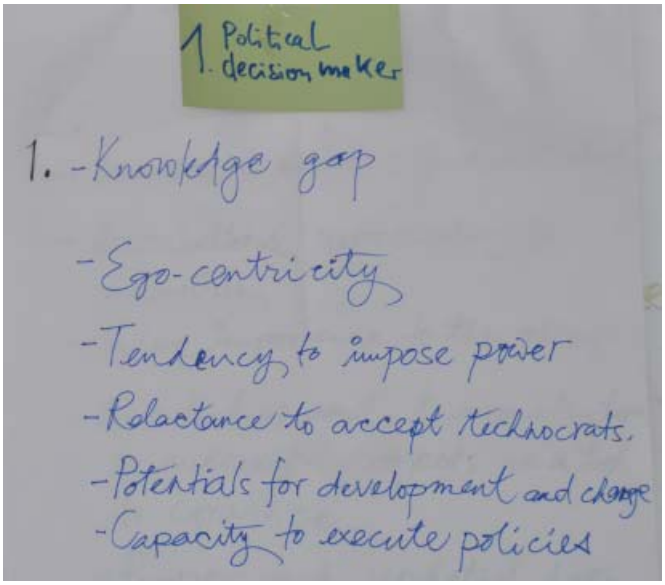


Picture 7: Plenum Brainstorming on legislative Framework Conditions (Usage of Bricks)

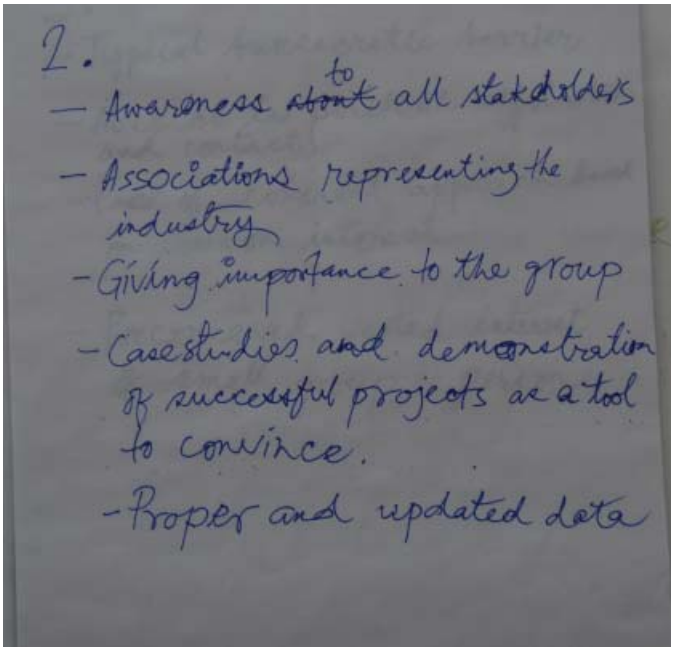


Session 5: Awareness Raising and Marketing

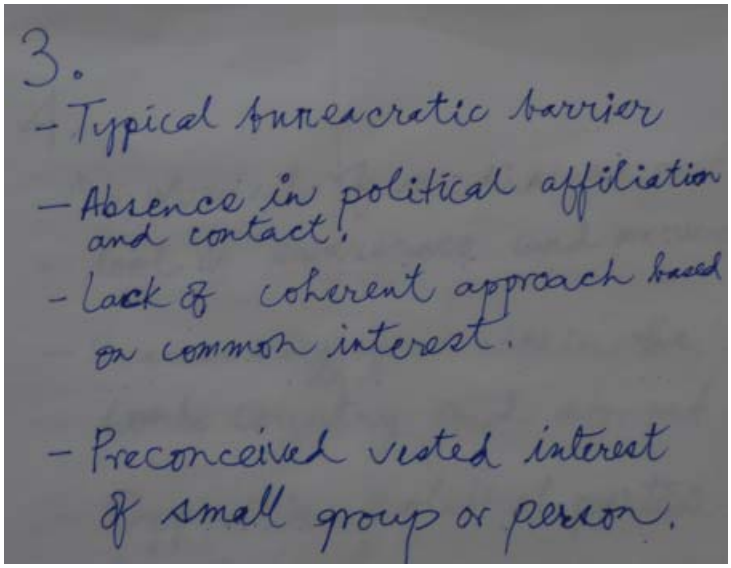
Picture 8: Political Decision Makers (Question 1)



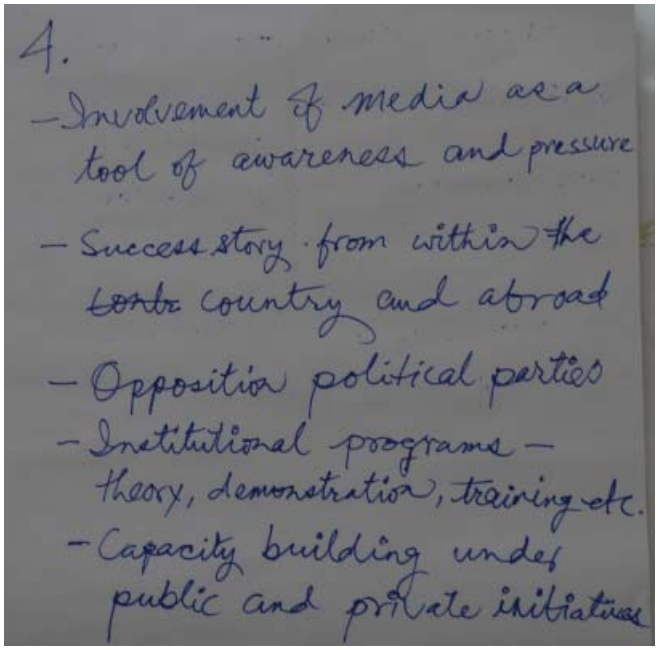
Picture 9: Political Decision Makers (Question 2)



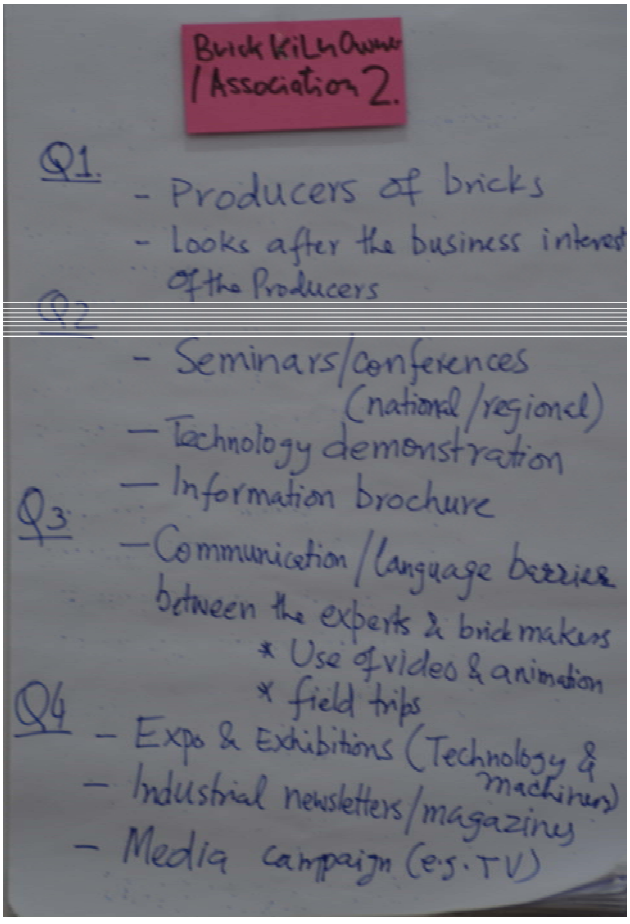
Picture 10: Political Decision Makers (Question 3)



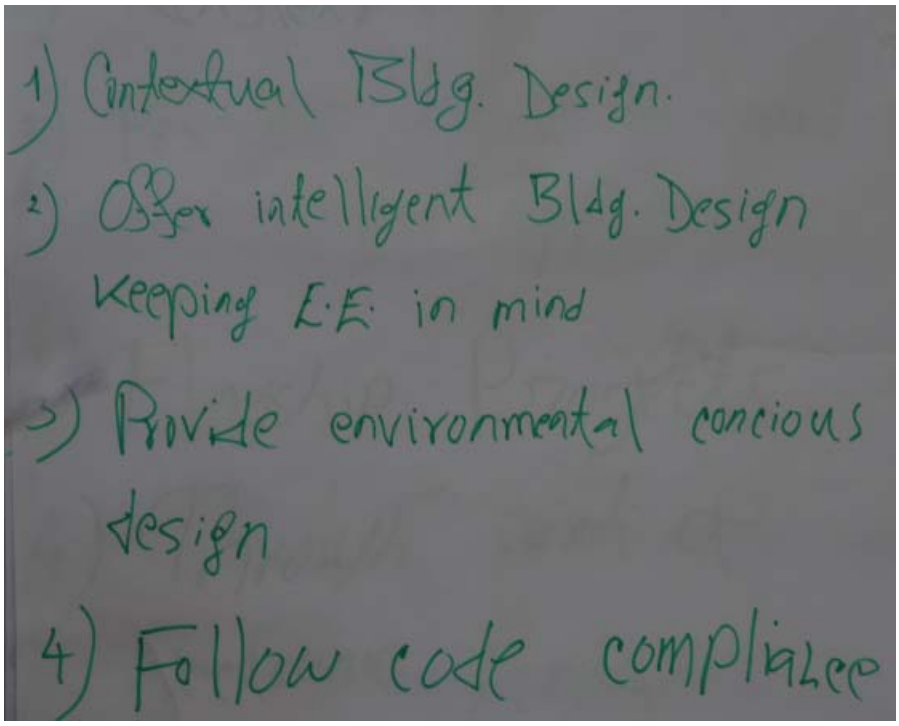
Picture 11: Political Decision Makers (Question 4)



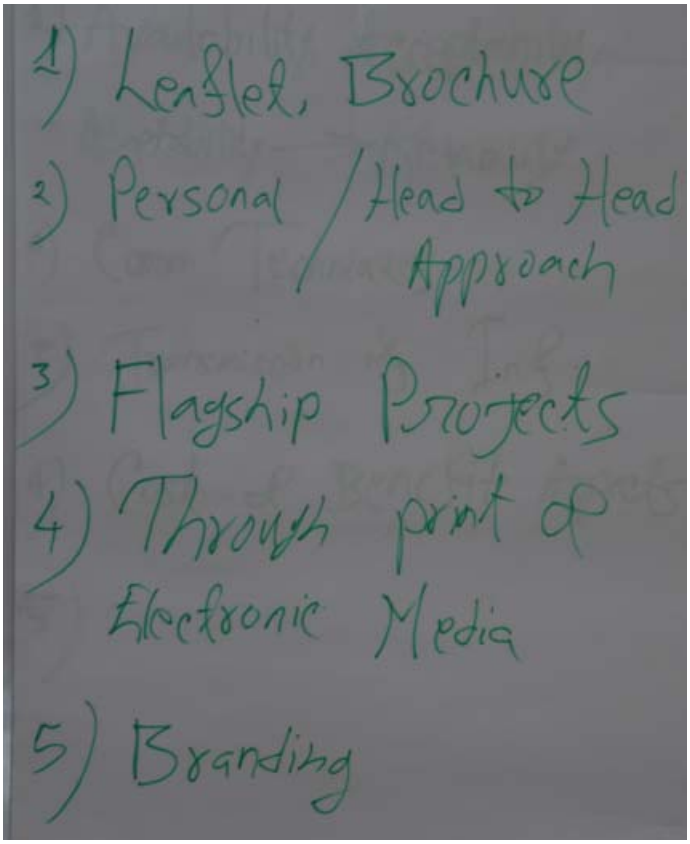
Picture 12: Brick Kiln Owner/Association (Question 1-4)



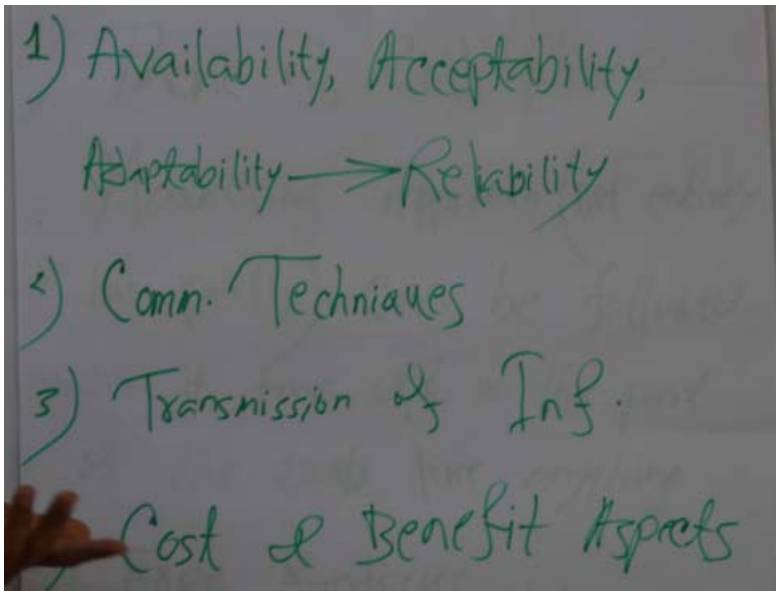
Picture 13: Architects/Construction Companies (Question 1)



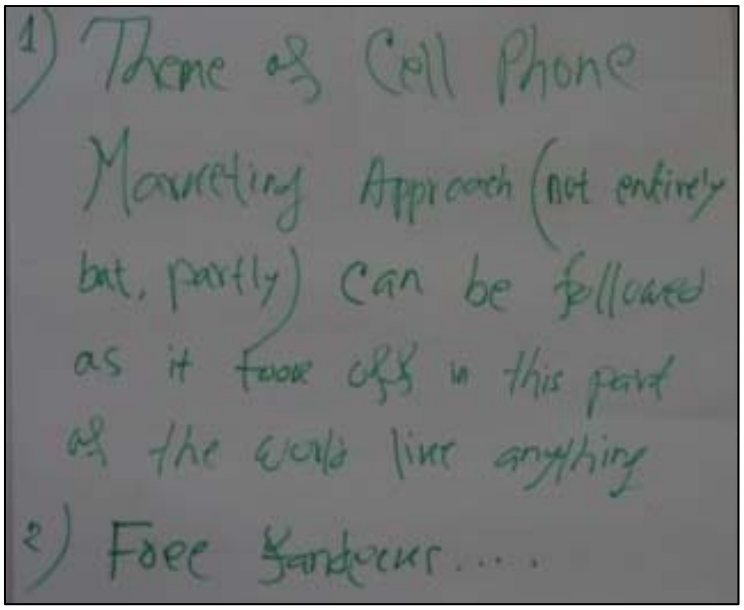
Picture 14: Architects/Construction Companies (Question 2)



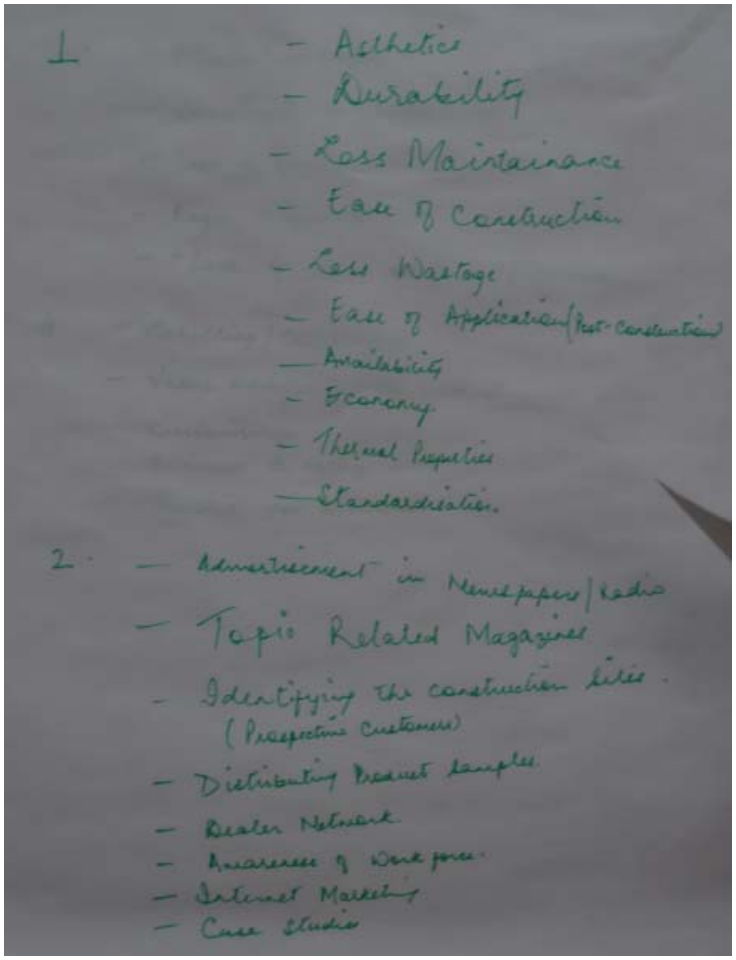
Picture 15: Architects/Construction Companies (Question 3)



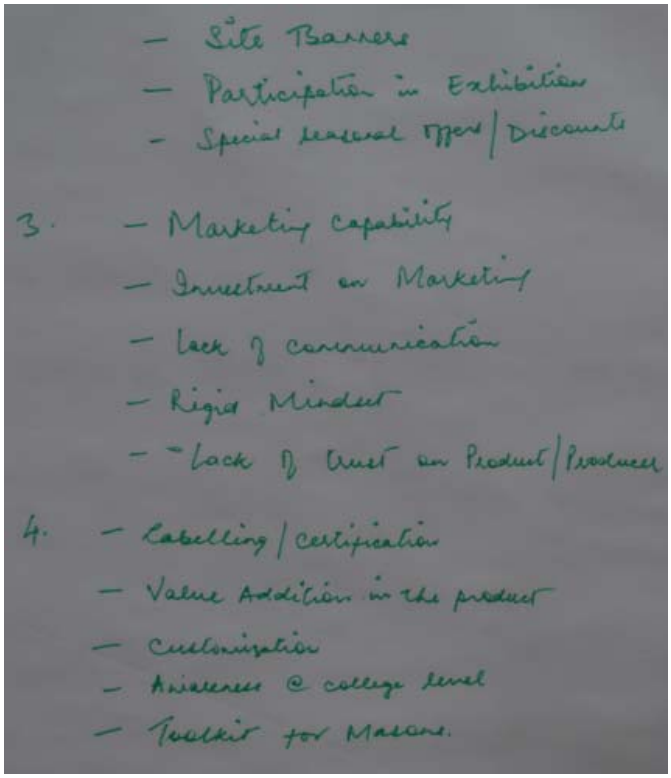
Picture 16: Architects/Construction Companies (Question 4)



Picture 17: House Owners/End-User (Question 1-2)

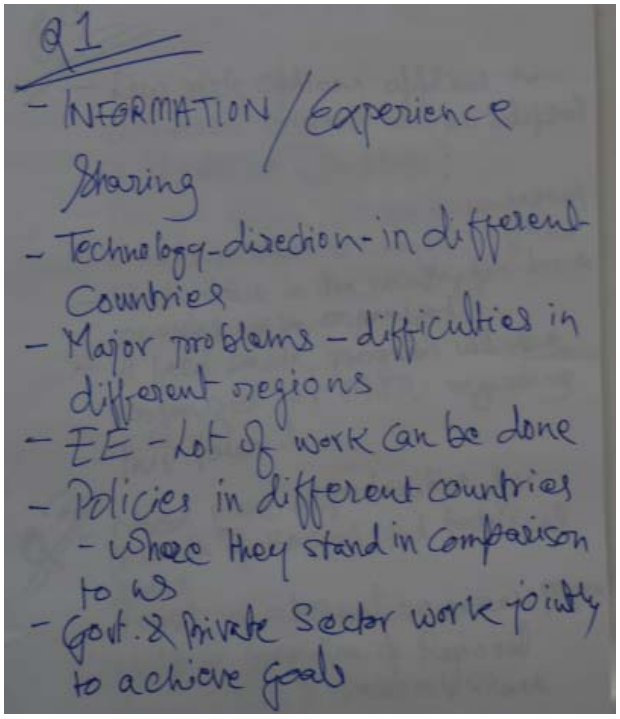


Picture 18: House Owners/End-User (Question 3-4)

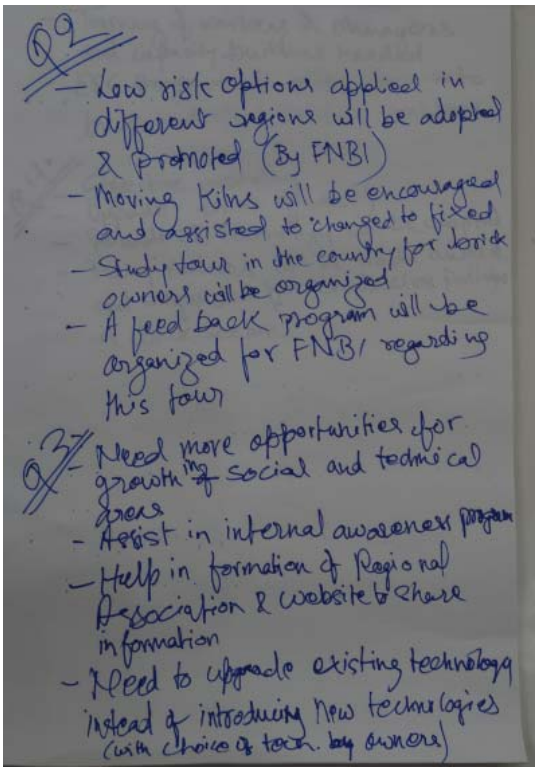


Session 6: Final Session/Conclusion

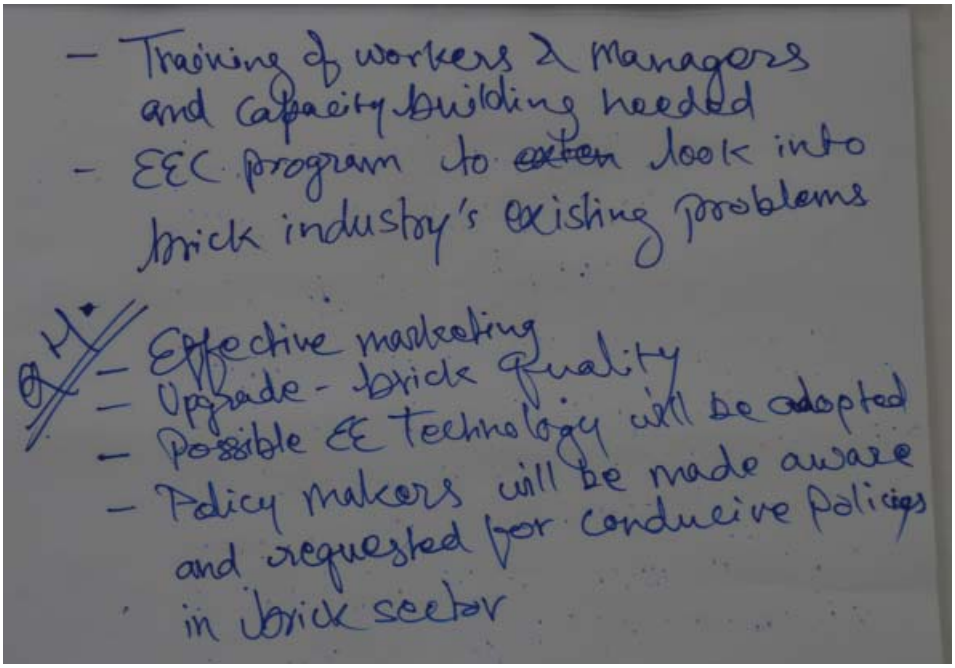
Picture 19: What have been the lessons learned of the dialogue? (Group Nepal)



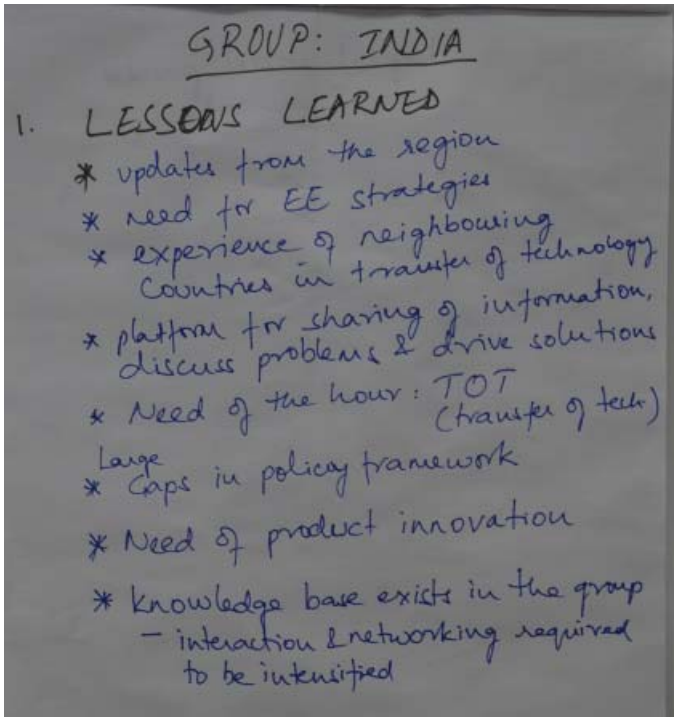
Picture 20: How can lessons learned be used and what future actions should be taken up? (Group Nepal)



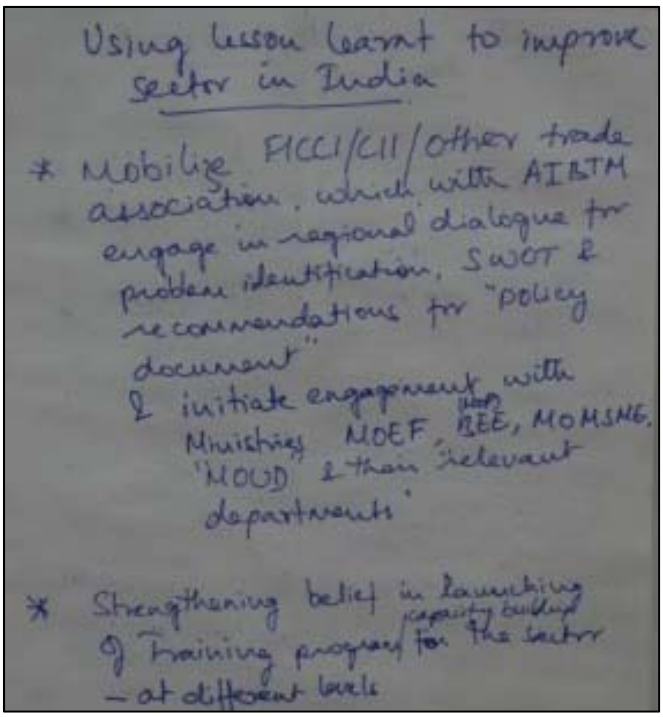
Picture 21: How will the results of the dialogue influence your work? (Group Nepal)



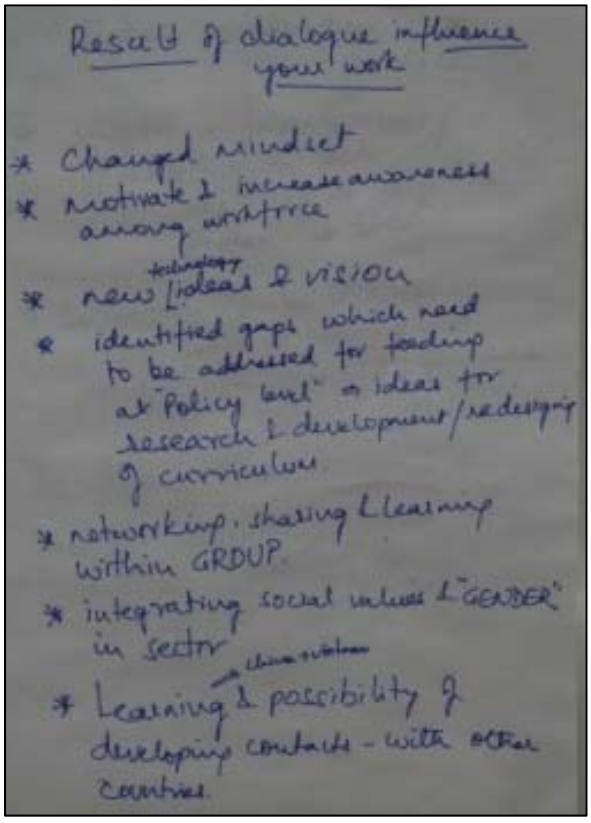
Picture 22: What have been the lessons learned of the dialogue? (Group India)



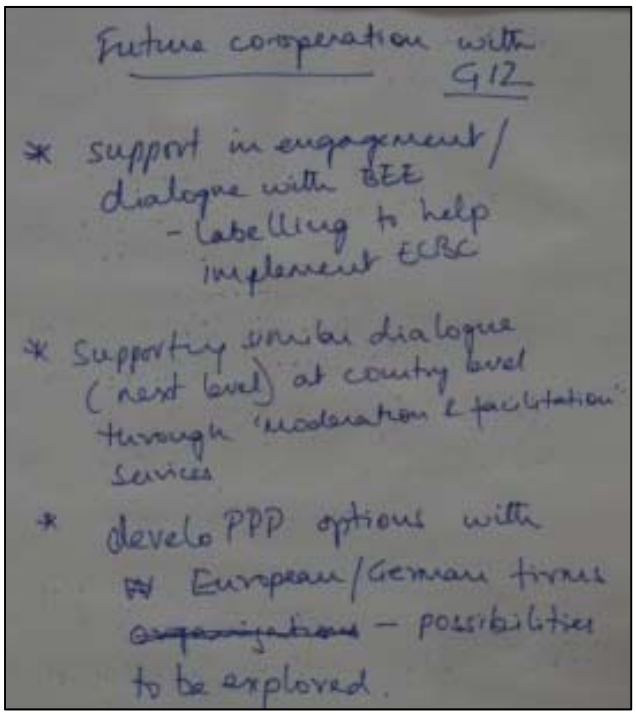
Picture 23: How can lessons learned be used to improve the country sector? (Group India)



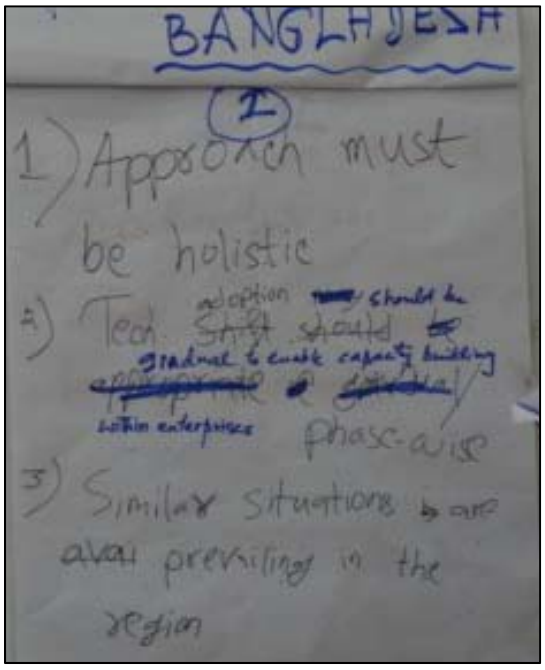
Picture 24: What future actions should be taken up? (Group India)



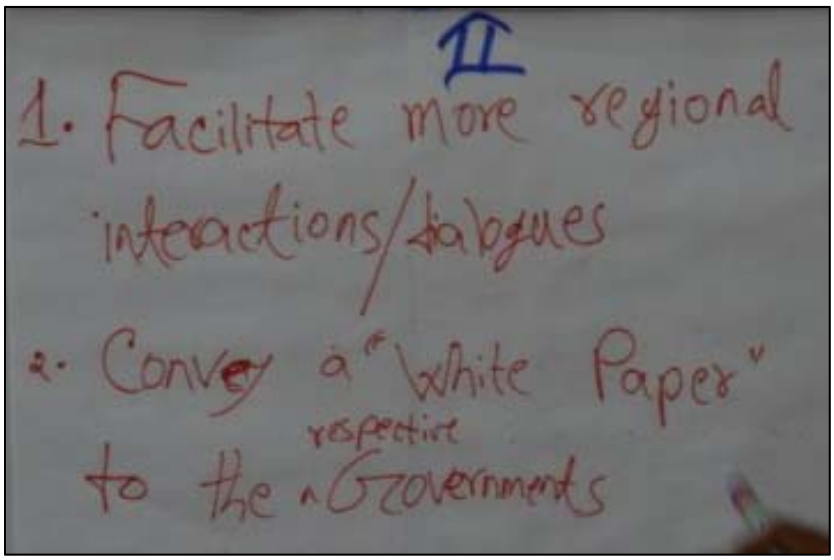
Picture 25: How will the results of the dialogue influence your work? (Group India)



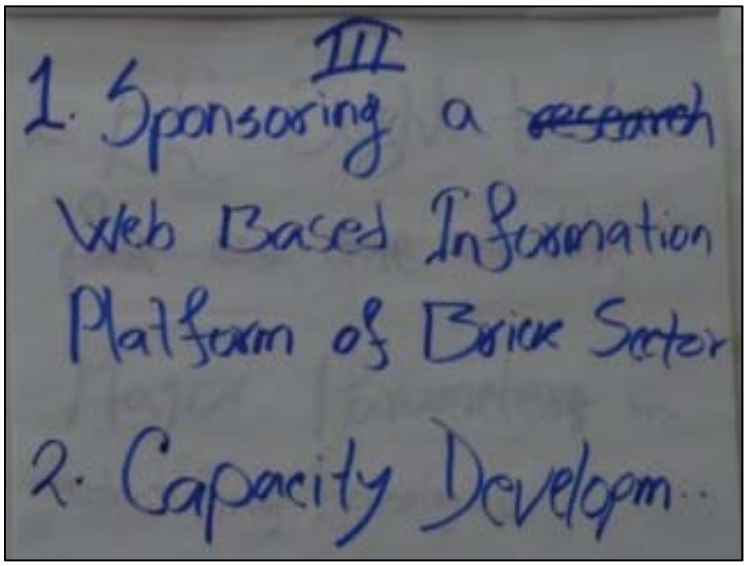
Picture 26: What have been the lessons learned of the dialogue? (Group Bangladesh)



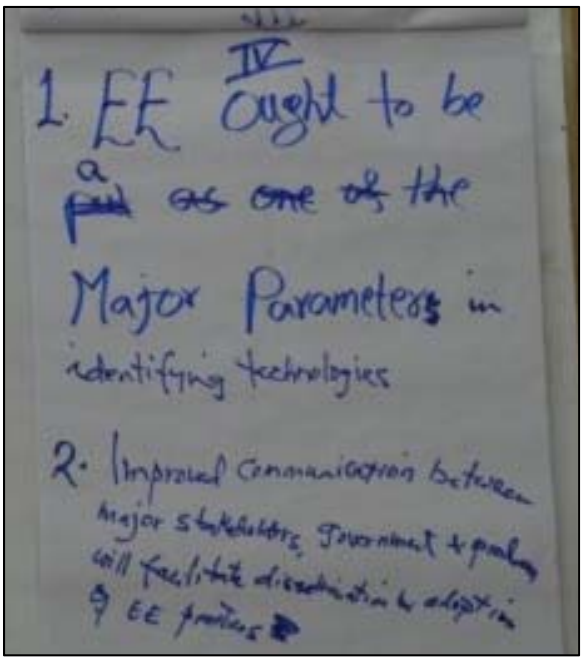
Picture 27: How can lessons learned be used to improve the country sector? (Group Bangladesh)



Picture 28: What future actions should be taken up? (Group Bangladesh)



Picture 29: How will the results of the dialogue influence your work? (Group Bangladesh)



Annex 3: Poster

Poster from Ms. Shaila Jamal, Clean Energy Alternatives (CEA), Bangladesh

IKEMBI – PROGRAMME 2009–2014

Improving Kiln Efficiency in the Brick Making Industry

SUMMARY

The IKEBMI programme is designed to remove barriers to the widespread adoption of energy efficient kilns and energy efficiency (EE) practices for the brick making industry in Bangladesh. Brick making is one of the largest sources of greenhouse gas emissions in Bangladesh, estimated to be in the order of 6 million tonnes of CO_2 annually. Brick making operations in Bangladesh are mostly within the informal SME sector, and there are no financial or strong regulatory incentives to make them more energy efficient. Growth of the brick industry has been estimated at 5.3% over the last decade; this growth trend is likely to continue over the next decade.

The project will take operational experience from a pre-project phase and use these results to implement another 15 demonstration projects over a 5-year project period.

The project will achieve its objectives by supporting an integrated set of component programs comprising: re-confirmation of all technology options; establishing demonstration projects; technical and managerial capacity development; communications and awareness; financing support; policy and institutional support development; and project management unit support.

Successful implementation of the demonstration energy efficient kilns would result in the direct cumulative energy savings of about 15,415 TJ or 526 kt of coal by the end of the project and 1,319 kt of CO_2 cumulative direct emission reductions during the expected 15-year service life of the energy efficient kilns.

GOALS

Overall: Reduction of energy use + decrease of GHG emissions from the brick making industry in Bangladesh

1. Increase understanding and appreciation of technology options and their environmental impacts by brick makers and other stakeholders.
2. Establishment of a critical mass of demonstration projects providing detailed information on energy efficient kiln (EEK) operations, energy savings and environmental impacts to interested brick makers.

3. Improvement of local vocational, technical, and managerial capacity to manage and sustain the operations of EEKs.
4. Enhanced awareness of the public and other stakeholders of EEKs and EE brick products.
5. Provision of financial and institutional support to encourage SMEs' adoption of energy efficient kilns.
6. Promulgation of and enhanced compliance with regulations that encourage the adoption of energy efficient kilns.

ACTIVITIES

Component 1 - EEK Technology Support Programme
Component 2 - EEK Demonstration Programme
Component 3 - EEK Technical and Management Capacity Development Programme
Component 4 - Communications and Awareness Programme
Component 5 - EEK Financing Support Programme
Component 6 - Policy Development and Institutional Support Programme

TECHNOLOGIES

Hybrid Hoffman Kiln (HHK) Technology

- Combination of highly efficient kiln technology with unique fuel injection technique
- Produces environmentally friendly quality bricks of any size, shape and pigmentation
- Uniform quality, meet international standards for strength, quality and appearance

ADVANTAGES OF HHK

- Large scale brick production
- Lower pollution (CO_2 emission reduction 40%)
- Year-round operation
- Female workers
- Very good quality (can be used in outer walls)

AWARENESS RAISING / MARKETING

Aim I:

- Remove barriers (related to low awareness of public and SMEs of technical alternatives and lack of access to information)
  - ➡ Establishment of a Brick Making Information Center (BMIC)
  - ➡ National workshops with policymakers and general public, TV programs, and media tours to demonstration sites

Aim II:

- Increase entrepreneurs' understanding of HHK investments to improve chances for HHK loan finance
  - ➡ Prepare an action plan for financing HHK demos
  - ➡ Conducting techno-economic feasibility evaluations for each potential HHK demo investment
  - ➡ Engagement of financial institutions in HHK projects
  - ➡ Promote business links
  - ➡ Increasing access to financing sources

STAKEHOLDERS

The US company Clean Energy Alternatives (CEA) with its affiliates in Bangladesh and Canada is the main implementing organization and responsible for:

- Technical and financial studies (including baseline data)
- Promoting technology and designing demonstration kilns
- Installation and operation support
- Mobilizing the financial institutions
- Preparing technical training manuals / conducting trainings, etc.

The Research Institutes Xian Institute of Wall Building Materials and **Bangladesh University of Engineering and Technology**

- Technical knowledge and advice (to suit local conditions)
- Leading construction, operation, and monitoring of demonstration projects
- Technical capacity building

Several governmental bodies (**MoEF, DoE, MoPEMR, SREDA**)

- Providing guidance to IKEBMI on issues related to coal supply security and sustainability at demonstration EEK sites
- Emission standards and favorable policy formulation

The Bangladesh Brick Manufacturers Owners Association (BBMOA):

- EEK dissemination efforts by establishing an information center within BBMOA
- Capacity building by organizing seminars and workshops

Private Sector entities

- Spearhead EEK installations where there is an absence of a business leader who can form effective SME clusters

The Industrial and Infrastructure Development Finance Company Limited (IIDFCL)

- Financial advisor to the project on required capacity building measures to qualify for financing EEK projects

SUCCESS FACTORS

1. Business case demonstrated: **ECO Bricks grows with 2 new HHKs** The breakthrough of better brick business
2. **Entrepreneurs are more aware of EEK & HHK:** A success of effective communication
3. **Successful impact on policy making** by providing high quality research - Review and comments on the proposed "Brick Burning (control) Act, 2010"

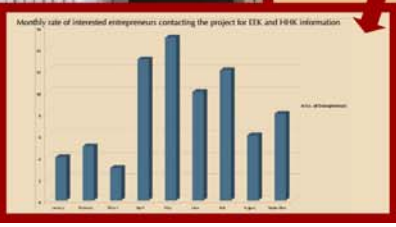
CHALLENGES

Institutional risks: Insufficient government support
➡ High level project coordination and monitoring of regulatory development

Low adoption of EEKs and EE practices
➡ Involvement, communication & assistance of stakeholders

Technology risk: Complex technology
➡ Capacity building and technical support

Financial risk: No financing by FI
➡ Assistance SMEs in disclosing reliable information



Poster from Mr. Pritpal Singh, Punjab State Council for Science and Technology, India

Energy Efficiency Improvements in Indian Brick Industry

SUMMARY

Punjab State Council for Science & Technology (PSCST) has been working in the brick sector since 1997, when it first designed and demonstrated energy efficient brick kilns along with best operating practices. This was the time when mass scale switch over from highly energy intensive process of Moving Chimney Brick Kilns (MCBK) to Fixed Chimney Brick Kiln (FCBK) took place (>3000 nos. mainly in north India) - with the sustained efforts of this organization. Besides this, capacity building through awareness campaigns, training, manuals and video films on better construction and operating practices has been achieved. These efforts have resulted in reduction of SPM levels, besides 10-15% reduction in fuel consumption and increase in output of better quality bricks

PSCST is currently undertaking an UNDP/GEF brick project "Energy Efficiency Improvements in Indian Brick Industry", as Local Resource Centre for northern region of the country. The goal of the project is to reduce energy consumption and restrict GHG emissions by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of Resource Efficient Bricks (REBs) in India.

GOALS

- Enhancing public sector awareness on resource-efficient products
- Access to finance for brick kiln entrepreneurs
- Improved knowledge on technology, including marketing
- Availability of resource efficient technology models in 5 clusters
- Improved capacity of brick kiln entrepreneurs

ACTIVITIES

- Exposure visits
- Focused interactions
- Organising workshops
- Detailed project reports of REB production of various capacities and different level of mechanization
- Interaction with Financial Institutions for technical appraisal of technology up-gradation and REB production projects

TECHNOLOGIES

- First EE efforts in early 90s
  - ➡ FCBK with better feeding, firing and operating practices
- Production of perforated bricks on small scale from 2005 onwards
- PSCST induced switch over to more energy efficient high draft kiln in 2009
- PSCST efforts initiated a movement to mechanization options for brick making

- Sustained interactions with brick kiln entrepreneurs and machinery manufacturers and dealers of foreign products
- First complete clay preparation lines in 2012 and manufacturing of REBs

AWARENESS RAISING / MARKETING

- For brick kiln entrepreneurs
  - ➡ Exposure visits to major brick producing clusters
  - ➡ Cluster level workshops
  - ➡ Shortlisting of entrepreneurs interested in adoption of mechanization
  - ➡ Detailed one-to-one meetings
  - ➡ Organizing international conferences
- For end users like Government departments / architects / builders
  - Focused group discussion regarding benefits of using REBs for construction
  - ➡ Feedback from senior architects and builders
  - ➡ Sensitization of workmen for use of REBs in construction
- Preparation of promotional material
  - ➡ Posters
  - ➡ Case studies
  - ➡ Feedback from architects / builders
- Marketing of REBs
  - ➡ Articles in major newspapers
  - ➡ Setting up of REBs Corner
  - ➡ Participation in road shows/ trade fairs
- Capacity building of workers/supervisors
  - ➡ Preparation of manuals/videos in local language
  - ➡ Development of curriculum to create a pool of trained workforce for production and use of REBs

STAKEHOLDERS

Brick kiln entrepreneurs
- Increased awareness on mechanization and REBs
- Motivated entrepreneurs to visit technology suppliers

End-users
- Sensitized on production and use of REBs

Government
- Govt. construction departments have started the use of REBs on trial basis at few sites

Architects
- Increased queries by architects on REBs

Technology suppliers:
- Facilitated one-to-one meetings with brick kiln entrepreneurs

The workforce
- Unaware of mechanized way of producing bricks
- Masons have apprehensions regarding REBs and generally discourage the consumers to use such products

SUCCESS FACTORS

1. Awareness campaign has trickled the mindset of entrepreneurs and consumers
   - ➡ Adoption of semi-mechanization by brick industry and u sage of REB.
2. "Seeing is Believing":
   - ➡ Display of REBs at various forums, exhibitions, trade fairs has increased the curiosity of end users
3. Successful demonstration
   - ➡ Fuel saving by 10-15% have been demonstrated through better construction and operating practices

CHALLENGES

- Manual tradition vs. mechanization
  - ➡ Technology dockets for different levels of mechanization (partial to full) are being developed
- Limited technical knowledge
  - ➡ Manual and training for construction practices for use of REBs are being developed
- Limited access to finance
  - ➡ Facilitating project appraisal through interaction with financial institutions
- Absence of demonstration models of REB producing units
  - ➡ Preparation of case studies
- No mechanism for the trouble shooting of operating problems in machinery.

Poster from Mr. Kundan Dighe, Wienerberger Brick Industry Pvt. Ltd., India

WIENERBERGER BRICKS – POROTHERM CLAY BRICKS

Activities for promoting and marketing highly sustainable, energy efficient construction material in the Indian market

SUMMARY

Wienerberger as a brick manufacture is 193 years old – founded in Austria in the year 1819. In India, Wienerberger started its first office in 2007 and the factory in Kunigal was commissioned in 2009. Since then Wienerberger has been manufacturing and supplying energy efficient bricks to the market. The core business of Wienerberger is focused and concentrated on POROTHERM HP – Clay Bricks (HP – Horizontally Perforated), a light and very energy efficient brick.

The POROTHERM HP – Clay Brick offers several advantages to its users. It is light in weight and hence helps to save substantially on structural cost and enables faster construction. However, the major advantage is its energy and resource efficiency. Used as a construction material, the bricks promise significant thermal insulation benefits. Additionally the bricks are a green building product, recognized by the Indian Green Building Council. The bricks are very energy efficient in their production; the input material partly uses recycled contents and the bricks are used as local material (> 500 kms distance from the factory).

By successfully marketing and bringing the POROTHERM HP – Clay Brick to the market, Wienerberger showcases the business case for and superiority of energy efficient bricks.

GOALS

- Wienerberger with its experience in other countries over the last two centuries is quite convinced of the holistic benefits of hollow bricks and particularly their sustainability.
- Looking at the huge potential for construction translating into brick demand in India, Wienerberger considered introducing the current brick design and aimed to achieve a significant market share.

- It was initially a huge challenge for Wienerberger to convince customers of the benefits of the energy efficient bricks.
- Customers and consultants involved currently have a positive outlook.

TECHNOLOGIES

- POROTHERM HP is manufactured in six different sizes constituted of full and half bricks.
- Regarding construction practice no major difference compared to usage of traditional bricks.
- Structural Design Consideration: lower density needs to be considered for designing building frame – structural saving can be achieved.
- Construction Practice – Same as with large size bricks or blocks
- Mortar ratios is 1:6 (1 part cement : 6 parts sand)

AWARENESS RAISING / MARKETING

- Technical study reports on structural saving potentials
  - ➡ Thermal and sound insulation tested and evaluated
  - ➡ Bricks were tested as per Indian Standard (IS 3952, Indian Standard for Burnt Clay Hollow Bricks for Wall & Partitions).
- Association with and active participation in Bureau of Indian Standards (BIS) and Indian Green Building Council (IGBC)
  - ➡ To incorporate and consider larger sizes of bricks in standard
  - ➡ To include POROTHERM in IGBC Product Directory

- Meets and training sessions for engineers
  - ➡ Communicate material through on-site demonstrations
- Training for masons on-site and at Masonry Training Centre (MTC)
  - ➡ Adresssing Architects' and Engineers' Associations at their monthly meetings with demos and product presentations to communicate advantages.
- Literature Support
  - ➡ Communication of product in respective literature
  - ➡ Product-specific information data sheets published

Marketing Channels
- ➡ Project sales (direct sales to builders – larger projects)
- ➡ Retail sales (sales through dealers – smaller projects)

Main Marketing Instruments
- ➡ Direct mailers
- ➡ Participation in exhibitions and events
- ➡ Digital media (website)
- ➡ One-on-one interactions and demonstrations (most effective in establishing product and acceptance)

STAKEHOLDERS

To address stakeholders as well as local professionals Wienerberger regularly participates in marketing events. Received feedback of the stakeholders:

- Architects & structural consultants show great interest and try to use energy efficient products in their projects
- House owners show great interest and find remarkable change in in-door temperatures
  - ➡ Feedback is very good and shows great promise for further development

- Customers also perceive products benefits
  - ➡ resulting in good consumer acceptance
- Further stakeholder
  - ➡ contractors, consultancies and architects

SUCCESS FACTORS

For large size projects / Townships

1. Structural savings
2. Faster construction
3. References from others and Wienerberger Technical Support

For small projects / individual houses

1. Thermal insulation
2. Faster construction
3. Good looks and aesthetics of the brick itself
4. Wienerberger professionalism in dealing with the customers

CHALLENGES

- Cost: cost difference could have negative side effects
  - ➡ Addressing benefits of POROTHERM
  - ➡ Attaching cost factor on saving potential and estimating net commercial benefit
- Market Power: possible fear of monopoly side effects
  - ➡ Factory visits
  - ➡ Quality Control Systems /stress on manufacturing capacity
  - ➡ Date validity to the quotes accepted by us for supply

- Application: hollow bricks as new concept – application is seen as major challenge
  - ➡ Documents on methodology for the fixing of residential utility fixtures
  - ➡ Demonstrations for load carrying capacities of the brick and the suggested fixture accessories
  - ➡ Site instructions and manual distribution in vernacular languages; sample bricks and boards for load fixtures

Poster from Mr. Pandit Bhishma, GIZ/Integration, Nepal

NEPALESE BRICK MAKING

opportunities and challenges for energy efficiency
– experience from energy efficiency initiatives

SUMMARY

Currently, Bull Trench Kilns (BTK) are the prominent kilns within Nepal, with solid brick used for building construction. At both ends – brick production and the usage of bricks as construction material – high energy saving potentials exist. On the production side, energy savings can be realized with housekeeping measures and the transfer of state-of-the-art technology. Additionally, the introduction of internal fuel (biomass) and a shift to the production of hollow bricks would bring key energy savings and also later decrease energy consumption within the building sector.

Overall, the Nepalese industrial sector's coal consumption represents 58% of total energy use in the country. Coal, which comes from Asam, India, is also used as fuel in the brick sector. Saving coal through efficiency measures leads to savings in production costs, a reduction in green house emission and savings of foreign exchange reserves.

Within the last decade, several activities and exchange programmes implemented through the Environmental Sector Programme Support (ESPS) by DANIDA have initiated a shift from using Moveable BTK to Fixed Chimney BTK within Kathmandu Valley. A demonstration kiln was implemented and technology adaptation from moveable kilns to new kilns also took place. Currently, 30% of BTKs kilns are running with improved brick stacking and firing methods in the Kathmandu Valley.

Despite the improvement over the last few years, major barriers to further energy efficiency improvement of the brick sector still exist.

GOALS

1. (Increase) awareness among stakeholders (government agencies, brick entrepreneurs, brick users, environmentalists, occupational and safety professionals and workers).
2. Knowledge sharing of Nepalese brick making technology among stakeholders in the brick sector in Nepal.
3. Awareness raising on improved housekeeping measures within the brick kilns.

4. Sharing of knowledge and solutions to overcome barriers to energy efficiency implementation within the kilns.
5. Technology discussion and transfer among regional players in South Asia.
6. Gaining assistance from regional stakeholders for efficient and sustainable technology and production systems.
7. Learning by analyzing sustainable consumption patterns within the region (hollow bricks, size of the bricks, quality of the bricks, etc.).

ACTIVITIES

- Collecting of baseline information and random monitoring of the technology within the Kathmandu Valley.
- Stakeholder consultation with brick entrepreneurs, officials from the government, environmental professionals etc.
- Study visits of programme officials, brick entrepreneurs and government officials to best practice examples in the region.
- Skilled worker migration (Energy Experts and best practiced entrepreneurs) from India

- Identification of proactive brick entrepreneurs and provision of financing of energy efficient technology implementation through loans and grants to the proactive entrepreneurs
- Demonstration projects of Induced Draught Fixed Chimney with improved stacking method implemented

TECHNOLOGIES

- Technology transfer from Clamp, Moveable Bull Trench Kilns to Fixed Chimney BTKs and Vertical Shaft Brick Kiln (VSBK) technology
- Good housekeeping measures while using Fixed Chimney BTKs and Moveable Chimney BTKs:
  - ➡ Coal feeding spoon size was minimized for better combustion within firing zone
  - Thermal insulation of kilns improved
  - ➡ Air infiltration within the kilns improved by using plastics within the doors of kilns
  - ➡ Improved stacking was done for waste heat recovery
- Other energy-improved brick making practices:
  - ➡ Internal fuel by adding clay with biomass
  - ➡ Extruder machines used for brick making processes
  - ➡ Improved brick transportation method applied

AWARENESS RAISING / MARKETING

- Awareness workshops for brick entrepreneurs and government representatives on VSBK within Kathmandu Valley
- Knowledge exchange programme on technology and better operating practices with India
- Environmental and energy monitoring of the kilns in Kathmandu Valley for VSBKs and BTKs for data comparison
- 2008: Government policy for stack emissions standards formulated
- Governmental monitoring of stack emissions in brick kilns

- Brick awareness trainings with brick owners by IEMP / Ministry of Industry
- OHS monitoring for VSBK by private companies
- Demonstration projects (with loans and grants) for VSBK and Bull Trench Kilns with Zig-Zag setting

STAKEHOLDERS

Brick entrepreneurs

- Directly affected by government rules for phasing out moveable BTKs
- Limited knowledge, so needed help (with technology and transition)
- Untapped potential / challenges for improvement

Government policy makers

- Not very aware of technological transitions
- Creating confusion

Pro public groups

- Leading roles in pointing out environmental and occupational risks
- Asked government for immediate phasing-out of old technologies
- But no alternative technologies previously tested in Nepal

Brick fireman and stackers (employees)

- Not trained and skilled, come from India and Bangladesh on seasonal basis
- High fluctuations in workforce, training is not sustainable

Environmental institutions

- Very marginal role
- Not been capable of doing emissions and hazards tests in kilns
- Not familiar with the technology

CHALLENGES

- Problem of VSBK adaptation among brick entrepreneurs
  - ➡ Required changes in production processes, upfront investment costs, lack of technological know-how and skilled manpower
  - ➡ Dependency on high clay quality
- Migration of skilled and unskilled workers between the kilns
- Seasonal business
- Very few government policies incentivize energy efficiency at brick kilns
- Competition for larger size rather than sustainable building construction

SUCCESS FACTORS

- Transformations from Moveable Chimney BTK to Fixed Chimney BTK: All kilns in the Kathmandu Valley transferred
- Mitigation of environmental problems: better combustion due to long airflow mechanism
- High chimney for better dispersion
- Kathmandu air quality monitoring observed improvements

Reasons for success:

- Business case for technology transfer demonstrated:
  - ➡ New technologies economically attractive for brick kiln owners (reduction in coal consumption by more than 20%)
- Energy efficiency leads to quality improvement as a side effect
- Improved firing practices lead to lower production costs
- Some mechanization for brick making