EXTERNAL REVIEW OF CLEAN BUILDING TECHNOLOGIES FOR NEPAL VSBK-CESEF PROJECT 2008-2011

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Abbreviations

BTK	Bull's Trench Kiln
CCC	Children Care Centre
CDM	Clean Development Mechanism
CEDB	Clean Energy Development Bank, Nepal
CER	Certified Emission Reduction (equivalent to 1t CO_2e)
CESEF	Cost Effective, Social and Environmentally Friendly (building technologies)
COOF	SDC Cooperation Office
DA	Development Alternatives (India)
DAGs	Disadvantaged Groups
DCSI	Department of Cottage and Small Industry
FCBTK	Fixed Chimney Bull's Trench Kiln
GHG	Greenhouse gases
GI	Galvanized iron
GoN	Government of Nepal
HQ	Headquarters
ILO	International Labour Organization
MCR	Micro-Concrete Roofing [Tiles]
MCBTK	Moveable Chimney Bull's Trench Kiln
MOEST	Ministry of Environment, Science and Technology[1]
NRs/ Rs	Nepali Rupee(s)
NRU	Natural Resources Division (of SDC, Berne)
OSH	Occupational Safety and Health
OVIs	Objectively Verifiable Indicators
RTB	Rat Trap Bond
SDC	Swiss Agency for Development and Cooperation
SEAM-N	Strengthening Environmental Administration and Management Nepal
SKAT	Swiss Resource Centre and Consultancies for Development
SO_2	Sulphur dioxide
SPM	Suspended Particulate Matter
VSBK	Vertical Shaft Brick Kiln
VER	Voluntary Emissions Reduction

[1] This ministry does not exist any more in May2011

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Executive Summary

This report presents the findings of the external evaluation of Phase 4 (2008-2011) of the SDC funded VSBK-CESEF Project (hereafter called the Project). The evaluation team held discussions with the Project and its stakeholders and carried out field visits to five locations covering new and old entrepreneurs in Kathmandu valley and the districts of Kapilbastu, Nawalparasi, Rupandehi, and Jhapa.

Technology Development and Transfer
The Project has successfully adapted the VSBK to local conditions, as evidenced by improvements in design and construction in successive kilns which are well built, and the technology has been well transferred to entrepreneurs. The attention devoted by the Team to raw material quality, testing, processing and green brick preparation has paid dividends in brick quality which is generally good albeit somewhat inconsistent across kilns. VSBKs are being operated around the year, rejection rates were found to be low at under 5% on average and the substantial (about 40%) energy savings could be further increased with more systematic use of internal fuel.

Dissemination of VSBKs has picked up momentum during the current phase despite a lack of incentives or a favourable policy environment except for the Government's recognition of VSBK as a non wood enterprise and consequent removal of sitting restrictions. The target of 20 VSBKs in this phase has been achieved and a further 10 Kilns were in the pipeline due to additional efforts by the Project Team. This means, there exist a total of 26 VSBK enterprises constructed in the country. The 26 units have a total of 58 shafts and an annual production of about 75'000'000 bricks per year. The uptake could have been higher and faster if Project Management had evolved a more strategic marketing and policy advocacy campaign. Nevertheless, the penetration of about 5% of the estimated 460 Brick Kilns is an outstanding achievement compared to the Indian experience. Given Nepal's smaller size and more compact brick-making regions, this penetration level and momentum generated is close to the "critical mass" necessary for economy-wise adoption of VSBKs, even though other measures would also be required. SDC can be justifiably proud of the platform it has helped build for propagation of energy-saving VSBK technology in Nepal.

The CESEF track which started three years and two phases after VSBK, during 2005-2007, has understandably not matured as much as the latter. The CESEF Team is excellent but some strategic planning and additional guidance by the Project Management would have taken the CESEF track further. The CESEF technologies have been somewhat randomly selected. Many of the technologies chosen have been

[2]The external Review team would like to acknowledge the support from VSBK-CESEF Project, SDC-Nepal and Berne, SKAT-Nepal and Switzerland, Government of Nepal and all other stakeholders in completing the review.

deployed before adequate adaptation, field testing, user feedback and market assessment.

The Project has met most outreach targets although in quantitative rather than qualitative terms. Close to 300 users in different categories have been transferred CESEF technologies but, with the exception of RTB, not measuring up to "best practices". Numbers of adopters are typical for the starting phase of interventions in the building sector but are nowhere near the "critical mass" or field-tested quality assurance required for economy-wide spread of CESEF technologies.

Environment and Climate Change

The VSBK technology greatly reduces the stack emissions including greenhouse gases and suspended particulate matter, which is very beneficial for the environment and contributes to climate change mitigation. The contribution of the Project in reducing greenhouse gases in the country is still fairly low, mainly because of the limited number of kilns, although the Project has managed to achieve the environment related targets mentioned in the logical framework. But considering the fact that the construction sector and Nepal's greenhouse gas emissions will probably continue to grow, VSBK's contribution in moving the country towards a low carbon economic growth path (including greatly reduced black carbon emissions) can be significant in the future.

The reduction of greenhouse gases in the construction sector as a driver for disseminating the new VSBK technology has certainly been overestimated by SDC and the Project management. Most important in the Nepali context is the much reduced emissions of SPM (including black carbon) which significantly mitigate the health hazard of the adjacent local communities near the kilns. As a significant co-benefit the greatly reduced black carbon emission of the VSBK technology has an immediate mitigation effect on climate change considering the much shorter lifetime of black carbon compared to CO_2. VSBKs generate ten to twenty times lower emissions of black carbon compared to BTKs.

Regarding the CESEF technology and its contribution to mitigate climate change and preserving the environment it is too premature for a conclusive assessment of the performance of the Project. It was only in this phase that the CESEF track has been included in the Project and several alternative building materials and technologies have been tested and disseminated.

Policy and Institutional Factors

Overall at the policy and institutional level, the project's activities have been very relevant but its effectiveness and efficiency has been moderate. While its partnership with local entrepreneurs has been very effective, the same cannot be said about its partnership with government agencies. This strategy of working closely with entrepreneurs has helped in demonstrating outputs in the field but weak links at the policy level has not helped ensuring the sustainability of the project outcomes.

Social Intervention Model and Outcomes

The workers in the brick kiln and construction sector are among the poorest and most vulnerable, especially as most of them are Dalits, and migrants from within or outside Nepal. Their working conditions are poor, and living conditions are characterised by lack of safe housing, water and sanitation. They do not have access to child care or education for their children or basic services for themselves. Women face sexual harassment at work as well as domestic violence. The legal and

regulatory environment does not provide for any social protection to them. In this context, the project interventions are highly relevant.

The project provides social support alongside technology inputs, and seeks to make entrepreneurs socially responsible. At the same time direct contact is made with workers to provide child care support, awareness, counselling and other inputs to increase productivity, health and nutrition of the family, especially children. Use of occupational safety and health awareness are promoted, among entrepreneurs as well as workers. A wide range of inputs covering a wide range of shareholders depicts a combination of service delivery and partnership approaches which do not yet adequately incorporate rights based elements.

Entrepreneurs and their associations have accepted and paid for some of the interventions, such as crèches and social mobilisers. Workers have benefited from increased awareness, provision of child care, and under CESEF, also from improved skills, and enrolment in workers unions[3]. Women have benefited in many ways: through child care, health and mental health support. Worker absenteeism has reduced. Child nutrition and health has recorded an increase, albeit to a lesser extent.

The limitations and constraints relate to the scale of social interventions, as each of the initiatives has covered only a few kilns each year. The team is scattered, making capacity building difficult. Earlier reviews had pointed to the need for more knowledge creation, better strategizing, policy influence, increased bargaining position of labour, and use of carbon finance for social interventions, all of which have remained areas of weakness.

Management Monitoring and Steering

The build up of the technical skills of the local team, which has branched out into MinErgy, a separately registered organisation, has been of a high order. However, there has been a clear absence of capacity building, strategic or technical support from SKAT to the VSBK team particularly for social interventions. Greater nationalisation, especially of senior management, would have helped with greater achievement in terms of government contacts and policy influence. The recommendations from the previous review to this effect were not followed by SKAT management.

The Way Forward

Further spread of VSBKs in Nepal will crucially depend upon the technical support services provided to entrepreneurs. At the present juncture, with no financial incentives and a lukewarm policy environment, and considerably higher capital costs for VSBKs than for BTKs, it is difficult to see entrepreneurs being able or willing to pay fees for such services. It is even more difficult to envisage much poorer masons, petty contractors, tiny-unit entrepreneurs or small home-owners paying for CESEF-related services. Services related to VSBKs could recoup costs in the not-too-distant future but CESEF will require a longer-term strategy for sustainability.

As the project comes to an end in 2011, it is essential that efforts are made to consolidate the lessons learnt so far and ensure the sustainability of the outcomes. Experience has shown that technical support from the VSBK Team in soil testing, kiln design and construction, and kiln operations notably loading, firing and unloading, are essential especially during the first two seasons in order to scale up the application of VSBK and CESEF technologies, it is strongly recommended that a

[3] Workers' unions have been part of the CESEF compo

workshop be held to showcase the experiences of VSBK, which would help in securing for a future project in this field. It may be useful also for MinErgy to be able to raise funds for time-bound, strategic and outcome-oriented actions aimed at making the VSBK-CESEF Technology and team self-sustaining, thus completing the task initially set out by SDC and the Project. Furthermore, the Project should also explore financing options such as carbon finance and tie up with Clean Energy Development Bank. Several other donors may be interested. EU, UNDP, DFID, World Bank and ADB support climate change related projects and DFID and GTZ would most likely be interested in funding social components, especially as they relate to Gender and Social Inclusion.

The Project should utilize the remaining period to produce a series of communication materials to capitalize and market its knowledge and develop a business model for self-sustainability.

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1 Introduction

The VSBK-CESEF Project promoting clean building technologies is a bilateral project of the Government of Nepal (GoN) and the Government of Switzerland represented by the Swiss Agency for Development and Cooperation (SDC).

The Project was initiated by the SDC with technical support from the former Natural Resources Division (NRU) of SDC HQ. The Project started in 2003 with Skat as implementing agency. The Project is currently in its 4th phase (2008 - 2011) with a budget of 4'200'000 CHF. The overall budget for all phases amounts to 8'700'000 CHF.

The overall goal of the project is to contribute to reduced emission of greenhouse gases (GHG) and pollution in the construction sector to mitigate global warming, health, and environmental degradation. Its objectives are (i) to help entrepreneurs adopt environment friendly technology and demonstrate a socially responsible behaviour, (ii) to motivate real estate developers and individuals constructing their own houses in urban and semi-urban areas use energy efficient building materials and technologies, and (iii) to influence GoN to have a favourable policy environment to promote clean production technologies in the brick sector.

Phase 4 (2008-2011) of the project has four thematic components, namely the i) VSBK track which deals with the dissemination of the cleaner brick firing technology, ii) CESEF track which focuses on the introduction of cost effective social and environmental friendly building technologies (i.e. products and their application), iii) building strategic alliances focusing on the environment and climate change including a strong policy dialogue with the authorities and advocacy in partnership with civil society lobby groups and environmentalists;, and iv) institutionalisation /

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privatisation of the programme services, including implementation and assessment of an exit strategy[8]. In addition, the project has a social component which is a transversal issue for both above mentioned components and deals with the increasing of the social responsibility of the entrepreneurs.
The project will be phased out in December 2011, and the current evaluation is intended to assess the project's results and lessons, for documentation and for possible sharing with a wide range of development organisations working in the field of climate change and environmental preservation.

2 Objectives and Methodology of Evaluation

This external evaluation reviews progress against key log frame indicators and comments on the context, relevance, achievements and effectiveness and sustainability, as related to the following aspects of project implementation:

1. Technology Development and Transfer
2. Effect on Environment and Climate Change
3. Policy and Institutional Influence
4. Social Intervention Model and Outcomes
5. Management, Monitoring and Steering

The study then suggests the future outlook and the way forward.

The evaluation methodology included study and review of studies done on the project and accessing studies and lessons from other programmes that work with brick kiln technology such as VSBK India. The team held interviews and focussed group discussions with key informants, and a wide range of stakeholders (including entrepreneurs, workers, investors and adopters of the VSBK/CESEF technologies) and carried out field visits to five locations including Kathmandu Valley and the districts of Kapilbastu, Nawalparasi, Rupandehi, and Jhapa[9].

Limitations: The evaluation was constrained by lack of data, especially that of a baseline for social aspects in the brick industry, in the absence of which outcomes and impacts are very difficult to assess. Secondly, while the evaluation considers relevance, effectiveness and sustainability, the efficiency aspect has not been considered in the review, as it was not possible to calculate and relate the total financial input, and its quantitative impact on different levels such as, improved health conditions of the local communities, reduced emissions and improved social working conditions for labour.

[8] Source: Project Document, Phase 4,15th October 2007
[9]The detailed Mission Programme is available at Annexure 2.

3 Technology Development and Transfer

The Project has two distinct components for technology development and transfer. The first relates to the VSBK technologies and the second to CESEF. They are evaluated separately in the following sub-sections.

3.1. VSBK

VSBK technology itself is well known and there is little need for a prima facie assessment of the technical feasibility of VSBK and its benefits compared to FCBTKs or MCBTKs in terms of energy used or emissions. Rather the issues to be addressed are the adaptation of the technology to local conditions, status and performance of VSBK technology as presently deployed in Nepal, the capability of the Nepal VSBK Team, effectiveness of technology transfer to entrepreneurs, and lessons regarding technical and technology-management aspects of dissemination under the Project and hence for future economy-wide dissemination.

Kiln Design & Construction

The Nepal VSBK Team has successfully adapted the VSBK to local conditions. As seen from different VSBKs visited, the kiln design and construction has undergone several changes since its initial introduction, showing a process of successive modification and optimization learning from performance and user experience. Modified shaft dimensions, chimney design and material (changed from metal to brick), and system for carrying green bricks to the top of the VSBK via stairs, ramp or lift, are all indications of a robust learning process and stand testimony to the capability acquired by the Nepal VSBK Team. As a result, VSBKs deployed under the Project are of sound design and construction. A few aspects however call for further improvement as suggested further below.

Brick Quality

Quality of bricks from the different VSBKs visited was found to be good although not outstanding and somewhat inconsistent across kilns. This is another area in which the Nepal VSBK Team showed their excellence and focus in absorbing the key aspects of the technology. The lesson from the Indian experience, that quality of VSBK bricks and hence success of the technology, is crucially dependent on proper testing and selection of soil, has been well absorbed by the Nepal VSBK Team. Most VSBKs visited showed that entrepreneurs too have learnt this lesson well, with several units bringing in better quality material from other locations when necessary. Variations in brick quality have been kept relatively low due to the VSBK Team's technical capability and successful transfer of technology and capabilities to entrepreneurs.

Attention paid under the Project to making quality green bricks is impressive. Mechanical pugging i.e. thorough mixing of raw material has been adopted by almost all VSBKs visited, although considerable variations in processing methods and proportions of admixtures, especially of coal dust as internal fuel, mean that pugging rarely conformed to "best practices." Ageing was being done cursorily if at all. Scope for improvement is considerable even without mechanization of brick moulding.

Good quality bricks do not yet command a premium price in Nepal contrary to claims in the Project documents (Project Document Phase 4, p.8). Indeed, VSBK entrepreneurs almost uniformly stated that brick prices were almost insensitive to quality with one entrepreneur in Imadole in Kathmandu Valley feeling no pressure to improve quality since he obtained a good price of Rs.9/pc anyway! Yet, VSBK brick quality could be improved considerably and, along positioning of VSBK bricks as premium products especially in exposed-brick buildings and other promotional measures, would indeed help in gradually establishing a VSBK brand-image.

Firing practices could be substantially improved, although on the face of it, breakage and rejection rates of around 3%-5% reflect well on the technology transfer to, and absorption by, the entrepreneurs. Temperature at the top of the stack, as judged by touch, appeared to be within acceptable range. Some post-firing rejection was clearly due to defects in green bricks as evidenced by cracks, distortion or inconsistent internal texture indicating problems in raw-material quality and/or drying. Some firing defects were also visible such as black spots, over-firing and lack of uniformity in hardness, colour or "ring" even within batches. Whereas some provision had apparently been made for peepholes to monitor flame colour and hence temperature, these were not accessible or used in any VSBK visited, so firemen were evaluating the firing process only from the top. Proper monitoring and control of firing is very important in VSBKs. The Nepal VSBK Team is urged to retro-fit and ensure in future installations peepholes in proper locations with convenient access, encourage the use of pyrometric cones to the extent possible (since thermocouples are known to be problematic even in India), and paste colour charts at each peephole to enable ready comparison with the desired colour at each of the observation points at different heights.

The above learning curve could have been shortened considerably if the transfer of VSBK technology from India had been institutionalized in the Project and lessons from the Indian experience systematically drawn upon.

Dissemination of VSBK

Progress in dissemination has accelerated substantially in the present Phase IV whereas it was quite slow earlier. The declaration of the Department of Forest of the Ministry of Forest and Soil Conservation on 23 April 2010 that VSBK is a non forest-fuel-wood industry has further speeded up dissemination. The Project has not only achieved the targeted 20 VSBKs, it has also catalyzed an additional 10 VSBKs likely to be set up in the remaining Project period. This is an outstanding achievement, amounting to about 5% of the estimated 460 Brick Kilns in Nepal. In comparison, in India, DA assisted in setting up 250-300 VSBKs amounting to about 0.2% of the around 100,000 Brick Kilns in India. Since Nepal is so much smaller, and the brick-making regions within it are relatively more compact, the penetration achieved could be close to the critical mass[10] necessary for economy-wise dissemination of VSBKs, although some other stimulation and support would be required for the same.

[10] The dissemination of any new technology needs time and depends on an array of factors many of them external and difficult to affect by the Project management. The removal of the forest distance rule clearly demonstrated how the change of a key factor could affect dissemination of VSBKs. Therefore, the term "critical mass" should not be taken to mean that self-dissemination is automatically achieved once a certain number of VSBKs are operational but rather as whether the number of VSBKs set up, and the impact this has made, has generated sufficient momentum to facilitate economy-wide uptake given other favourable factors. This is not objectively triggered by a specific number but is a matter of judgement.

A strategic approach to dissemination through purposeful identification of drivers, adopters, likely partners and supportive policies based on experience from earlier phases would have resulted in, and will in future too be required for, more extensive and quicker adoption of VSBKs. Realizing earlier that minimizing localized pollution is a stronger motivation than reducing GHG emissions, or that VSBKs attract new entrants rather than older BTK entrepreneurs, combined with a more targeted policy-advocacy and marketing, would have yielded better dividends. Some efforts by SKAT Team Management in this direction does not appear to have translated into action.

Technical back-up by the VSBK Team has clearly been critical for the dissemination effort especially since it has involved mostly new entrants to the brick industry. Even at the extant level and pace of uptake, the resources of the VSBK Team have been stretched. For future dissemination likely to be wider and more rapid, the Team needs to be expanded and strengthened including for marketing and liaison.

3.2. CESEF

Promotion of a set of "Cost Effective, Social and Environmentally Friendly" (CESEF) energy-efficient building materials and construction techniques was added on to the Project in Phase 3 i.e. in 2005-2007, three years and two phases after the VSBK work had been initiated. The core idea was that adding other energy-saving technologies to the intervention basket would complement the VSBK technologies and together make a significant impact on the building construction sector in Nepal while also addressing additional stakeholders in the construction industry ranging from home-owners to masons, building material entrepreneurs, builders, architects and others.

CESEF Component as a set
CESEF Team itself is excellent and very well led. Some additional guidance in technology management, technology transfer and strategic thinking would definitely enable the Team to take the CESEF project forward.

The technologies comprising the CESEF package have been somewhat randomly picked up from a few specialist NGOs in India. Not only are other options too available, but also those chosen have been deployed before adequate field assessment. A wider but better selected menu of options, along with a period of adaptation, demonstration and field-testing would have enabled the emergence of a better, user feedback-based set of options for deployment. Market feedback would further select the most viable options.

Individual CESEF Technologies
Each of the different technologies is briefly discussed below from the technical, viability and deployment strategy points of view.

Rat Trap Bond (RTB)
The star of the CESEF stable has been time-tested for over three decades in India. It is a technique rather than a product, saves money by reducing number of bricks required and also reduces the thermal load of buildings. But in India it is yet to catch on outside of Kerala state although over 100,000 houses have been built with it there, thus demonstrating the inertia and reluctance to change in the construction industry.

Concrete Blocks (with/without round aggregate)
This is again a well-established technology but one which will gather acceptance gradually and at varying pace in different market segments: in India, it is more widely used in rural areas and also in boundary walls in commercial urban buildings. The few units visited in Butwal, Nawalparasi and Kapilavastu showed that quality of the blocks still needs considerable improvement especially in terms of finish although they appeared to be reasonably well cured.

Micro-Concrete Roofing (MCR) Tiles
This well-known technology meets the needs of a rather small and perhaps shrinking user segment that falls between clay tile and Galvanized Iron (GI) sheet roofing, and is very price sensitive. MCR Tiles also suffer from disadvantages being vulnerable to damage in high winds, seepage of rain water and dust and the roof slope also needing adjustment depending on local wind conditions. Several installations visited showed precisely these problems which should have been understood before deployment. A serious compounding factor is the poor quality and finish of the MCR tiles due to the fact that all the machines used were manually operated, a deliberate choice on grounds that entrepreneurs wanted less expensive machines that did not depend on electricity. However, this results in poor quality tiles because the concrete matrix is not imparted sufficient vibration. The motorized machine is inexpensive and can be operated with a small stand-by generator in case of power failure.

Round Aggregates
Use of smooth rounded pebbles instead of the usual small jagged stones has been around for some time but has been adopted in the CESEF package with a measure of aplomb. A factor that immensely assists this is the availability of the material in nature and the ease with which the requirement of official permits can be evaded.

Other Technologies
The Project Team has also inducted Concrete Door and Window Frames, and tried but abandoned Ferro-Cement Roofing technologies. The former would have demand in rural areas and low-end housing due to its lower cost compared with aluminum, although MS frames are likely to be serious competition. Ferro-cement channels may not work as roofing over dwelling units but, like MCR tiles, could well be used over garages, parking stands, porticos, animal sheds etc. The technology is also useful for making door and window panels, storage containers for rainwater harvesting etc. Other technologies too are available especially for rural application but each will have its particular appeal, utility and market niche. These require to be well understood and the technologies adapted for local conditions before being deployed and while promoting enterprises.

Dissemination and Viability of CESEF Technologies
The Project has substantially met most of its outreach targets although more in quantitative than in qualitative terms. 260-300 building-sector technology users including entrepreneurs have been transferred and trained in different CESEF technologies but, as seen above, not in a manner measuring up to what can be termed "best practices". A few builders have adopted RTB or other CESEF technologies and 50 home-owners have built their own houses using CESEF technologies while 100 have used RTB. These are typical figures for the starting phase of interventions in the building sector but are nowhere near the critical mass required for economy-wide spread of the technology.

The construction sector is changing rapidly in South Asia and Nepal is no exception. All building materials and techniques are subject to severe competition and changes in trends. Even in the medium term the popularity or sustainability of any one technology cannot be taken for granted and will be subject to many pulls and pressures. CESEF needs to have not merely one finite set of technologies but a core strategy, institutional structure and mechanisms to flexibly adopt, adapt and deploy (or abandon) a relatively wide range of need and demand-based construction technologies.

A strategic approach to deployment and promotion of CESEF technologies needs to be adopted. Differences in market segments, "carriers" for different techniques and materials, policy drivers such as acceptance of CESEF technologies into formal building codes, all need to be taken into account keeping in mind that most house construction takes place under informal systems. In such a context, the approach adopted in the CESEF track was rather ad hoc and itself caused impediments for dissemination. As seen above, deployment was often taken on before technologies were adequately adapted, stabilized and tested in local conditions and sometimes even visible deficiencies in technologies were not corrected before deployment, all possible in the hope that weaknesses would be ironed out along the way. Perhaps in an effort to catch up with the VSBK track, the stage-wise innovation process envisaged initially was not followed. These issues need to be redressed for future dissemination and sustainability of the CESEF track.

Sustainability

Absence of some institutionalized set-up for CESEF - a kind of field laboratory where different technologies would be tried out, adapted and standardized, where products could be tested and practitioners could come for exposure and training - is a serious handicap. The Project's preference for a field-based rather than an institutional approach is partly understandable but also means a considerable loss to the CESEF programme as regards technology adaptation, standardization and testing prior to deployment and trouble-shooting during it. A "CESEF Field Centre" could also contribute to revenues.

Long-term sustainability of the "MinErgy Group" comprising both VSBK and CESEF groups requires to be developed and measures taken to actualize this. Within such a structure, it should be ensured that CESEF-related work also carries its weight as a revenue stream and not require to be "subsidized" by VSBK work. Experience of organizations in India may help generate a model suitable for Nepal.

NGOs in India have generated revenues in construction technologies broadly through one or all of 3 modalities:

- offering consultancy or contracting services
- A business model for undertaking building construction themselves, usually under relevant Government Schemes e.g. housing for the rural poor, or for rehabilitation
- setting up and operating enterprises for building materials e.g. MCR Tiles, Fly Ash Bricks

In particular, the concept of NGO-run "Building Centres" promoted in India by the

government's Housing and Urban Development Corporation (HUDCO)[11] would appear to be suitable for adoption in Nepal since it provides for technology adaptation, testing, training of users/practitioners and a profit centre for longer-term sustainability.

4 Effect on Environment and Climate Change

4.1. The VSBK Track

The brick industry is mainly responsible for the following impacts on the environment and climate change:

- Deterioration of ambient air quality due to emission of pollutants, particularly suspended particles and sulphur dioxide, thereby increasing the health hazard of adjacent communities;
- Deforestation due to the use of fuel wood;
- Loss of soil fertility and increased erosion at the soil extraction sites due to mining of top soil;
- Contribution to climate change due to emission of greenhouse gases and black carbon.

As shown by several studies (see e.g. Heierli and Maithel 2008; CEN 2009) VSBKs have a) a more efficient heat transfer process and lower heat losses and b) a more complete combustion of fuel than BTKs, resulting in lower emissions of pollutants.

Air Quality and Health Issue
Air pollution is one of the most visible and important issue in the local context, particularly in Kathmandu valley, where air quality is a major problem, with serious health implications. Brick industry in the Kathmandu valley and other urban areas is considered as the second most important polluter after vehicles (Government of Nepal 2006). It is estimated that in 2005, brick kilns in the valley emitted 1850 tons of SPM per year, which is 11 percent of the total pollution load in Kathmandu (Gautam 2006).

BTKs also emit large amounts of sulphur dioxide. Although, the concentration of SO_2 in Kathmandu valley's ambient air is not a major problem, it is generally higher in areas around brick kilns. Monitoring of SO_2 in 2003 indicated that the highest level of SO_2 level was recorded in Bhaktapur, which has many brick kilns. Here the SO_2 level was higher than 50 $\mu g/m^3$ at all times and once the SO_2 concentration slightly exceeded the national standard of 70 $\mu g/m^3$ (CEN/ENPHO 2003).

Kathmandu's air pollution has serious implications on public health and the economy. A study done by the then Ministry of Environment, Science and Technology estimated that the PM_{10} (particle size less than 10 microns) emission in Kathmandu is responsible for 1600 premature deaths per year (MOEST 2005). The economic cost of urban air pollution in Nepal is estimated to be US$ 21 million or 0.29 percent of the country's GDP (World Bank 2007).

[11] (see (http://hudco.org/site/FormTemplete/frmTemp1PLargeTC1C.aspx?MnId=47&ParentID=22) or go to hudco.org and Search for Building Technology)

The GoN has prescribed standards for SPM emissions. It is very commendable that since 2003 the Project has mandated private laboratories/Projects accredited by The Government of Nepal to monitor stack emissions of VSBKs and BTKs including SPM and SO_2 in 2003, 2004, 2005, 2008. These surveys show that SPM and sulphur oxides (SO_x) emitted by VSBK's are systematically and considerably lower than the values from BTKs (see Table 1 in Annexure 3). Therefore, VSBK does provide tangible benefits for the local people living around brick kilns in terms of better health and cleaner environment (respiratory problems, soot deposits on clothes, homes and water bodies, smoggy ambient conditions).

There are occasional incidents where local people have raised their voice against brick kilns in Kathmandu valley. Most recently, on 22 March 2011 about 1000 people from Nakhel VDC in Bhaktapur district organized a protest rally and surrounded the Chief District Officer demanding the removal of polluting brick kilns from their village.[12] As urbanization continues to expand in Kathmandu valley as well as other areas, there is bound to be more conflicts between polluting brick kilns and local people.

Greenhouse Gases

No doubt VSBKs, like other energy efficient combustion devices, help to reduce emissions of GHG by burning less coal than BTKs for comparable quantities of bricks produced, and also by effecting more complete combustion thus reducing noxious gases (carbon monoxide, SO_x, NO_x, methane) and unburnt substances including black carbon. As an important spin-off also the amount of GHG from the coal transport from India to Nepal are considerably reduced.

It is also widely accepted that the building construction sector contributes substantially to GHG emissions. As such VSBKs undoubtedly contribute to mitigation efforts (see Annexure 3). Yet, it is also important not to overestimate the contribution of brick-making to national GHG emissions. However, as Nepal's overall contribution to global greenhouse gas emissions is negligible and of the country's total GHG emissions of 39,265 Gg of CO_2e in 1994-95, only 320 Gg is from the industry, mining and construction sector (MOPE/UNEP 2004), the contribution of the VSBK track in reducing GHG emissions in the country or global context is fairly low. But considering the fact that the construction sector and Nepal's GHG emissions will probably continue to grow, VSBK's contribution towards moving the country towards a low carbon economic growth path can be significant in the future. In this context it is also noteworthy, that most donors in Nepal are engaged in climate change adaptations and only few in mitigation measures.

The role and value of GHG reductions as a driver for adoption and dissemination of the VSBK technology is doubtful as also borne out by the Indian experience, and has probably been overestimated by both SDC and the Project Team as stipulated in the Project Document Phase 4 (SDC 2007). More tangible for the local communities and the GoN is the improved ambient air quality near VSBKs resulting as a co-benefit from reduced stack emissions as outlined above.

Black Carbon

The role of black carbon in climate change mitigation has been overlooked until recently. Black carbon exists as particles in the atmosphere and is a major

[12] http://www.nagariknews.com/society/nation/24563-2011-03-22-10-16-26.html

component of soot. Black carbon result from incomplete combustion of fuel leads to greatly increased content of soot including black carbon. The recent report from UNEP and WMO (2011) highlighted the prominent role of black carbon as a short-lived climate forcer affecting climate change in three ways:

1) Warming the earth by absorbing heat in the atmosphere (on the other hand organic carbon and other aerosols are cooling agents);
2) Disturbing tropical rainfall and regional circulation patterns such as the Asian monsoon, affecting the livelihoods of millions of people;
3) Darkening the snow and ice surface (reduced albedo) thereby increasing the absorption of sunlight leading to increased glacier/ice melting as in the Himalayas; the downstream effects on river flows and water supply is of prime importance for Nepal.

Black carbon is found worldwide, but its presence and impact are particularly strong in Asia, especially in the Himalayas (NASA 2011; UNEP and WMO 2011). Black carbon stays in the atmosphere for only several days to weeks, whereas CO_2 has an atmospheric lifetime of more than 100 years. Therefore, any significant cuts in the emission of the short-lived black carbon through technological improvement in the combustion process of fuel will yield much faster reductions in planetary heating, as compared to reductions in CO_2.

VSBK technology is explicitly stated by UNEP and WMO (2011) as a measure having a large emission reduction potential that improves climate change mitigation and air quality. The percentage of black carbon in SPM in stack emission of VSBKs is greatly reduced resulting in ten and twenty times lower emission of black carbon, when compared to FCBTKs and MCBTKs, respectively (see Table2 in Annexure 3).

VSBK Emission Reduction Potential

Overall, the VSBK technology greatly reduces the stack emissions of the brick kilns including total mass emission load[13], total $C0_2$[14] as well as coal consumption. Figure 1 illustrates the annual amount of mass emission load[15], CO_2, and coal saved by the 26 VSBK[16]when compared to BTKs (for producing the same quantity of bricks). The respective total annual black carbon reduction potential of VSBKs is very high with at least ten times less emitted black carbon (although the detailed calculation has not been made), as shown in Figure 1[17]:

Figure 1 Annual reduction potential of 26 VSBKs compared to FCBTKs/ MCBTKs for same number of Bricks

	FCBTK	**MCBTK**
Mass emission load	196 t (87%)	697 t (96%)
CO_2	15,002 t (44%)	12,224 t (39%)
Coal	4733 t (34%)	3606 t (28%)

[13] IEM, 2005

[14] Primary data (VSBK) and CEN, 2009

[15] kg pollutant/1000 bricks

[16] 90,150,000 bricks at full capacity including all VSBKs constructed in the four Project phases or currently under construction

[17] Overall, the VSBK technology greatly reduces the stack emissions of the brick kilns including total mass emission load[1], total $C0_2$[2] as well as coal consumption (see Figs. 3-5 in annexe 3).

The market share of the overall brick production in Nepal is still quite low with 6.3% (considering full production of the 26 VSBKs). But the recent increase of the number of VSBK from 4 in 2009 to 26 in 2011 is quite impressive although the increase has been certainly favoured by the declaration of the GoN stipulating that VSBK technology is a non-wood based technology, therefore not requiring certification of forest distance (5 km).

While coal is the main fuel used in brick kilns, some of the kilns also use other fuel types including in particular fire wood but also agricultural residues and saw dust. However, these fuels are not used regularly but mainly during ignition. According to a survey of 100 brick kilns in Nepal, only 21 percent used non-coal based fuel along with coal (CEN 2009). However, should coal prices rise, there is a possibility that more kilns switch to fuel wood since fuel prices are a major portion of production costs. As VSBK uses only coal, and cannot use wood as a fuel, it will obviously contribute towards reducing deforestation.

The GoN has called for a ban on the MCBTK technology all over the country by end of 2011. This is a unique opportunity to scale up VSBK technology through a promotion campaign including all major stakeholders. If this is not done, there is a strong possibility that most of the existing MCBTKs will be replaced by FCBTKs, as happened in Kathmandu valley in 2003, when the Government banned MCBTK technology in the entire valley.

Most important in the Nepali context is the much reduced emissions of SPM (including black carbon) which significantly mitigate the health hazard of the adjacent local communities near the kilns. As a significant co-benefit the greatly reduced black carbon emission of the VSBK technology has an immediate mitigation effect on climate change considering the much shorter lifetime of black carbon compared to CO_2.

4.2. The CESEF Track

The impact of building material and construction techniques on the environment and on climate change is a function of a) type and amount of resources used (wood, cement, iron etc.) and b) energy needs of the production cycle, and c) amount of emissions.

The CESEF technologies are being over-sold in the Project Document Phase 4 (SDC 2007) as emission-reducing "green" technologies, since several of these technologies are based on cement-concrete (except the main one, RTB). It is well known, and acknowledged in the Project Document itself, that "the energy consumed in manufacturing modern building materials, i.e. bricks, cement and steel, can far outstrip the entire life cycle of the building!" It would be better if life-cycle emissions of different technologies are properly compared. Moreover, the benefits of substituting other products such as wooden window/door frames thereby reducing deforestation should also be included in the comparison. A more modest, and a more accurate claim would be that these technologies are more economical and can also save some energy compared with burnt bricks or burnt clay tiles.

Although bricks are still the major building material in many parts of Nepal (Winrock 2009), the focus of the Project, by being restricted to VSBK and selected CESEF technologies, perhaps neglected other environmentally friendly building materials such as compressed earth blocks.

Carbon Offsets

The idea of leveraging Certified Emission Reductions (CERs)[*] for the VSBKs, did not fructify, although an attempt was made with the assistance of Winrock Nepal (Winrock 2009). While conceptually a good idea and the effort was laudable, positive results were always unlikely given the too low numbers of kilns, the high transaction costs involved and the notorious difficulties of obtaining CDM carbon-credit funding. MinErgy may find the different options available in the voluntary carbon market (VER) more attractive. Although with lower value than CERs, VERs are relatively easier to transact and may therefore be preferable, particularly the Gold Standard VERs with a higher quality and a better price.

A business partnership could be built with VSBK entrepreneurs and the Clean Energy Development Bank Nepal (CEDB) which is an investor in clean energy with a good record of funding entrepreneurs in the VSBK Association.

5 Policy and Institutional Factors

Appropriate policies and capable institutions are critical factors for scaling up the application of cleaner technology and practices. The project has recognized this and included "favourable policy environment" as one of its objectives. However, the project has neither done an overall policy review, nor developed a clear strategy to meet this objective. As a result, the Objectively Verifiable Indicators (OVIs) related to this outcome and the achievements of the project in this sector are fairly limited. Policy advocacy is not an easy task, especially at this time of political instability and transition in Nepal. In this context, the successful advocacy for declaring VSBK as a non-forest fuel based technology by the Ministry of Forest and Soil Conservation and the Ministry of Industry is a major milestone and this has resulted in simplifying the registration process of VSBKs and subsequently increased the number of entrepreneurs who have invested in this technology. However, more efforts could have been put in advocating for and supporting the development of policies related to proper enforcement of environmental regulations and standards, incentives for entrepreneurs investing in clean technologies and incorporation of promotion of clean building technologies in climate change related policies.

The external evaluation of 2007 had already highlighted the need for improved policy advocacy and made the following main recommendation to the programme, which was quoted by the Programme Document for Phase IV to justify the reorientation of the new phase:

"The programme must become more holistic and strengthen those dimensions that can act as drivers for change. The important dimensions climate change debate,

[*] There are two markets for carbon offsets: 1) The larger, compliance market, under the Clean Development Mechanism (CDM) of the Kyoto Protocol (1997) using Certified Emission Reductions (CER) and 2) the much smaller, voluntary market, using Voluntary Emission Reductions (VERs).

policy dialogue with the government, but even more with civil society, massive training and marketing of need to be addressed and for this it is advisable to strengthen the capacities through liaising with other organisations and seeking the support of other donors. Inside the project some 'connectors' should be recruited who can make this liaising productive and release all this potential."

The SKAT management has not implemented the policy recommendations of the previous review, as the proposed reorientation of the programme has not yet happened to the desired extent. The Programme Document mentions that, "instead of looking from a supply side, Phase 4 introduces a shift of perspective by positioning the Project in the climate change complex of problems." However, the Project has not been able to project itself as a climate change related project and it is not mentioned in the list of ongoing climate change related projects by the Ministry of Environment. It appears that the Project is not participating actively enough in climate change related discussions or policy making and it is not part of climate change related networks such as the Climate Change Network Nepal. A recent document on climate finance in Nepal has not even listed the project in climate change related projects in Nepal (Oxfam 2011), a clear indicator of a visibility issue.

5.1. Policy and Regulatory Framework

Three sets of policies are relevant, those relating to environment, to climate change and the institutional framework and regulations relating to working conditions and living conditions of labour, especially the social aspects. Policies related to the social aspects will be addressed in Section 6.

Environmental Policies Legislation and Standards

Nepal has some policies and legislation to promote cleaner production and environmental protection, such as the Environmental Protection Act (EPA) and Regulations, National Ambient Air Quality Standards and Emission Standards for Brick Kilns. However, policies are often not followed by the necessary plans and programmes for their implementation, and legislation and standards are rarely enforced, mainly due to institutional weaknesses on the part of the Government as well as low priority of the GoN in implementing such legislation and standards. The Ministry of Environment, for example, clearly does not have the necessary manpower and financial resources required to monitor brick kilns. It has been requesting the GoN for establishing a Department of Environment to do the implementation work, but this has not been materialized. Similarly, the Department of Industry does not seem to be serious enough to issue pollution control certificates as stipulated in the EPA. Under such a scenario, it is difficult for the project to use policy and regulatory framework to promote VSBKs and CESEF technologies. Although the project has made some efforts in creating an enabling environment for the enforcement of the legislation and standards, more needs to be done. One interesting case is the decentralization of pollution control certificate done in Morang District with support from Strengthening Environmental Administration and Management Nepal (SEAM-N) project, where the responsibility of Ministry of Environment has been handed over to the local government. Such a system could be promoted in other areas as well.

Besides the Environmental Protection Act and Regulations, there are environment related provisions in other regulations as well. In the past one of the main stumbling blocks in the promotion of brick kilns had been the categorization of all brick kilns as fuel wood based industries and thus the rule that brick kilns had to be located at least

5km away from forests. One of the main achievements of the project has been its ability to convince the Department of Cottage and Small Industries to declare VSBK as a non-forest based technology and therefore there should not be a requirement of forest distance. This was achieved through the good offices of COOF/ SDC officers in Nepal, who advocated with government for exempting VSBK technology from this restriction.

Climate Change Related Policies
Recently the GoN has introduced two important policies – the National Adaptation Programme of Action (NAPA) and the Climate Change Policy – which are relevant to the future of VSBK and CESEF in Nepal. Although the policies do not mention clean building technologies, they have highlighted the need for climate sensitive development and initiatives such as VSBK/CESEF.

One of the targets of Nepal's Climate Change Policy, which was approved by the Cabinet in January 2011, is to prepare and implement a low carbon development strategy within three years to make socio-economic development climate resilient. The policy also mentions that incentives will be provided for development, transfer and use of technologies that reduce greenhouse gas emissions.

NAPA, which was endorsed by the Government in 2010 to prioritize Climate Change adaptation, has identified nine priority projects, one of which is "Promoting Climate Smart Urban Development." One of the activities within this proposed project is "facilitating in developing and implementing low carbon development strategies" (piloting in urban areas and spreading in country side). Both VSBK and CESEF could be promoted through this project.

Although the VSBK/CESEF Project has not been directly involved in formulating these policies, it should work with partners to take advantage of these policies and advocate for their implementation.

Social Policies
Nepal's Labour Act 2048, has various provisions related to working and living conditions in industries in order to protect the welfare of labourers, but the Act is often not implemented in the field, with labour inspectors rarely visiting brick kilns.

5.2. Institutional Framework

The Project is working with several institutions in promoting VSBK and CESEF. In the field level, the Project is mainly working with VSBK entrepreneurs and their association, petty contractors' association and CESEF entrepreneurs. This partnership with local entrepreneurs and their association has been very successful and is one of the main strengths and unique points about the Project. Most of the entrepreneurs have not received any support from other projects or agencies in the past and they appreciate the technical support provided the Project. This has helped the technology transfer process at the grass root level and it has also empowered the entrepreneurs, many of whom have relatively small scale operations, and expanded employment opportunities.

At the policy level, the Project is mainly working with the Ministry of Environment and the Department of Small and Cottage Industries (DSCI), but the links with these government institutions is not as strong as it could be. The Director General of the DSCI mentioned that although the linkage with the Project has not been very strong, it has improved in the past few years. Similarly at the Ministry of Environment, the

Project has been working with the Environmental Pollution Control and Monitoring Section within the Environmental Management Division, but it has not been able to establish good working relationship with other key sections within the ministry such as the Climate Change Division or with the higher up officials such as the Secretary and Joint Secretaries, who are important decision makers. Even at the Environmental Pollution Control and Monitoring Section, a recent report prepared by the section describing its activities does not mention the VSBK project (EPCMC 2011). For long term sustainability and anchoring of the achievements, the Project needs to work more closely with the Ministry of Environment as whole as well as other important institutions such as the Ministry of Industry and the National Planning Commission.

Besides private sector and GoN, other important stakeholders are civil society organizations, media and international development partners, who can play a role in shaping public opinion or doing advocacy campaigns. Here again, the Project has occasionally worked with civil society groups, media and other international organizations in the sector, but these partnerships have not been at the strategic level. The Project could have used alliances such as the Nepal Forum for Environmental Journalists, the Clean Air Network Nepal or the Climate Change Network Nepal more effectively to advocate for its cause.

Overall at the policy and institutional level, the Project's activities have been very relevant but its effectiveness and efficiency has been moderate. While its partnership with local entrepreneurs has been very effective, the same cannot be said about its partnership with government agencies. This strategy of working closely with entrepreneurs has helped in demonstrating outputs in the field but weak links at the policy level have not helped ensuring the sustainability of the Project's outcomes.

6 Social Intervention Model and Outcomes

This section summarises the context, model of intervention, achievements, constraints and way forward for the Project's social interventions (see Annexure 4 for a detailed discussion).

6.1. The Context and Relevance of Social Interventions

Nepal's Construction Sector has many "Working Poor". Fifty three percent of Nepal's population lived below the poverty line in 2005. Given that 4 out of 5 person above the age of 15 are in the work force, Nepal is characterised by "working poverty" meaning that even though people are employed, their earnings remain abysmally low. The construction sector in Nepal contributes 5.9% to the country's GDP and 3.2% to employment, and is an important sector for social and labour related interventions.

Working on Brick Kilns

The number of workers in the brick kiln sector is estimated to be 40,000 (Tdh 2008), of which an earlier estimate shows that 82% were Nepali and 18% from India (ENPHO 2001). They are grouped according to the tasks they perform (making green bricks; transporting; loading, firing and unloading; etc.), and according to their

national/caste/ethnic origins. Their living shacks are on different sides on the kiln, and they have little social or work related interaction. They are marginalised people that have been economically and socially exploited (Tdh 2008). This marginalisation and exploitation continues on the brick kilns.

The working and living conditions on the kilns are dismal, with workers in each activity exposed to several risks. Those workers who move to the kiln with families have typically poor housing, unsafe for women. They do not have access to safe drinking water, sanitation facilities, and children face high levels of under-nutrition[18].

Worker organisation on brick kilns is heavily dominated by the traditional type, whereby the "*thekedars*"[19] contract out the others, and manage the advances and payments to them. Workers' associations in Nepal are too weak to make inroads in the brick kiln sector, and given that a majority of the workers are migrants from India or within Nepal, trade unions do not find it worth their while to include them as members. The only exceptions are project-based efforts such as those of ILO/IPEC, ILO bonded labour programmes, and CESEF, where the projects provide motivation, capacity building and often some finances for reaching out to marginalised groups such as bonded labour or brick kiln workers. Another exception is the All Nepal Construction Workers Union (ANCWU), which has raised the issue of wages and other demands with the entrepreneur associations, and with the government (ANCWU 2011).

Thus the social situation of workers on BTK sites is dismal, with a need to work with entrepreneurs as well as workers, and to influence policy and organisations. All these underscore the high relevance of social interventions in the brick kiln and construction sectors. The Project indeed recognised these needs in its documents and sought to address these needs through its varied and many interventions, which are now discussed.

6.2. The Project Interventions and Achievements

In the VSBK Project, social interventions were designed to go along with the technical ones right from the beginning of the programme in 2003, when a "techno-socio integration" approach was followed (SKAT 2002; SDC 2002; SKAT 2004). The intention was always to "create an interface between technology and the people to benefit the workers" (Manandhar 2011), and again in the third phase of funding, 2005-2007, the Project objectives included "improvements in environmental performance and social equities of the building materials sector" (SKAT 2004:4).

The idea, therefore, was to follow a partnership based approach to influence two sets of key stakeholders: entrepreneurs and workers. The focus with entrepreneurs was

[18] Studies in VSBK showed that 63% of the children on brick kilns are undernourished.
[19] Labour contractors

to make them socially responsive, and participate actively and financially in the introduction of several improved practices as elaborated later. In order to give entrepreneurs the time to understand the intended interventions, and overcome fears related to social action with workers, the social interventions are not started in the first season, but in the second season of brick production. The interventions with workers are aimed at increasing awareness and changing behaviour patterns regarding work, for instance use of protective equipment, habits related to food and nutrition, improved gender relations especially stopping domestic violence.

In 2011, the Project's social interventions cover 9 VSBKs and 1 FCBTK. Four child care centres operate in VSBKs. The social team comprised of one social coordinator, 6 programme staff (of which 2 for CESEF) and 11 social mobilisers (of which 3 for CESEF), 7 care takers and 3 women supervisors. A total of 323 workers were covered under VSBK and 477 workers under CESEF components. CESEF worked with 4 producer groups and 34 contractors / entrepreneurs.

Four key areas of interventions were included in the VSBK Project Phase 4 log frame, for the VSBK and CESEF tracks. Achievements against these are as follows:

1. Logframe Indicator 1: Worker absenteeism is reduced
Absenteeism of workers is reduced, leading to improved productivity and increased wages, as wages are based on the number of bricks.

Logframe Indicator 2: 40% of targeted workers are seen to use at least 3 types of personal protective gear
By 2010, 40% of targeted workers are seen to use at least 3 types of personal protective gear (helmets, dust masks, gloves). There is evidence to show that the project was effective in raising awareness about occupational safety and health (OSH), and in recording the incidence of diseases related to OSH.

3. Logframe Indicator 3: Cases of sexual harassment are reported and are dealt with on an individual or group level
Sexual and gender based violence cases have been revealed through home visits and peer educators. There has been a move to introduce secure doors on the sheds and by demand wage distribution in an open place, and in the presence of women.

4. Logframe Indicator 4: Increased average weight of children at the end of each brick production season
Evidence from 2008 to 2010 shows, that 32 to 41% children were underweight. Project interventions led to increased weight of 5.5% to 22%, with about 35-50% showing an increasing trend. The increase in the weight of children at the end of each brick production season was achieved through more awareness about health and nutrition amongst families. However, the modest figures rightly indicate that low weight of children arises from multiple and complex problems, and is not easy to set right through small interventions of a single project.

The Project made several key interventions which enabled it to achieve the results as mentioned above. The most important of these is the introduction of **Child Care Centres (CCC)** at worksites by kiln owners. First it helps reduce absenteeism. Second, it has been a huge step in increasing the productivity of women workers. It was also observed that when CCC's were closed, worker

productivity went down by 35%[20] (VSBK 2011). The other major interventions and achievements relate to:

Entrepreneur Acceptance: Entrepreneurs have accepted many of the interventions, especially the CCC. They even pay for the social mobiliser, as it increases the productivity of workers. However, it is not certain if entrepreneurs will address issues of sexual harassment or domestic violence in the absence of the Project's support.

Provision of Safe Drinking Water: The project increased awareness of workers about safe drinking water, and also piloted successfully in one or two locations, a water-vendor model, whereby workers purchased safe drinking water. In some kilns, the entrepreneurs supplied safe drinking water (Sapkota 2009).

Health and Working Conditions of Labour: Earlier investigation has suggested that labourers in VSBK factories have better working conditions, and less latent risk and hazards as compared to FCBTK (Krishanmurthy, Khanal and Giri, undated). Although quantified observations were not possible, this evaluation largely endorses the earlier view that discomfort due to heat is much less in VSBKs although loading could be more arduous since this involves lifting bricks up to the top of the shafts, and even through some VSBKs have replaced stairs with ramps, their slope is still too high.

Skill Enhancement: Skill enhancement, undertaken in the CESEF component, had positive impacts in terms of income increase, improved self-esteem and improved status within the family and community.

Figure 2: Women's Empowerment Enhanced

Shanta used to be a labourer in the construction sector three years ago. She was invited to attend a training by VSBK. She used to cycle the 10-15 km from her village to Butwal for the training. Her daily wage rate at the time was Rs. 120 to 130 per day. Now, after three years, she gets Rs. 220 to 300 as a mason. The increase is not only due to a general increase in wage rates, but rather to her skill levels, which have been enhanced. She feels that if she receives further training, she can command Rs. 500 per day, as men masons do. She gets more respect at home from her husband and feels much more confident and connected after becoming part of the CESEF group.

Benefits to Women: Under the CESEF programme, women have been provided training. Some have also been trained as masons, enabling them to move from being unskilled labourers to skilled ones, and commanding a higher wage. Many have received leadership training, and have become members of savings and credit groups, as well as of labour unions. They have increased their confidence, networking and linkages, empowering them for decision making within the household and their businesses.

Workers Associations: The Project has worked with already existing trade unions to expand their membership among brick kiln workers, and to offer

[20] Admittedly, the lack of baseline information makes impact assessment difficult, further compounded by methodological flaws in the studies conducted on the project, such as small numbers, and changing profile of children affecting the tracking of change over time not being for the same children.

technical trainings. Unions have begun to keep some vigilance on contractors for good payment practices, and some have also provided access to social security, by designing programmes for accident and medical insurance[21].

Savings and Credit Groups: The Project has set up savings and credit groups under the CESEF track, which have been very useful for the workers to learn about thrift and credit. Some have also been able to continue the savings habit, and link with mainstream savings options such as those with banks and NGOs in Nepal.

6.3. Project Shortfalls and Constraints in Implementation

Some areas which are listed in the Project log frame but on which sufficient progress could not be made relate to:

Knowledge Creation: The Project envisaged action research on mitigating of debt circle, and on brick sector specific joint committees, and refining of issue based social action packages. The Project's baseline information is scanty at best, and monitoring information too scattered. The research has not been quantitatively or qualitatively significant, therefore hampering the formulation of any of its initiatives as a serious model for consideration.

Policy and (Self) Regulations: The Project envisaged facilitating a code of conduct for protection of workers, and establishing a link to Early Child Development (ECD) policy of GoN. While the Project made an effort both at the district level and national levels to add establishment as a requirement for licensing of brick kilns by the Department of Cottage and Small Industry (DCSI), sufficient progress could not be made on these during the Project.

Addressing Gender Issues: The Project has found it difficult to address both for domestic violence and sexual harassment at work. Home visits and counselling the women helps, but falls short of addressing men and putting systems in place for prevention of gender based violence. Though individual incidents have been handled, significant achievement could not be made in systems setting. The perception that women are seasonal workers, and that their primary responsibility is at home, works against investing in building their capacities as leaders at the community level. There are, however, no good practice examples of making a positive impact on these, in any other projects with brick kilns by national or international agencies.

Capacity Building for Social Interventions: The Project envisaged that staff capacities will be built to address social issues, especially of the supervisors, social mobilisers and child care takers. While the Project makes an effort through monthly meetings in each region of its work, the kilns are scattered, so is the team; troubleshooting takes priority in monthly meetings, so capacity building remains thin, and therefore the social inputs remain bit weak, too. The capacity building and handholding support has been lacking also from SKAT senior management, who could have provided the strategic overview and capacity building which would have enhanced both scale and quality of the impact, not only for tackling gender issues

[21] There was evidence of this from Butwal, where workers and union leaders explained these initiatives and provided anecdotal evidence of intervening successfully in conflict resolution.

but also other issues concerning labour such as decent working and living conditions or fair wages.

Follow up of Earlier Recommendations: The external evaluation of the Project in 2007 recommended attention to three issues: 1) Increased bargaining position of labourers, 2) strategisation of social interventions for the construction sector as whole, and 3) use of carbon finance for social interventions. It has not been possible for the Project to make progress on these aspects.

Group Formation and Organisation Building is difficult in the brick kiln sector due to seasonality of work and workers being migrants. Migrant workers are also not able to access state-provided basic services and social welfare. This results in workers continuing to be disenfranchised in their new location, even though many have been coming to the same kilns for more than ten years.

Scaling up Child Development Centres could not be achieved due to the fact that only a few VSBKs operated CCCs in any given year. Further, the implementation agencies for FCBTKs (Tdh) and VSBKs were separated, though the intervention model remained the same.

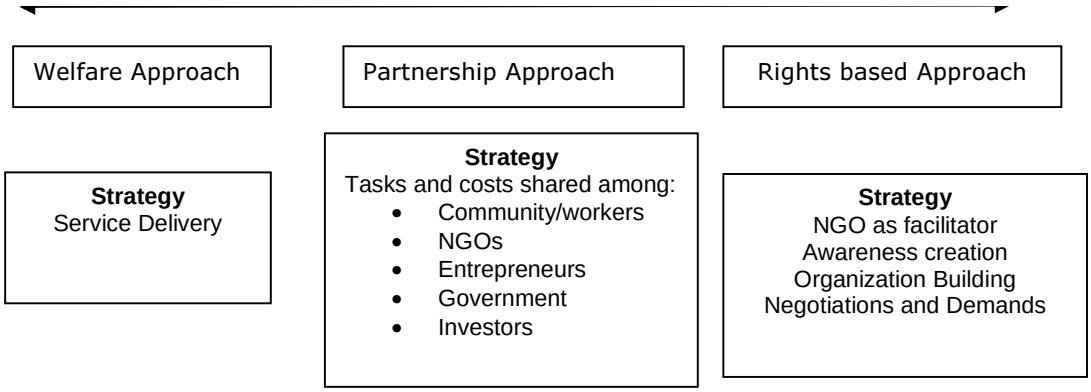
Wages Fixing Standards: Wages are based on output, and are fixed at very low rates, and given that labour and transport costs are the two major cost components, the cost of bricks being one third of the market price shows a bias against giving a fair return for labour as a factor of production.

Poverty, debt, social exclusion and family disintegration are some of the key issues plaguing workers at brick kilns, especially the migrants. Admittedly, VSBKs have a far better organization and care of workers, as seen due to the interventions of the Project.

6.4. Reflecting on the Model for Social Development

The approaches, strategies and key activities for social development in a clean energy project in the brick kiln and construction sectors can be envisaged along a spectrum that is depicted in Figure 2:

Figure 2: Social Intervention Models



Key Activities

- Introduction of socially responsible business practices like ECD (such as providing safety gear to workers and setting up CCCs)
- Individual home visits, issue-based group discussions and mass awareness building; promotion and education about safety at the workplace and occupational hazards, and social problems such as malnutrition, water problems and sexual violence are discussed
- Mother's forums for discussion on child health and nutrition, preventive health care practices including women's reproductive health and HIV/AIDS
- Sanitation programme
- A psycho social approach to attend to gender issues such as sexual harassment at work and domestic violence
- Skill training of workers, especially women and men masons, under CESEF track
- Awareness creation, motivation and welfare schemes facilitated in workers' unions, under the CESEF track
- Establishment of savings and credit groups, especially under the CESEF track
- Inclusion of women entrepreneurs (especially under CESEF track) and masons for skill training and enrolment in worker associations
- Capacity building and coaching of social mobilisers
- Social action committees and conflict resolution processes

The approach followed is not too different from that followed by ILO on its project in Nepal some years ago, though the ILO approach had some strong elements which the VSBK Project does not such as school/out of school education for children from 6-18 year age group.

The social interventions on the Project are framed within a partnership approach, wherein the intention is to influence the entrepreneur and work through him to establish some worker friendly measures. However, the interventions that are done on the brick kiln or construction sites require that the entrepreneurs are collaborative. The maximum support from them is bound to come for those activities for which they see direct benefits, such as reduction in absenteeism or increased productivity due to CCCs. Other areas, however, remain under-addressed, due to the

sensitive nature of the problem, and/or due to low capacity to address these, such as sexual harassment at work, domestic violence, or wage negotiations.

The Project approach also has some elements of service delivery, such as CCCs, which are delivered with the entrepreneur's support, nutrition advice and counselling. It has a few elements of rights based approach, such as negotiations, and issue based meetings between workers and entrepreneurs mediated by VSBK. These latter elements have developed more recently, showing the increasing confidence of the VSBK team in representing and responding to workers' issues.

7 An Overall Assessment of the Project

This section presents an overall assessment of five of the main aspects of the Project using three key criteria. An overall rating is shown in Table 4 and discussed thereafter.

Table 4: Overall Rating

Project Aspects	**Evaluation Criteria**		
	Context and Relevance	**Achievements and Effectiveness**	**Sustainability**
Technology transfer	High	High	Medium
Environmental improvement	High	High	Medium
Social Interventions	High	Medium	Low
Policy & Institutional framework	High	Medium	Medium
Management, Monitoring and Steering	High	Medium-Low	Low

A more detailed assessment is given at Annexure 5, where the evaluation team has made comments on the Logframe and outcomes expected.

7.1. Context and Relevance

This evaluation has found that all aspects of the Project are very relevant in the current Nepalese context. This is mainly because of the following reasons:

- The brick industry in Nepal, as elsewhere in South Asia, operates in the unorganized sector characterized by old energy-inefficient techniques and dismal working conditions. Therefore there is an urgent need for both technical and social interventions.
- Local air pollution from brick kilns is a major concern for the Government and people of Nepal. Although the Government has introduced some policies for environmental improvement, it still needs policy and institutional support to make it more effective.
- The climate crisis and consequent urgent need to reduce global emissions add to the importance of reducing the use of coal in brick kilns, identified as an important source of GHG emissions and black carbon, even though Nepal's

contribution to global GHGs is negligible and emissions from construction are a tiny part of the country's total emissions.
- There are only a few organizations in Nepal working to introduce cost-effective energy-saving building materials while also upgrading skills and incomes of the marginalized sections employed in this industry.
- The approach of the Project in building local capacities, strengthening local entrepreneurs and "change agents," and catalyzing a supportive policy environment is very relevant to Nepal's contemporary needs.

In this context, the need for better, energy-efficient technologies and interventions to improve working conditions is self-evident, and this Project is clearly both important and timely.

7.2. Achievements and Effectiveness

The Project has been very effective in terms of technology transfer and environmental improvement but as for the other aspects, the achievements have been moderate.

Dissemination of VSBK has accelerated sharply during this phase, with 13 VSBKs already constructed and 9 under construction. This is an outstanding achievement, amounting to about 3% of the estimated 700 brick kilns in Nepal (estimation by BTK association), and has generated good momentum for economy-wide spread of the new technology, provided adequate technical support and a supportive policy and business environment are also available. While "critical mass" has not been achieved for dissemination of VSBK technology, it is certainly headed in that direction and it has sufficient visibility to create policy space and attract more entrepreneurs.

VSBK technology has been well adapted to local conditions. Kiln design and construction are sound, and knowledge and skills in different aspects of brick-making in VSBKs have been effectively transferred to entrepreneurs. Energy savings in terms of coal used (30%), reduction of GHG emissions (40%) and reduction of particulate matter emitted especially soot including black carbon (over 90%), have been consistently equal to or better than projected.

Although the CESEF component is not as mature as VSBK, mainly because of its late start, operational targets of reaching around 300 stakeholders or having 100 houses built with the Rat Trap Bond brick-laying technique have been reached.

The technical Team has excellent technical and inter-personal skills and has very creditably performed its tasks of outreach, training, enterprise promotion, popularization and motivation. However, in both VSBK and CESEF tracks, project management has suffered from weaknesses in strategic planning, even more in the CESEF than in the VSBK track. More strategic thinking and implementation as regards both marketing and policy advocacy could have enabled, and will be required in future for, faster and more effective dissemination.

The Project has made modest achievements in influencing policies and strengthening institutions related to the construction sector and the environment. While the recognition of the GoN that VSBK is not a forest based industry was a major achievement, the Project has not been able to effectively target or catalyze other systemic policy changes such as taxation or other incentives for adoption of VSBKs. Other changes in the policy environment such as incorporation of CESEF technologies

into building codes or bringing the brick industry under more effective labour law regulation are of course very complex and perhaps beyond the scope of any single project.

On the social side, good work has been done by the Project under challenging circumstances to improve working conditions and provide some welfare services by convincing entrepreneurs of better returns to them in higher productivity and reduced absenteeism. However, issues relating to behaviour of entrepreneurs and workers, poor bargaining strength of the latter, poverty and lack of access to educational, health and other social welfare facilities are so endemic to the unorganized sector and the brick industry in particular, that structural improvements are difficult to achieve through a limited set of Project-based interventions such as the present one.

The SKAT Project management has been effective in building the capacity of a young team of Nepalese professionals but they have not been very successful in policy advocacy, alliance building and marketing although this is critical for achieving outcome 3 of the Project Document and has been highlighted as a key recommendation in the earlier evaluations done in 2007 and 2009. The current team is technically capable and hard working but they lack the expertise and experience of working with and influencing senior government officials. The Project has also suffered from not being 'nationalised' to a greater extent. The Project Manager is still an expatriate from SKAT. Only recently the technical Project staff founded the private company MinErgy in order to take over the promotion of clean building technologies after the phasing out. The planning of the phasing out of the Project after SDC's decision not to go beyond the current project phase should have started much earlier by the Project Management.

There have been several drawbacks due to inadequate strategisation. On the technology front, the spread of VSBK technology suffered due to an inability to liaise well with the government and remove policy constraints. Both VSBK and CESEF components need to be better strategized, taking into account the market segments, "carriers" and "drivers" of technologies such as policies, building codes, tax incentives, and the fact that CESEF interventions are largely in the informal sector. The strategizing can benefit from experiences in other countries, where there have been pilots for setting up centres for promotion of technologies with government/NGO partnerships.

7.3. Sustainability

As SDC has decided not to continue the Project beyond this current phase, the sustainability of the Project and its outcome is a major concern. Although, the Project has made significant achievements over the past 8 years, the sustainability of the promoted clean building technologies, has not yet been achieved. Without some form of technical support and incentives, it is very unlikely that the number of VSBK kilns and the application of CESEF products which have not even reached the momentum of the former will continue to grow at their current level. Similarly the social interventions will also continue to require external support as the interventions made so far have been scattered and are not yet fully accepted by the industry. Even in terms of policies, while the Government has already enacted some policies there is still need for more policies and legislation and more importantly, the implementation of these policies will require advocacy and support. For example, the Government's

decision for banning all MCBTK in Nepal by 2011 may be implemented but in the absence of continued support for promotion of VSBK, it is likely that the MCBTK will be replaced by the FCBTK, and VSBK will once again loose a golden opportunity. In such a case, the achievements made so far in preserving the environment and contributing to climate change could be lost. The gathering momentum in favour of VSBKs may not only be slowed, but negative trends may also set in with VSBKs slipping from the national agenda in Nepal, undermining all the good work done by SDC and the Project.

7.4. The Way Forward

Significant achievements have been made by the Project, particularly in terms of technology transfer and environmental improvement and an excellent platform has been created for economy-wide dissemination of VSBKs. However, further spread of VSBKs in Nepal will depend upon the technical support services provided to entrepreneurs. At the present juncture, with no financial incentives and a lukewarm policy environment, and considerably higher capital costs for VSBKs than for BTKs, it is difficult to see entrepreneurs being able or willing to pay fees for such services. It is even more difficult to envisage much poorer masons, petty contractors, tiny-unit entrepreneurs or small home-owners paying for CESEF-related services. Services related to VSBKs could recoup costs in the not-too-distant future but CESEF will require a longer-term strategy for sustainability. Therefore the Project should actively look for ways to ensure sustainability of its efforts and continue some of the support that is being provided to entrepreneurs. The following steps should be taken in this process:

- A business model for self-sustainability of the VSBK-CESEF Team should be conceived, concretely evolved and actualized during this remaining period.

- The possibility of carbon financing should be seriously considered. While the CDM process is complex and expensive, the voluntary carbon market (VER) may be a more attractive option. Although with lower value than Certified Emission Reductions (CERs), VERs are relatively easier to transact and may therefore be preferable, particularly the Gold Standard VERs with higher quality and better price.

- MinErgy should explore the possibility of business partnership with Clean Energy Development Bank Nepal (CEDB). As CEDB is an investor in clean energy with a good record of funding VSBK entrepreneurs, it may be able to assist with provisional credit.

- The Project/MinErgy should seize the opportunity of the ban of MCBTKs all over Nepal by 2011 and launch a promotion programme for VSBK technology aimed at entrepreneurs. In order to provide support to these entrepreneurs, the Project/MinErgy could explore the potential for support from donors such as EU, UNDP and DFID, who are supporting climate change related projects.

The critical need for social interventions in the brick and construction sectors needs to be strategised well, and approaches that combine elements of service delivery, partnerships and rights based work to influence business practices and bring about policy changes need to be promoted. The Project could seek opportunities to work

with other partners in this sector so as to continue the good work that has been initiated. Some potential partners could be EU, UNDP, DFID, World Bank and ADB who support climate change related projects. DFID and GTZ would most likely be interested in funding social components, especially as they relate to Gender and Social Inclusion. Organisations like ILO and Save the Children Fund could partner with both fundraising and implementation methodologies[22].

- In order to consolidate and capitalize the knowledge that has been acquired during the project period, the Project should document its experiences and prepare several knowledge products. These should be shared with all stakeholders to inform them about the Project activities as well as seek their support for future activities in the sector.

- The undeveloped nature of the market will need advocacy to influence the GoN to prioritise energy saving and environment friendly construction technologies, and offer economic incentives to cover the increased costs or risks of adopting these technologies.

Any future work in this sector will call for social interventions along with the technical assistance, and for this the role of external support is important in developing the model. At the same time, policies and regulations continue to be of prime importance, as mainstreaming of decent work norms is extremely important to their implementation, especially in the brick kiln and construction sectors which employ some of the most marginalized people. The VSBK project has offered some very important lessons in this field to the larger development community.

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[22] See Annexue for a more detailed note on a proposed workshop and likely donors and stakeholders as participants.

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Annexure 1:
Terms of Reference of External Evaluation of VSBK Phase 4

General TORs for All Consultants

SDC Program

Clean Building Technologies for Nepal

Terms of Reference for External Review 2011

A Context

The Vertical Shaft Brick Kiln (VSBK) Project of the Clean Building Technologies for Nepal Program is a bilateral project of the Government of Nepal (GoN) and the Government of Switzerland represented by the Swiss Agency for Development and Cooperation (SDC).

The VSBK Project initiated by the former Natural Resources Division (NRU) of SDC Head Quarters together with the implementing agency Skat in 2003 is currently in its 4th phase (1.2008 - 12.2011) with a budget of 4'200'000 CHF. The overall budget for all phases amounts to 8'700'000[23] CHF.

The overall goal and objectives are the following:

Overall Goal:

- Contribute to reduced emission of greenhouse gases (GHG) and pollution in the construction sector to mitigate global warming, health, and environmental degradation.

Current Objectives:

- Entrepreneurs adopt environment friendly technology and demonstrate a socially responsible behaviour.
- Real estate developers and individuals constructing their own houses in urban and semi-urban areas use energy efficient building materials and technologies.
- GoN has a favourable policy environment to promote clean production technologies in the brick sector.

In Phase 3 the VSBK track was complemented with the CESEF component to have a more holistic approach, covering a broader spectrum to reduce energy consumption in the building and construction sector of Nepal. Therefore, the CESEF track is basically at its development stage and has not reached yet the full dissemination potential.

For Phase 4, four components have been identified, namely the i) VSBK track which deals with the dissemination of the cleaner brick firing technology, ii) CESEF track which focuses on the introduction of cost effective social and environmental friendly building technologies and techniques (products and its

.

application), iii) the social component which is a transversal issue for both above mentioned components and deals with the increasing of the social responsibility of the entrepreneurs, and iv) Institutionalisation / privatisation of the programme services.

In September 2010, after a mid-term review of its country strategy with Nepal, SDC's Cooperation Office management decided to phase out the VSBK project in Nepal by end 2011 when the current 4th phase will expire. Nevertheless, the planned external review, foreseen to take place in the first quarter of 2011, was maintained in order to provide evidence and lessons learnt from the project both for the local stakeholders and for potential new donors in the field of climate change mitigation in Nepal. In addition, a special event has been proposed in order to share the results and lessons with the project partners, concerned stakeholders and interested donors working in the field of climate change and environmental preservation.

The purpose of the review is thus twofold:

1) to assess the achievements of the current phase, regarding VSBK and CESEF components, especially its cost-effectiveness, viability and potential for scaling up while taking into consideration the current and presumable future policy frame conditions; and
2) to assess if the social achievements of the project generated through the introduction of the VSBK technology justifies the financial support of SDC's Cooperation Office to this sector in general and to the VSBK and CESEF entrepreneurs in Nepal in particular.

B Areas of observation and related questions

The review is intended to address the following general areas of observation (questions in italic are more retrospective, others pro prospective ones):

6. Context and relevance

- *What have been the implications to the project due to the reorganization at SDC HQ and the transfer of the project from the NRU to the South Asia Division?*
- *How realistic or appropriate were the project assumptions and risks as described in the original Credit Proposal and the subsequent ProDocs?*
- *Which contextual changes have occurred since the project started and how have they impacted on the implementation?*
- *How and to what extent has the prevailing political and macro economical situation affected the implementation of the project?*
- *How and to what extent has the project been able to cooperate and establish trust with official governmental actors to promote a VSBK technology transfer?*
- How and to what extent has the project contributed to social responsive entrepreneurship among VSBK entrepreneurs?
- How favorable was/is and presumably will be the policy environment to promote VSBK technology?

7. Achievements

- *To what extent has the project achieved its phase objectives and targets (outputs and outcomes)?*

- *How has the project influenced policies for cleaner technologies in the construction sector of Nepal?*

8. Effectiveness and efficiency

- *How efficiently have the project means been used to achieve the targeted project outcomes and outputs?*
- *How satisfactory is the cost-benefit ratio of the project in respect of the financial input, the reduced gas emissions and the improved social / working conditions for labors especially woman and children?*
- *How and to what extent has the project led to a sustainable adoption/introduction of the VSBK technology?*

9. Management, monitoring and steering

- *How performing was the management, monitoring and steering of the project including the capacity to respond to relevant contextual changes or opportunities?*
- *How and to what extent have the findings, limitations and recommendations of the 2007 and 2009 reviews been utilized to better manage the project?*
- *How and to what extent have the required adequate professional capacities been built up?*
- *How effective was the internal and external communication of the Project Team, especially with regard to raising environmental awareness and the marketing of the new technology?*

10. VSBK component

- Has the project reached the critical mass of VSBK units to secure a substantial impact for self dissemination/replication?
- What evidence is there about a replication of the VSBK technology outside/beyond the project?
- How far is the VSBK component contributing to climate change mitigation?

11. CESEF component

- *How and to what extent has the CESEF approach lead/contributed to a sustainable anchoring of the VSBK technology in Nepal?*
- *Who are/have been the prime beneficiaries of the CESEF technology transfer and what exactly has been their benefit?*
- What needs to be done to increase the impact and the sustainability of the introduced CESEF technology in Nepal?

12. Social component

- *What have been the effects, achievements, benefits and impacts of the introduced social elements / aspects in brick production?*
- *To what extent did the achieved social effects legitimate SDC's support to the VSBK entrepreneurs and the CESEF partners in from the project intervention areas?*

- What needs to be done to further improve / expand the desired positive social effects and impacts of the VSBK technology?
- To what extent has the program focused on the critical social issues and which are the future ones that need to be addressed / taken into consideration?
- What needs to be done to secure the future sustainability of the introduced social improvements in brick production?

13. Outlook

- What is the scope / perspective for continuing to support the promotion of VSBK and CESEF technologies in Nepal and what can be done to improve this transfer with regard to cost / benefit ratio, social effects, policy environment, and implementation support by the GoN?
- What are potential future key requirements / lines of action for all 4 tracks?
- How can the identified shortcomings, obstacles and weaknesses or mistakes best be addressed and avoided in future?
- What strategy should be developed and applied in future to achieve a more rapid and wider adoption of the VSBK and CESEF technologies?
- Who could be potentially interested to act as next (co-)funding partner provided the achievements and the general conditions allow for a continued support of VSBK and CESEF technologies in Nepal?

C Methodology and time requirement

The review team shall tackle the defined areas of observation and the above questions by:

- reviewing different written materials such as mentioned under F
- interviewing different people / institutions who have been involved / connected to the program
- visiting key project sites and talk to staff on the ground / inspect technical 'hard ware'
- conducting 'focus group discussions' or the like as deemed appropriate
- performing visioning exercises to explore possible future avenues for environmentally friendly and socially acceptable brick construction in Nepal.

The final choice of appropriate methods is left to the review team while being subject to a final approval by SDC COOF including the related budget expenditures.

D Tasks and deliverables

The key task of the review team is to perform an independent review in accordance with the 'areas of observations' stated above and to answer the respective questions by applying the described methodology. The team is expected to present the findings in an appropriate format such as a Power Point presentation in addition to delivering a written report of maximum 20 pages including an executive summary of 2-3 pages plus a number of annex materials as deemed meaningful.

It is expected that the team leader and the Nepali team member will participate in the planned public event meant as a feedback to various stakeholders and as a

potential fund raising mechanism to substitute SDC as funding partner beyond 2011.

The designated lead review team member will be responsible for the final quality control and the endorsement of the review on behalf of the entire team.

E Review team

For the review a mixed team is proposed covering different fields of expertise and combining different professional backgrounds. In order to enrich the team's discussions and exchange it is proposed to assemble 2-3 local/regional reviewers with 1-2 extra-regional reviewers. All team members should be independent from the current or past program and implementers.

Two team members are expected to be more familiar with environmental and energy issues related to construction materials as well as with technical aspects of building materials in general and with brick production, including VSBK technology in particular.

Two other team members are expected to be more familiar with social, political, economic and gender issues linked to bonded labour or similar/comparable working conditions in Nepal and/or the Indian subcontinent.

Efforts will be undertaken to compose a gender balanced team if possible. One of the team members will assume the lead responsibility and act as the main editor of the report. The team leader and the Nepali team member shall participate in the restitution/feedback and also presumably in the planned 'public event' scheduled for April 2011.

The different team members will be involved in different capacities depending upon their role, field of expertise and the need according to the areas of observation and guiding questions.

F Reference materials

In order to appreciate the different aspects of the review a series of key project documents will be made accessible to the review team according to their needs and responsibilities. These will encompass in particular:

- Initial Credit Proposal
- Project Document Phase 4 1st January 2008 to 31st December 2011 (dated 14th December 2007)
- Contracts with the implementer including the respective ToRs, and logical frameworks (logframes)
- Annual / progress reports (content & financial)
- Review reports: e.g. 'The speed of change in the brick industry' (external review of the VSBK and CESEF projects in Nepal, March 2007) and the report of the internal Mid Term Review December 2009
- Brick by Brick: The herculean Task of Cleaning up the Asian Brick Industry, February 2008, SDC Switzerland
- Response to the MTR 2009 by Skat (April 2010)
- Report of the technology marketing analysis (August 2010)
- Discussion Paper concerning SDC's intended termination of the VSBK Program by end of Phase 4, 31.12.2011 (by Skat, December 2010)
- Swiss Cooperation Strategy for Nepal 2009 – 2012 (www.swiss-cooperation.admin.ch/nepal)

G Process and timeline

Given the decision of the COOF in September 2010 to phase out the funding for the VSBK project in Nepal by 31 December 2011, the review will need to be carried out as early as possible in order to allow for identifying potential new donors who would be ready – based on evidence and lessons learnt - to pursue the project efforts beyond end 2011.

A combined HO briefing and inception meeting is proposed to be held in Switzerland around mid February 2011 prior to the field visit of the review team. A complementary briefing will be held at the COOF when field visits will start, most probably end of February / beginning of March 2011.

A restitution and validation meeting is proposed to be held at COOF at the end of the field visit / review mission based on a very preliminary draft report / outline.

The review is expected to be accomplished during the month of March/April 2011 (submission of the final report). Based on this final report, a public event is tentatively scheduled to take place in April 2011 in Kathmandu where different interested stakeholders are to be invited as well as new potential funding partners who could provide support to pursue work in 2012 and beyond. In order to allow for mutual learning and exchange partners from India and Pakistan might be invited to the event as well.

H Responsibilities and resources

The overall responsibility for the review lays with the COOF in Kathmandu. The COOF will also sign local mandates / contracts for reviewers from Nepal and/or the region (e.g. India), help in contacting relevant stake- and shareholders, and elaborate a tentative field visit programme for the reviewers. Once the review is over and the findings presented and 'digested', COOF will organize a public event to present the findings and possible raise the interest of new future donors in pursuing the VSBK technology transfer in Nepal.

SDC HO will provide support in particular regarding the development of the review concept and methodology, formulating the 'Terms of Reference' (ToRs), identifying suitable reviewers, providing feedbacks and inputs to reports, and helping in designing and participating in the final public event. In addition to the South-Asia Division the Global Program 'Climate Change' will be involved in helping to identify and choose the reviewers, review the ToRs, and participate in the public event after the review.

For the planned review an overall maximum budget of 150 kCHF is available. This includes the costs for the customization of the findings and recommendations and for their presentation and discussion at a 'public restitution event' in Kathmandu tentatively scheduled for April 2011.

Specific role & tasks and time allocation of the local consultant

The local consultant will complement the international review team and hence contribute actively to the achievement of the above set objectives and specific tasks. He/she is expected to particularly bring in the social, economic and environment/climate change related realities, challenges and opportunities from lessons learnt in Nepal. If needed, the local consultant acts as a translator.

<u>The specific tasks are the following:</u>

1. Assess the **economic and social livelihood** aspects of a rural family from a brick labourer perspective including days of working days, family members involved including child labour, migration and occupational health and safety.
2. Assess the **legal, policy and institutional framework** of the Vertical Shaft Brick Kiln / Clean Building Technologies regarding
   - Labour rules;
   - Existing relevant environmental rules (MoE);
   - Existing incentives / restrictions (MoICS);
   - Development of Clean Development Mechanism (CDM) and Voluntary Emissions Reduction (VER) Projects;
   - Economical stakeholder mapping including assessment of alliances between government, private sector and civil society including brick worker associations and brick manufacturer associations.

Specific TOR for Technical Consultant on Construction Technologies

Apart from the broader ToRs for the Evaluation Team as a whole, the following additional or more specific ToRs were given to the Technical Consultant covering the technical aspects of the Project :

To particularly bring in the technical aspects of Brick Kiln/Clean Building Technologies related realities, challenges and opportunities from lessons learnt in India, and specifically to:

- assess the technical viability of different brick kiln types (e.g required skills,
- quality of bricks, gas emissions etc.).
- assess the potential of traditional and alternative building material as compared to brick houses.
- assess the health risks of labourers using different brick production
- technologies and practices.

Annexure 2:
Evaluation Team's Itinerary of Nepal Visits

8.1. First Visit, March 2 to 11, Drs. Smita Premchander, Urs Bloesch, Bhushan Tuladhar

Date	Time	Activities	Responsible
Wednesday 2 March	….. hrs 14:00-17:00	Arrival – Transfer to Hotel Meeting external review team – final preparations for the review	BRM Review team
Thursday 3 March	8:00-9:30 10:00-12:30 1:30-17:00	Briefing Meeting with SDC Meeting with VSBK/CESEF team **FIELDVISIT 1**: **Kathmandu Valley** Visit Satynaran VSBK	VCE/BNN/DNC VSBK/CESEF team VSBK/CESEF team
Friday 4 March	7:30 - 10.30 AM 10.30 - 15.30 PM	**FIELDVISIT 2: Dhading** Departure from SDC Travel to Yeti VSBK, Dhading • Meeting with Suyash Shrestha, entrepreneur Group discussion with other VSBK entrepreneurs (Raj Singh Dangol & Bishnu Pandit) from Dhading at Yeti VSBK **FIELD VISIT 3: Nawalparasi** Travel to Pashupati VSBK , Nawalparasi • Meeting with Thakur Sharma, entrepreneur • Meeting with Firemaster team, also discussion on social action Visit MCBTK next to Pashupati VSBK	Accompanied by (Suyesh Prajapati) SP Accompanied by SP, (Birkash Chettri) BC
Saturday 5 March	8:00 08:00 – 12:30 13:00 – 13:45 14:00 – 14:45	**FIELD VISIT 4: Madhyabindu, Nawalparasi** • Meeting with Shiva Giri, entrepreneur, MBVSBK • Interaction with workers Focus group discussion with entrepreneurs (6-8 VSBK entrepreneurs) at MBVSBK **FIELD VISIT 5: Madhyabindu community hospital at Kawasati Danda** Visit of Rat-trap bond buildings	Accompanied by SP Shiva Giri, Community Acompained by (Santosh Lama) SL, BC

		Discussion with women masons' groups and a partner (KCSA) in Kawasoti, Nawalparasi	Acompained by SL
	14:45 – 15:45 15.45 - 16.30	**FIELD VISIT 6: Room to reed School Building** neer Kawasati , 5 km north form highway Bishnu Subedi, Room to Reed Technician	Acompained by SL
	16.30 - 17.00	School community Travel to Dawayna **FIELD VISIT 7: Dawanya Devi Tile Block Udhyog, at Dawanya, Nawalparasi** Tika Ram Bhandari, CESEF EP (D&W frame) Raju Cement Samagri Udhyog at Bhutha, Nawalparasi Raju Bishwa, CESEF EP	
Sunday 6 March	07:00 – 07:45 07:45 – 08:30 08.30 - 09.45 09:45 – 10:15 10.15 - 11.30	**FIELD VISIT 8: Badganga Cement Tile Udhyog (Kapilvastu) -Phul Kumari, Women CESEF EP** Group meeting / discussion: Vatavaran Maitri Concrete Block Udhyog, Rupandhei Rim B Shrestha, CESEF EP & Coordinator, trainier for CESEF, change Agent Will organize at this place a focus group meeting on CESEF producers Travel back to Butwal Group discussion: Construction and Allied Workers Union of Nepal, • Suhil Ghimire, Chairperson of Manglapur Unit, also interacted with social activities • Om Prakash Chaudhary, Chairpetrson Rupandhei, also interacted with social activities Building Workers International (Association) • JB Gurung Country Coordinator, CESEF local Coordinator • Ms. Rekha Khawas, women mason, change agent and member of BWI Raj Kumar Chaudhary, RTB trainer, certified RTB mason Indra Raj Chaudhary, Petty contractor, Change agent, Certified RTB mason, Member of Workers Organization	Acompained by SL

		(Janakalyan)	
	11.45-12.30 PM	Interaction with women masons and workers group (Janakalyan Samuha) • Ms. Meena Chaudhary, mason, • Ms. Durga Chaudhary, mason Ms. Ayodhya Chaudhary , member of Janakalyan	
	12:30 – 13:15	Lunch	
	13.30 – 14:00	**FIELD VISIT 9: Nepal Earth Movers(Yagya Raj Adhikari)**	
	16:00	**Travel back to KTM by air from Bhairawa**	
Monday 7th	9:00-11:00	Meeting with MinErgie	
	11:30-12:30	Urs/ Bhushan: Meeting with DFID representative for climate change	
	13:30-14:30	Smita: Meeting with Prakash Sharma, former ILO/IPEC staff at MinErgie	
	15:00-16:00	Meeting with TdH & project rep.	
		Meeting with Representative of Association of Brick Kiln	
Tuesday 8 March	9:00-10:00	Meeting with representatives of Association of VSBK Brick Kilns	
	10:30-11:30	Meeting with Ministry of Environment (Mrs Sushma Upahyaya and Mr. Rishi Raj Koirala)	
	12:00-13:00	Urs/ Bhushan: Meeting with Department of Urban Development and Building construction (Deputy Director General, Mr. Ramesh Singh, Senior. Div. Eng. Mr. Sagar Joshi, Sarita Shrestha)	
	14:00-15:00	Meeting with Department of Cottage and Small Industries (Mr. Bishnu Aryal DG, Mr. KP Kharel Technical Director	
	15:30-16:30	Smita: Meeting with Mr. Shengjie Li, Director ILO Nepal and attended workshop on Employment trends in Nepal	
Wednesday 9 March	9:00-10:00	Meeting SEE project, Barbara Weiermann at SDC	
	10:15-11:15	Urs/Bhushan: Meeting with UNDP (Mr. Vijay Singh)	
	11:30-12:30		

		Meeting with Mr. Suresh Pradhan, Plan International, Nepal office Meeting with VSBK Steering Committee Final discussion and clarification with the VSBK team if necessary. Otherwise brainstorming & preparation of debriefing	
Thursday 10th	14:00-15:00 15:00-16:00	Debriefing with SDC **Departure of International review team**	GTO/BNN/DNC and VSBK team GTO/BNN/DNC

8.2. Second Visit, March 15 to 20

Drs. Smita Premchander and D. Raghunandan

15.03.2011	• Arrival in Kathmandu • Briefing by Ms.Corinne Demange, SDC Nepal en route to VSBK Office • Briefing Session with VSBK/CESEF Team at VSBK Office • Meeting with Dr. Raghunandan, Dr. Smita Premchander and Mr.Bhushan Tuladhar at Hotel Greenwich
16.03.2011	• Travel to Jhapa with Dr. Smita Premchander along with VSBK Team's Mr.Suyesh Prajapati and Ms.Usha • Visit to VSBK at Kakarbita • Visit to Moving Chimney BTK near Bhadrapur • Visit to VSBK at Jhapa
17.03.2011	• Visit to VSBK at Kushal • Visit to Fixed Chimney BTK at ??? • Return to Kathmandu • Visit to Clean Energy Bank with Dr. Smita Premchander and discussions with CEO and other Senior Officials
18.03.2011	• Travel to Bhairahwa/Butwal • Visit to Osho Builders with Mr.Santosh Lama • Visit to M/S Earth Movers, Round Aggregate Grading Plant and interaction with Mr.Yagyaraj Adhikari, Proprietor • Meeting with 8 Change Agents, Certified Masons and Petty Contractors in Butwal Hotel • Visit to M/S Davanya Devi Tiles and Block Udyog, Bardhaghat, Nawalparasi
19.03.2011	• Dr. Premchander in Kathmandu, visit to VSBK Dr. Raghunandan: • Visit to M/S Vatavaran Maitri Concrete Block Udyog, and interaction with Ms.Rim Bahadur Shreshtha, Propriotor, Ms.Phool Kumari and Ms.Mathura Sharma, Entrepreneurs • Visit to Ms.Phool Kumari's Tiles etc Unit • Visit to M/S Hamro Cement Tiles Udyog and interaction with Mr.Bom Prasad Upadhyaya, Proprietor • Return to Kathmandu
20.3.2011	• Visit to MC BTK at Kathmandu Valley

	• Visit to VSBK at Imadole • Visit to Children's Home in Bhaktapur • De-briefing with Ms.Corinne Demenge at Hotel Greenwich
21.03.2011	• De-briefing with SDC at Swiss Embassy • De-briefing with VSBK Team

Annexure 3:
Effect on Environment and Climate Change

The VSBK Track

The brick industry is mainly responsible for the following impacts on the environment and climate change:

- Deterioration of ambient air quality due to emission of pollutants, particularly suspended particles and sulphur dioxide, thereby increasing the health hazard of adjacent communities;
- Deforestation due to the use of fuel wood;
- Loss of soil fertility and increased erosion at the soil extraction sites due to mining of top soil;
- Contribution to climate change due to emission of greenhouse gases and black carbon.

As shown by several studies (see e.g., Heierli&Maithel, 2008, CEN, 2009)VSBKs have a) a more efficient heat transfer process and lower heat losses and b) a more complete combustion of fuel than BTKs, resulting in lower emissions of pollutants.

Air Quality and Health Issue

Air pollution is one of the most visible and important issue in the local context, particularly in KathmanduValley, where air quality is a major problem, with serious health implications. Brick industry in the Kathmandu valley and other urban areas is considered as the second most important polluter after vehicles (Government of Nepal 2006). It is estimated that in 2005, brick kilns in the Valley emitted 1850 tons of SPM per year, which is 11 percent of the total pollution load in Kathmandu (Gautam, 2006). The proportional contribution of brick kilns to Kathmandu's air pollution may be have gone down a bit since then as the number of brick kilns have not increased significantly over the past five years while the number of vehicles, which are the main source of air pollution in Kathmandu, continues to increase rapidly.

BTKs also emit large amounts of sulphur dioxide. Although, the concentration of SO_2in KathmanduValley's ambient air is not a major problem, it is generally higher in areas around brick kilns. Monitoring of SO_2 in 2003 indicated that the highest level of SO^2 level was recorded in Bhaktapur, which has many brick kilns. Here the SO_2 level was higher than 50 $\mu g/m^3$ at all times and once the SO_2 concentration slightly exceeded the national standard of 70 $\mu g/m^3$(CEN/ENPHO, 2003).

Kathmandu's air pollution has serious implications on public health and the economy(see Annexure 3). A study done by the then Ministry of Environment, Science and Technology estimated that the PM_{10} (particle size less than 10 microns) emission in Kathmandu is responsible for 1600 premature deaths per year (MOEST, 2005). The economic cost of urban air pollution in Nepal is estimated to be US$ 21 million or 0.29 percent of the country's GDP (World Bank, 2007). Table 1shows the energy consumption and emission from VSBK and different types of FCBTK.

Table 1: Comparison of Energy Consumption and Emissions from Different Type of Kilns in Kathmandu Valley

Kiln Type	Specific	Suspended	SO_2	Mass

	Energy Consumption (MJ/kg of fired bricks)[24]	particle matter emissions (mg/m^3)	emission (mg/NM^3)	emission load (kg SPM/1000 bricks
VSBK	0.83	101	36	0.33
FC – FD, Zigzag Stacking	0.91	116	145	0.87
FC – FD Straight Line Stacking	0.92	125	170	1.82
FC - ND Straight Line Stacking	1.16	238	228	2.51

Note: FC-FD: Fixed Chimney Forced Draught; FC-ND: Fixed Chimney Natural Draught. Most of the kilns in Kathmandu are FC-ND with straight link stacking.

The Government of Nepal has prescribed standards for SPM emissions. It is very commendable that since 2003 the Project has mandated private laboratories/Projects accredited by The Government of Nepal to monitor stack emissions of VSBKs and BTKs including SPM and SO_2in 2003, 2004, 2005, 2008. These surveys show that SPM and sulphur oxides (SO_x) emitted by VSBK's are systematically and considerably lower than the values from BTKs (see Table 1). The recent environmental monitoring carried out by MOEST (report not yet officially published) further confirm the significant and considerable lower emissions of SPM of VSBK compared to other kiln types.Therefore, VSBK does provide tangible benefits for the local people living around brick kilns in terms of better health and cleaner environment (respiratory problems, soot deposits on clothes, homes and water bodies, smoggy ambient conditions).

Figure 1 Black plume of MCBTK at Rajahar, Nawalparasi

There are occasional incidents where local people have raised their voice against brick kilns in KathmanduValley. Most recently, on 22 March, 2011 about 1000 people from Nakhel VDC in Bhaktapur district organized a protest rally and surrounded the Chief District Officer demanding the removal of polluting brick kilns from their village.[25] As urbanization continues to expand in KathmanduValley as well as other areas, there is bound to be more conflicts between polluting brick kilns and local people. However, so far the overall impact in reducing air pollution is probably not very significant in KathmanduValley as there are only two VSBK's in operation. In this context, there is possibility for the number of VSBK, along with its positive impacts on the environment to increase substantially in the future, provided that there is a supporting environment for the growth of VSBK technology. The rapid expansion of VSBK technology in the Terai in the past two years must have contributed to improve ambient air quality in the region as well, but at the moment it is not possible to quantify these benefits or impacts.

[24]The figures are sources from IEM (2003, 2005)

[25]http://www.nagariknews.com/society/nation/24563-2011-03-22-10-16-26.html

Many VSBK entrepreneurs spoken to said they were less apprehensive about government regulations than the opinions and responses of local populations, and preferred to adopt VSBKs because they would be able to operate for longer in a conducive local environment rather than a hostile one due to BTKs' visibly dirtier smokestack pollution.

Greenhouse Gases

No doubt VSBKs, like other energy-efficient combustion devices, help to reduce emissions of GHG by burning less coal than BTKs for comparable quantities of bricks produced, and also by effecting more complete combustion thus reducing noxious gases (carbon monoxide, SO_x, NO_x, methane) and unburnt substances including black carbon. As an important spin-off also the amount of GHG from the coal transport from India to Nepal are considerably reduced.

It is also widely accepted that the building construction sector contributes substantially to GHG emissions. As such VSBKs undoubtedly contribute to mitigation efforts (see Figs 3, 5). Yet, it is also important not to overestimate the contribution of brick-making to national GHG emissions. However, as Nepal's overall contribution to global greenhouse gas emissions is negligible and of the country's total GHG emissions of 39,265 Gg of CO_2e in 1994-95, only 320 Gg is from the industry, mining and construction sector (MOPE/UNEP, 2004), the contribution of the VSBK track in reducing GHG emissions in the country or global context is fairly low.But considering the fact that the construction sector and Nepal's GHG emissions will probably continue to grow, VSBK's contribution towards moving the country towards a low carbon economic growth path can be significant in the future.

The role and value of GHG reductions as a driver for adoptionanddissemination of the VSBK technology is doubtful as also borne out by the Indian experience, and has probably been overestimated by both SDC and the Nepal VSBK Team as stipulated in the Project Document Phase 4 (SDC 2007). More tangible for the local communities and the Government is the improved ambient air quality near VSBK's resulting as a co-benefit from reduced stack emissions as outlined above.

Black Carbon

The role of black carbon in climate change mitigationhas been overlooked until recently. Black carbon exists as particles in the atmosphere and is a major component of soot.Black carbon result from incomplete combustion of fuel leads to greatly increased content of soot including black carbon. The recent report from UNEP and WMO (2011) highlighted the prominent role of black carbon as a short-lived climate forcer affecting climate change in three ways:

4) Warming the Earth by absorbing heat in the atmosphere (on the other hand organic carbon is a cooling agent);
5) Disturbing tropical rainfall and regional circulation patterns such as the Asian monsoon, affecting the livelihoods of millions of people;
6) Darkening the snow and ice surface (reduced albedo) thereby increasing the absorption of sunlight leading to increased glacier/ice melting as in the Himalayas; the downstream effects on river flows and water supply is of prime importance for Nepal.

Black carbon is found worldwide, but its presence and impact are particularly strong in Asia, especially in the Himalayas (NASA, 2011 UNEP and WMO 2011). Black carbon stays in the atmosphere for only several days to weeks, whereas CO_2 has an atmospheric lifetime of more than 100 years. Therefore, any

significant cuts in the emission of the short-lived black carbon through technological improvement in the combustion process of fuel will yield much faster reductions in planetary heating, as compared to reductions in CO_2.

VSBK technology is explicitly stated by UNEP and WMO (2011) as a measure having a large emission reduction potential that improves climate change mitigation and air quality. The percentage of black carbon in SPM in stack emission of VSBKs is greatly reduced resulting in ten and twenty times lower emission of black carbon, when compared to FCBTKs and MCBTKs, respectively (see Table2).

Table 2: Black carbon concentration in stack emission of brick kilns[26]

Kiln type	Number of kilns	% of black carbon in SPM	Average black carbon (mg/Nm^3)
MCBTK	3	92.2	180.6
FCBTK	17	86.7	105.9
VSBK	4	15.0	9.3

VSBK Emission Reduction Potential

Overall, the VSBK technology greatly reduces the stack emissions of the brick kilns including total mass emission load[27], total $C0_2$[28] as well as coal consumption. Figures 2-5illustrate the annual amount of mass emission load[29], CO_2, and coal saved by the 26 VSBK[30] when compared to BTKs (for producing the same quantity of bricks). The respective total annual black carbon reduction potential of VSBKs is very high with at least ten times less emitted black carbon (although the detailed calculation has not been made). In future, the benefits of the immense reduction of black carbon emissions by VSBKs and its immediate impact on climate change mitigation should be better marketed.

Figure 2: Annual reduction potential of 26 VSBKs compared to FCBTK and MCBTK

Mass emission load: 196 t (87%) and 697 t (96%), respectively

CO_2: 15,002 t (44%) and 12,224 t (39%), respectively

Coal: 4733 t (34%) and 3606 t (28%), respectively

Figure 3: Total annual mass emission load reduction potentialof 26 VSBK in comparison to BTKs

[26]Private Laboratory Soil Test (P) Ltd. accredited by the Government of Nepal 2011
[27]IEM, 2005
[28]Primary data (VSBK) and CEN, 2009
[29]kg pollutant/1000 bricks
[30]90,150,000 bricks at full capacity including all VSBKs constructed in the four Project phases or currently under construction

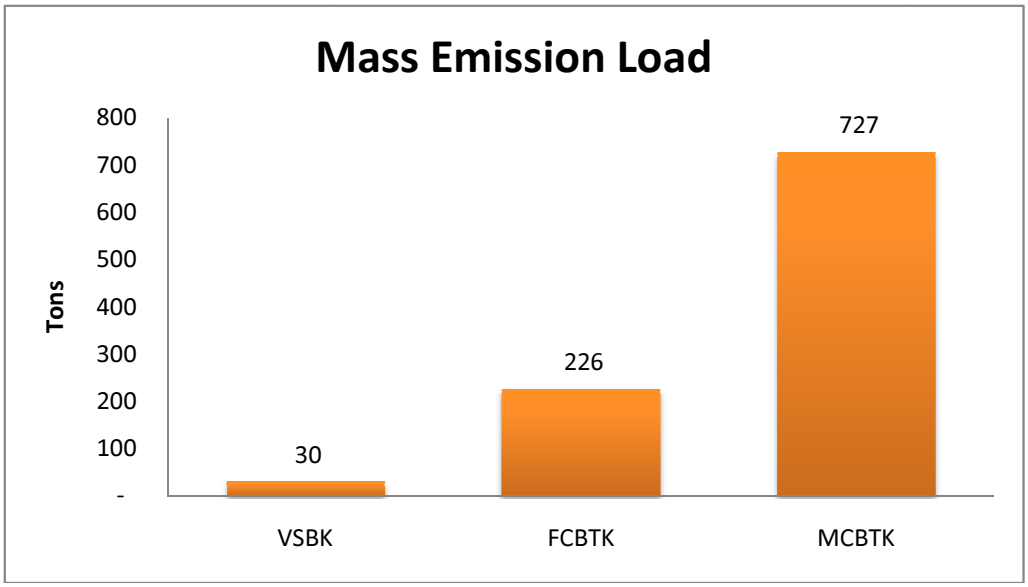


Figure 4: Total annual C0₂reduction potentialof 26 VSBK in comparison to BTKs

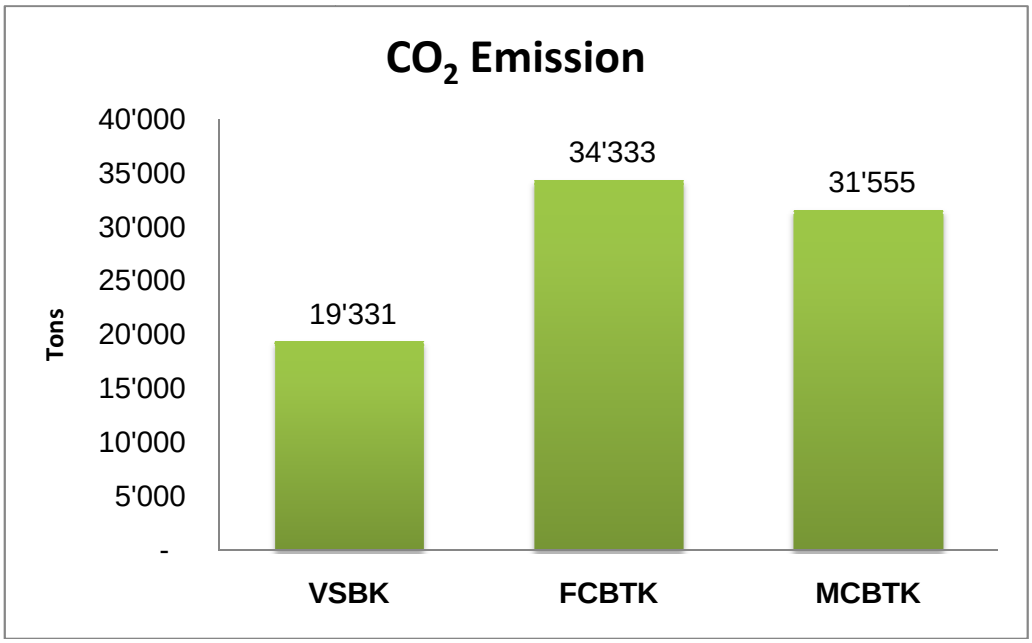
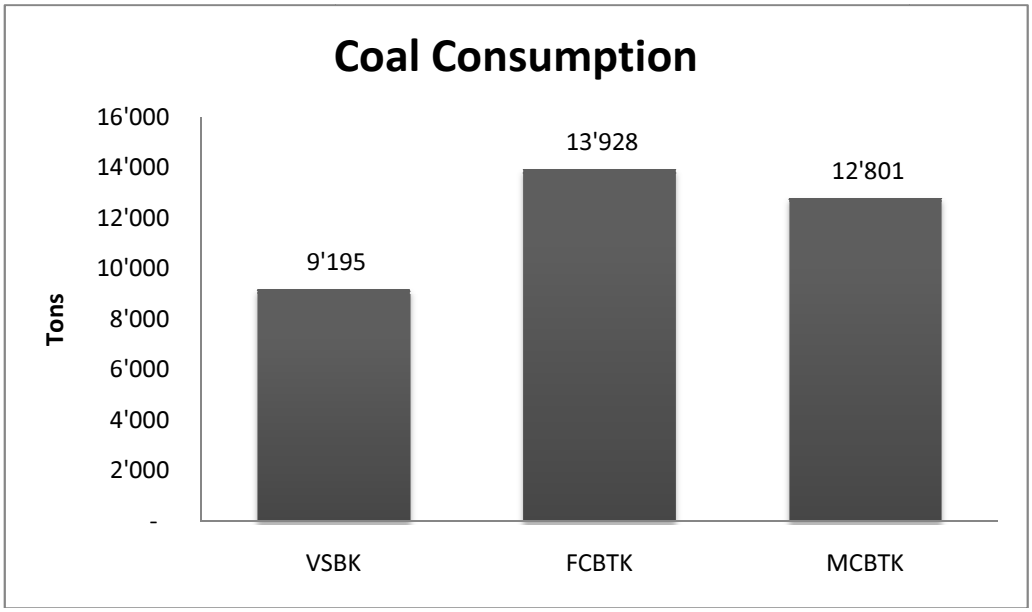


Figure 5: Total annual coal reduction potentialof 26 VSBK in comparison to BTKs



The mitigation potential of pollutants using VSBK technology is considerable. The market share of the overall brick production in Nepal is still quite low with 6.3% (considering full production of the 26 VSBKs). But the recent increase of the number of VSBK from 4 in 2009 to 26 in 2011 is quite impressive although the increase has been certainly favoured by the declaration of the Government of Nepal stipulating that VSBK technology is a non-wood based technology, therefore not requiring certification of forest distance (5 km).

While coal is the main fuel used in brick kilns, some of the kilns also use other fuel types including in particular fire wood but also agricultural residues and saw dust. However, these fuels are not used regularly but mainly during ignition. According to a survey of 100 brick kilns in Nepal, only 21 percent used non-coal based fuel along with coal (CEN, 2009). However, should coal prices rise, there is a possibility that more kilns switch to fuel wood since fuel prices are a major portion of production costs. As VSBK uses only coal, and cannot use wood as a fuel, it will obviously contribute towards reducing deforestation.

The Governmenthas called for a ban in the MCBTK technology all over Nepal by end of 2011. This isanuniqueopportunity to scale up VSBK technology by large scale promotion campaign including all major stakeholders to avoid that most of the existing MCBTKs will be replaced by FCBTKs, as it was the case in Kathmandu Valley in 2003.

Most important in the Nepali context is the much reduced emissions of SPM (including black carbon) which significantly mitigate the health hazard of the adjacent local communities near the kilns. As a significant co-benefit the greatly reduced black carbon emission of the VSBK technology has an immediate mitigation effect on climate change considering the much shorter lifetime of black carbon compared to CO_2.

Carbon Offsets

A carbon offset is a reduction in emissions of carbon or greenhouse gases made in order to compensate for or to offset an emission made elsewhere. Carbon

offsets are measured in metric tons of carbon dioxide-equivalents (CO_2e). There are two markets for carbon offsets: 1) The larger, compliance market, under the Clean Development Mechanism of the Kyoto Protocol (1997) using CER and 2) the much smaller, voluntary market, using VER. Overall, the current annual potential in CO_2 reduction (see Fig. 8, 10) of the 26 VSBK's (operational or under construction) would correspond to 12 – 15,000 CERs or VERs (only considering CO_2).

The Project mandated WinrockNepal to elaborate the Project Design Document for applying CERs for the VSBKs (Winrock 2009). However, the idea of leveraging CERs for the VSBKs, did not fructify. While the concept sounds good, and the effort was laudable, positive results were always unlikely given the relatively low numbers of kilns being dealt with, the high transaction costs of the compliance market and the notorious difficulties of obtaining CDM carbon-credit funding. Development Alternatives in India did manage to obtain some carbon credits through the World Bank, and this did indeed help as an added incentive for VSBK adopters, but Development Alternatives had to expend enormous effort and cost, and have been left wondering if the time-consuming and expensive effort was worth it.

MinErgyshould further explore the different options of the voluntary carbon market (VER) and its financial incentives considering transaction costs and crediting periodwhich could represent an attractive financial incentive for further promoting the VSBK technology. Although at lower value than CER, VER are relatively easier to transact and may be the preferred route. MinErgy should strive for Gold Standard VER since they guarantee higher quality and have a better price.

The former Project staff of MinErgy has gained experiences in the compliance carbon market in participating in the collection of data and in the elaboration of the CDM Project Design Document. A key requirement for both, the compliance and voluntary market, is the principle of additionality, i.e., the construction of new VSBKs will not happened without a financial incentive by selling carbon offset credits (for technical support for operating the more sophisticated VSBK and as a contribution to the higher upfront investment of VSBKs compared to BTKs). Only carbon credits from projects that are "additional to" the business-as-usual scenario represent a net environmental benefit.

Informal discussions with myclimate, a Swiss-based non-profit foundation showed that the VSBK technology is suited to eligible for VER. Myclimate is among the world leaders when it comes to voluntary carbon offsetting measures and is currently supporting several energy-efficient projects worldwide including upfront payments as bridging advance for VERs under certain conditions.

In view of accessing the voluntary carbon market a business partnership should be built with 1) the VSBK entrepreneur association which is interested in receiving carbon credits and 2) the Clean Energy Development Bank Nepal (CEDB) which is an investor in clean energy and have a MOU with VSBK association to fund entrepreneurs using this technology.

The CESEF Track

The impact of building material and construction techniques on the environment and on climate change is a function of a) type and amount of resources used (wood, cement, iron…) and b) energy needs of the production cycle and amount of emissions.

Besides VSBK, CESEF products such as hollow concrete blocks and rat trap bonds also contribute towards reducing GHG emissions by using less energy and favouring better house insulations.

The CESEF technologies are being over-sold in the Project Document Phase 4 (SDC 2007) as emission-reducing "green" technologies,since several of these technologies are based on cement-concrete (except the main one, RTB). It is well known, and acknowledged in the Project Document itself, that "the energy consumed in manufacturing modern building materials, i.e. bricks, cement and steel, can far outstrip the entire life cycle of the building!" It would be better if life-cycle emissions of different technologies are properly compared. Moreover, the benefits of substituting other products such as wooden window/door frames thereby reducing deforestation should also be included in the comparison. A more modest, and a more accurate, claim would be that these technologies are more economical and can also save some energy compared with burnt bricks or burnt clay tiles.

Although bricks are still the major building material in many parts of Nepal (Winrock 2009), the focus of the Project, by being restricted to VSBK and selected CESEF technologies, perhaps neglected other environmentally friendly building materialssuch as compressed earth blocks which are more environmentally-friendly.

Overall, in terms of environment and climate change the VSBK/CESEF Project and its performance during the evaluation period is found to be very relevant and effective. The sustainability of the promoted clean building technologies, however, is not yet achieved. Without some form of technical support and incentives, it is very unlikely that the number of VSBK kilns and the application of CESEF products which have not even reached the momentum of the former will continue to grow at their current level. In such a case, the achievements in preserving the environment and contributing to climate change could be lost.In this context it is also noteworthy, that most donors in Nepal are engaged in climate change adaptations and only few in mitigation measures.

Annexure 4:
Evaluation of Social Interventions and Achievements

9 Contents

10 Social Interventions and Outcomes

The outcomes for social aspects on kilns are dependent on the intervention model being used to bring about the changes. This Annexure analyses the context in which brick kiln labourers live and work, the project's social interventions, the effects of these, and the constraints faced. It ends with an analysis of what improvements could be made in the intervention strategy, in any future work with labour on brick kilns. The paragraphs offer a detailed discussion of issues presented briefly in the main report.

10.1. The Context and Relevance of Social Interventions

Working Poverty in Nepal

According to national estimates, 31% of the population of Nepal lived below a modest poverty line of NRs 7696 per person per annum. Using an international poverty line ($1.25 per day, or NRs 12,900 pppa), 53% of Nepal's population lived below the poverty line in 2005. In addition, there are high levels of inequality in incomes as well as regional disparities (Khare and Slany, 2011). Forty percent of Nepal's population is below the age of 15, with 72% enrolled in primary school, and only 15% continuing their secondary education.[31] Employment rates in Nepal are high, with 4 out of 5 person above the age of 15 working, and agricultural sector being the major employer. There is a high incidence of child labour, with 15% of all workers being children less than 15 years old. Thus Nepal is characterised by "working poverty" meaning that even though people are employed, their earnings remain abysmally low.

The construction sector in Nepal contributes 5.9% to the country's GDP and 3.2% to employment, and as it has shown positive trends in income over the previous decade, is an important sector for social and labour related interventions. A brief

[31] Only 12% Girls get secondary education.

overview of the conditions of those employed in the brick kiln and construction sectors reveals features of "working poor" as relevant for these workers.

Working on Brick Kilns

In 2001, Nepal had a total of about 28,000 workers on BTKs, of whom 82% were Nepali and 18% from India (ENPHO, 2001). Recent estimates show about 40,000 workers in this sector (Tdh, 2008).

Brick kilns are highly labour intensive enterprises. The entrepreneurs make three large investments: in securing the land, in constructing the kiln, and in ensuring labour availability. A traditional brick has from 150 to 300 labourers, and a VSBK can have from 70 to 200 labourers, depending on the number of shafts.

Worker groups on brick kilns are based on three key factors: the type of work they do, where they come from, and their social/ethnic origin. The work groups can relate to the following tasks:

1. Transport clay from another location to the kiln
2. Season the clay, mix by pug mill or manually, transport to flat land for brick making, make green bricks
3. Transport and stack green bricks for firing
4. Load green bricks into kiln
5. Fire the bricks , and unload baked bricks (tasks 4 and 5 are done by the same group on VSBKs)
6. Load baked The workers are grouped along the lines of their national, ethnic and caste origins. Their living bricks into trucks for shipping

The grouping of tasks can differ a little from kiln to kiln, and from VSBK to traditional kilns as well. Each of the tasks is done by a group of people, and within a larger group of 30 to 70 or 100 workers doing one particular job, there are subgroups based on family units.

Their living shacks are on different sides on the kiln, and they have little social or work related interaction. They are marginalised people, almost always of Dalits or tribal origin (Dalits and Janajaits, DAGs), and from ethnic minorities that have been economically and socially exploited (Tdh, 2008). This marginalisation and exploitation continues on the brick kilns

.

Worker organisation on brick kilns continues to be heavily dominated by the traditional type, whereby the "*thekedars*"[32] contract out the others, and manage the advances and payments to them. While the *thekedars* are labour contractors, interactions with them revealed that they do not any more 'control' labour, in ways that create bondage. They are merely first points of contact for the brick manufacturers, and do the financial transactions with the latter, keeping their margins in the advances as well as wage payments. The informal organisation of labour into groups led by *thekedars* is the traditional and more sustainable

[32] Labour contractors

compared to new forms such as labour unions. Workers' associations in Nepal are too weak to make inroads in the brick kiln sector, and given that a majority of the workers are migrants from India or within Nepal, trade unions do not find it worth their while to include them as members.

The working conditions on the kilns are dismal, with workers in each activity exposed to several risks. The loading and unloading tasks are heavy, with young and old women and men carrying heavy loads of bricks to and from the kiln. The green brick moulding requires long hours of work to be able to make a decent wage for a day. The firemen, who are the best paid among kiln workers, are subject to high levels of heat.

Those workers who move to the kiln with families have typically poor housing, unsafe for women as often they don't have doors that can be latched from inside. Women face sexual harassment at work[33] and gender based violence (GBV)is common in Nepal. While GBV is addressed at the policy level, with policies and laws, the structures to deal with them remain weak in Nepal. Even in the few districts where structures have been set up to provide food and shelter to violence affected women, the government staff remain unaware and the supports stays un-operationalised (The Asia Foundation, 2010). The workers have lack of clean drinking water, and lack of nutritious food. Studies in VSBK showed that 63% of the children on brick kilns are undernourished. Thus the context in which social interventions were designed, was a dismal picture of labourers working and living conditions.

Nepal's Labour Act, 2048 has various provisions related to working and living conditions in industries in order to protect the welfare of labourers, but the Act is often not implemented in the field. The Department of Labour within the Ministry of Transport and Labour is the government agency responsible for ensuring that the Act is implemented, rarely follows up on labour conditions in various industries, unless someone files a complaint. The Department of Labour has Labour Inspectors, but the staff at the VSBK project is not aware of any visits made by the labour inspectors to the brick kilns. The project has made some efforts to work with the Occupational Health and Safety Programme at the Department of Labour to provide training and develop guidelines, but these are at a very preliminary level.

Nepal also has labour unions, which are affiliated to different political parties and are quite vocal and aggressive in raising issues related to labour welfare. However, the unions are not very active in brick kilns because of the seasonal nature of work and the temporary migrant workers who are not well organized. The unions, for instance the All Nepal Construction Workers Union) have however raised the issue of wages and other demands with the entrepreneur associations, and with the government (ANCWU, 2011).

Other institutions such as Ministry of Social Welfare also do not have specific programmes related to workers in brick industries. ILO, as well some NGOs such as CONCERN, has done some research on the condition of workers in the brick industry but they do not have any programmes to improve the living and working conditions of the workers. Recently, Brick Clean Network has been established by a few organizations, including VSBK project, to promote socially responsible brick industry. This is a good initiative but it has yet to make a major impact in the sector.

[33] Many instances were mentioned by VSBK staff as well as ILO staff who had worked on ILO/IPEC project.

Thus the social situation of workers on BTK sites is dismal, with a need to work with entrepreneurs as well as workers, and to influence policy and organisations. All these underscore the high relevance of social interventions in the brick kiln and construction sectors. The project indeed recognised these needs in its documents and sought to address these needs through its varied and many interventions, which are now discussed.

10.2. The Project Interventions and Achievements

In the VSBK project, social interventions were designed to go along with the technical ones right from the beginning of the programme in 2003, when a "techno-socio integration" approach was followed (SKAT, 2002; SDC, 2002; SKAT, 2004)). The intention was always to "create an interface between technology and the people to benefit the workers" (Manandhar, 2011). The model in Phase 1 included twin outputs related to 1) ecologically and socially oriented enterprises; and 2)improved social status and working conditions of brick workers. These involved working through the entrepreneurs, create awareness, and get them to participate and contribute to the welfare of labourers and their families. Direct work with labourers was focused on maternal and child health, and child care during work hours. By the time the programme reached the third phase of funding, 2005-7, the project objectives included "improvements in environmental performance and social equities of the building materials sector" (SKAT, 2004: 4).

The approach, therefore, was to follow a partnership based approach to influence two sets of key stakeholders: entrepreneurs and workers. The focus with entrepreneurs was to make them socially responsive, and participate actively and financially in the introduction of several improved practices as elaborated later. In order to give entrepreneurs the time to understand the intended interventions, and overcome fears related to social action with workers, the social interventions are not started in the first season, but in the second season of brick production. The interventions with workers are aimed at increasing awareness and changing behaviour patterns regarding work, for instance use of protective equipment, habits related to food and nutrition, improved gender relations especially stopping domestic violence.

In 2011, the project's social interventions covers 9 VSBKs and 1 FCBTK. Four child care centres operate in VSBKs. The social team comprised of one Social Coordinator, 6 programme staff (of which 2 for CESEF) and 11 social mobilisers (of which 3 for CESEF), 7 care takers and 3 women supervisors. A total of 323 workers were covered under VSBK and 477 workers under CESEF components. CESEF worked with 4 producer groups and 34 contractors/ entrepreneurs.

Four key areas of interventions were included in the VSBK Project Phase 4 log frame, for the VSBK and CESEF tracks:

- Reduction of absenteeism
- Use of Occupational Safety and Health aids
- Recording of cases of sexual harassment and gender based violence
- Increase in the weight of under-weight and undernourished children

The rationale, processes and achievements are briefly described:

1. Logfame Indicator 1: Worker Absenteeism is Reduced

Rationale: Social issues are one of the major and hidden factors for absenteeism or less productivity hampering the income of workers and their families. Some of the prevalent social causes are preventable diseases, child diseases, family disintegration (domestic violence), alcoholism, and sexual abuse. When confronted with any of these problems, a worker takes off thus losing out on wages for the day(s). Kiln owners, too, suffer a loss of productivity as a result. A quick calculation based on a short research by VSBK is presented in Figure 3.

Figure 3: Absenteesism Is Costly For the Worker and The Entrepreneur

The VSBK project did a rough calculation through a short research, when it checked the impact of absenteesism over 29 working days (mid Jan to mid Feb 2008) for 68 moulders of 29 households:

- 305 worker days because of lack of soil and dumper
- Loss of production capacity (@ 300 bricks/day) = 91,500
- Profit foregone (@ Rs 1/brick) = Rs 91,500
- Income loss for 68 moulders (@Rs 300/1000 bricks) = Rs 27,450

The reduction of absenteeism, therefore, has become an entry point to tackling both technical and social issues, and has offered many learnings.

Achievements: Absenteeism of workers is reduced, leading to improved productivity and increased wages, as wages are based on the number of bricks. In 2008, 267 targeted workers in 3 kilns showed improving trends of less absenteeism. In 2009, 434 workers in 6 VSBKs showed an increase of working days in the range of 3% to 14%. In 2010, 36 difficult cases were followed up and absenteeism was in reducing trends by end of the season. Incidences of water-borne diseases decreased which indirectly contributed to increased production.[34]

Lograme Indicator 2: 40% of targeted workers are seen to use at least 3 types of personal protective gear

Rationale: Absence of protective gear at the workplace poses health risks, more so as the workers are poor and thus have a low nutritional intake.

Achievements: In 2008, 78 workers in 3 kilns used at least 1 preventive gear. In 2009, 100% of 55 fire masters in 5 VSBKs used at least 1 preventive gear. In addition, 146 targeted workers (coal crushers, transporters) in 5 kilns used 1 preventive gear. By 2010, 40% of targeted workers are seen to use at least 3 types of personal protective gear (helmets, dust masks, gloves). Masks are commonly used, increased water intake observed among fire-masters, transporters and construction workers.

[34] The project has consistently followed the causes of the problem, and drinking water problem was later addressed and a new approach piloted.

In 2010, 112 cases of occupational disease/accidents were recorded in 4 kilns, against a baseline of 2009, wherein 12 cases revealed in 3 kilns. This shows that the project was effective in raising awareness about occupational safety and health, and in recording the incidence of diseases related to OSH.

3. Logframe Indicator 3: Cases of sexual harassment are reported and are dealt with on an individual or group level

Rationale and Context: Sexual harassment is rampant. The lack of secure doors on the shacks where workers live, and the place in which cash is distributed by contractors both make women vulnerable to sexual abuse.

Achievements: In 2008, 33 cases were reported in 2 kilns. In 2009, a case of sexual harassment in 1 kiln became public through a group of adolescents and a girl peer educator[35]. In 2010, 1 case was revealed and handled through home visits. All 3 old kilns continue having women supervisors as protection measures against sexual harassment. Sexual and gender based violence cases are being revealed through home visits.

There has been a move to introduce secure doors on the sheds and by demand wage distribution in an open place, and in the presence of women

4. Logframe Indicator 4: Increased average weight of children at the end of each brick production season

Rationale: Malnutrition is responsible for high rate of child diseases resulting in the loss of productivity of a family and over expenses on medication. Sessions on health and nutrition awareness were conducted for workers. The weight of children is monitored regularly and home visits made to counsel those families where children are undernourished.

Achievements: In 2008, 41% (160 out of 385) children in 9 kilns (3 VSBKs, 6 FC) were underweight. 9% (16 out of 160) gained weight and another 35% (56 out of 160) showed an increasing trend. In 2009, 41% (31 out of 68) children in 2 VSBKs were underweight. 22% (7 out of 31) gained weight and 45% (14 out of 31) showed an increasing trend. In 2010, 32.14% (18 out of 56 children across 4 VSBKs) were underweight. By the end of the season, 5.5% (1 child) had gained weight and 50% (9 children) displayed a weight increasing trend.

The weight of children is shown to have increased at the end of each brick production season due to more awareness about health and nutrition amongst families. However, the modest figures rightly indicate that low weight of children arises from multiple and complex problems, and is not easy to set right through small interventions that the project makes.

The project made several key interventions which enabled it to achieve the results as mentioned above.

The first key intervention is the introduction of Child Care Centres (CCC) at worksites by kiln owners. First it helps reduce absenteeism. Second, it has been a huge step in increasing the productivity of women workers. It was also

[35] Peer educators are groups of young girls and boys that the project has formed, on selected kilns, who get awareness training, exposure visits and capacity building inputs. They often are key informants and links between the project staff and workers.

observed that when CCC's were closed, worker productivity went down by 35%[36]. (VSBK, 2011)
These aspects above have been part of the log frame. Meanwhile, the project has developed other aspects of the model and has reported on these, even though they are not included in the log frame. These additional aspects relate to:

Entrepreneur Acceptance: Entrepreneurs have accepted many of the interventions as they increase the productivity of workers. Economic analysis was used as a tool to convince entrepreneurs to make social investments[37]. By January 2011, the VSBK association and Brick Kiln manufacturers' association appreciate the social interventions initiated and are willing to collaborate and get technical assistance from VSBK towards these.

Entrepreneur support may be expected to continue support for CCCs and OHS equipment; however the quality of support may fall[38]. It is not certain if entrepreneurs will address issues of sexual harassment or domestic violence in the absence of Project support.

Provision of Safe Drinking Water: In addition to increasing awareness of workers about safe drinking water, the project also piloted a water-vendor model, whereby workers purchased safe drinking water. The practice of chlorination of water was also introduced, which workers have found useful and many adopted[39]. A study showed that not only did the workers increase their purchase and use of water, some entrepreneurs were also convinced to provide additional drinking water during working hours (Sapkota, 2009).

Health and Working Conditions of Labour: It is almost impossible to properly assess health impacts of VSBK working conditions in the short time available and without conducting health and/or ergonomic tests that were not possible in this study. Earlier investigation has suggested that as VSBK factories are better organised, labourers work under the roof and have a factory like environment, VSBK technology has lesser latent risk and hazards as compared to FCBTK technology(Krishanmurthy, Khanal and Giri, Undated). In this evaluation, some conclusions are drawn by inference from observations.

Working conditions in all brick kilns, whether VSBK or BTKs, are more or less the same for equivalent practices except in the firing zone where the thermal comfort in VSBKs is clearly better. Handling of raw material has the same potential hazards of dust inhalation, but the addition of coal dust in VSBKs could add to these hazards, despite the simple masks seen in some VSBKs and whose efficacy in keeping PM10 or smaller particulates out is doubtful. Loading operations in VSBKs are slightly more arduous, since they involve lifting bricks up to the top of the shafts. Efforts have been made to reduce drudgery by replacing stairs with ramps in later installations, although the slope the ramps is still too high, and lifts have not worked due to lack of power.

[36] Admittedly, lack of baseline information makes impact assessment difficult, further compounded by methodological flaws in the studies conducted on the project, such as small numbers, and changing profile of children affecting the tracking of change over time not being for the same children

[37] The CCCs have demonstrated increased productivity. Similarly increased use of safety equipment has improved worker satisfaction.

[38] On a kiln visited after closure of an ILO/IPEC project, the CCC was in a dismal state, with no access to clean water or toilet for children.

[39] This was stated especially by workers in the CESEF track, in Jhapa. Some of these practices had better adoption outide of Kathmandu valley.

Skill Enhancement: Skill enhancement is a major contributor to income increase, as it immediately enables the worker to increase his/her wage per day. It also adds self-esteem and improves status within the family and community, therefore has positive social impacts as well. These benefits were experienced by all CESEF workers who got training in construction from the Project.

Figure 4 Master Fire Master

Bhim B. Khadka, 29, from Rolpa, is not just a Fire Master; he trains other fire masters and is also a contractor for fire masters. Ten years ago, he was an ordinary labour carrying bricks in kilns of Kathmandu. However, after receiving Fire Master Training from VSBK project n 2004, he became a professional fire master at Sri Satya Narayan Itta Udhyog, Lalitpur. He has not looked back since then and has demonstrated his expertise in VSBKs of Udaypur, Jhapa and now in Nawalparasi. Along the way he has trained about 100 people as well. He earns about about Rs. 12,000 per month and is satisfied with the work. "It is a good working environment and I feel proud that I have contributed to the growth of this sector," he says.

Benefits to women: Under the CESEF programme, women have been provided training. Women have also been trained as masons, enabling them to move from being unskilled labourers to masons, and commanding a higher wage (see Figure 5).

Women have also received leadership training, and become members of savings and credit groups, as well as of labour unions. These have increased their confidence, networking and linkages, empowering them for decision making within the household and their businesses.

Workers Associations: The Project has worked with already existing trade unions to expand their membership among brick kiln workers, and to offer technical trainings. To begin with, skill enhancement programmes have been linked with the unions.

Figure 5: Women's Empowerment Enhanced

Shanta used to be a labourer in the construction sector three years ago. She was invited to attend a training by VSBK. She used to cycle the 10-15 kms from her village to Butwal for the training. Her daily wage rate at the time was Rs. 120 to 130 per day. Now, after three years, she gets Rs. 220 to 300 as a mason. The increase is not only due to a general increase in wage rates, but also due to her skill levels, which have been enhanced. She feels that if she receives further training, she can command Rs. 500 per day, as men masons do. She gets more respect at home from her husband and feels much more confident and connected after becoming part of the CESEF group.

Secondly, unions keep some vigilance, so that when contractors hold back payments of workers, they can intervene. Unions have also provided access to social security, by designing programmes for accident and medical insurance[40].

Savings and Credit Groups: The project has set up savings and credit groups under the CESEF track, which have been very useful for the workers to learn about thrift and credit. Some have also been able to continue the savings habit, and link with mainstream savings options such as those with banks and NGOs in Nepal, as shown in Figure 6.

Figure 6: Savings and Credit Groups

The savings and credit group set up with CESEF workers in Butwal has 13 members. The savings are Rs. 100 per month per member, with the possibility to save more, upto Rs. 200 to 300 per month when they have money. Over the past 3 years members have saved over Rs. 50,000/-. They give small loans (Rs. 2,000 - 5,000) from this capital to their members on which an interest rate of 2% per month is charged. They plan to reduce the interest rate to 1% to allow members to take more loans. The repayment has to be made over six months, and within this period, members have the flexibility to repay as and when they have money. Members also save in other organisations such as Nirdhan Utthan Bank.

10.3. Project Shortfalls and Constraints in Implementation

Some areas which are listed in project logframe but on which sufficient progress could not be made relate to:

Knowledge Creation: The project envisaged action research on mitigating of debt circle, action research on brick sector specific joint committee (Management, Supervisors, *Naike* and workers) and *Naikes* groups, and refining of issue based social action packages. The project's baseline information is scanty at best, and monitoring information too scattered. The research has not been quantitatively or qualitatively significant, therefore hampering the formulation of any of its initiatives as a serious model for consideration.

Policy and (Self) Regulations

The project envisaged facilitating a code of conduct for protection of workers, and establishing a link to Early Child Development (ECD) policy of GoN. The Project coordinated at the district level with government authorities, and did initiate a note at the national level to add establishment as a requirement for licensing of brick kilns by the Department of Cottage and Small Industry (DCSI). However, sufficient progress could not be made on these during the project.

[40] There was evidence of this from Butwal, where workers and union leaders explained these initiatives and provided anecdotal evidence of intervening successfully in conflict resolution.

Capacity Building for Social Interventions: The project envisaged that staff capacities will be built to address social issues, especially of the supervisors, social mobilisers and child care takers.

The social team of VSBK is headed by a Social Coordinator located in Kathmandu, with social mobilisers placed in the VSBK locations. The profile of the persons working at the field level on brick kilns is of social work, so they are well oriented to the social aspects. However, they need to learn a lot about the specific technical aspects of work, such as nutrition, health, counselling, etc. The project has been doing significant capacity building, and monthly meetings are held at district level, yet given that the kilns are situated far away and not clustered together, the team is scattered, there are critical problems to solve always, so capacity building remains thin, and therefore the social inputs remain a bit weak.

Further the sustainability of social mobilisers on the project is low. While the intention is that entrepreneurs will pay the salaries of these mobilisers, the support to the staff is not only a question of salary. They have technical support and advice from VSBK, which is important for continuation of social development interventions. When difficult issues are faced, such as domestic violence or sexual harassment, or accidents due to internal conflicts among workers, mediation is needed from senior staff and project management, and social mobilisers are too isolated to be effective in this role if they are to report only to the entrepreneur, and derive their salary from him.

Other constraints faced by the project are in the following areas:

Follow up of Earlier Recommendations

The external evaluation of the project in 2007 recommended attention to the following issues:

Increased bargaining position of labour: this has occurred to a very limited extent on the project. As firemen are the most skilled among brick construction labour, they have greater proximity to the entrepreneurs, and enjoy more income and more power compared to their workers.

Increased ownership of the entrepreneur: The project has been able to achieve high levels of engagement of the entrepreneurs with the approach and intervention of the project. The project has been able to keep in touch with the workers and new initiatives in social development.

Strategise social interventions for construction sector as whole. Here it was envisaged that VSBK and CESEF social development strategies will get better articulated, with a clear differentiation between the two models, and a difference between social strategies on the two components.

Use carbon finance for social interventions: This was expected to generate funds for social interventions, however it has not been possible to make progress on this aspect.

Addressing Gender Issues

The predominant way in which VSBK staff address gender issues is through home visits and individual counselling, for which enquiries about absenteeism offer a

good entry point. Women's absenteeism often relates to gender issues. Women workers accompanied by very small children must often take time off to tend to them, resulting in loss of wages. Home visits also offer a window to address inter-household gender issues, such as domestic violence, for which individual counselling is provided to the woman, and some times, to the man perpetrating the violence.

The project also works to bring out and report cases of sexual harassment. The staff assigned to social interventions have not been able to adequately address issues like sexual harassment and domestic violence. These problems would require intervention from senior staff members at the kilns. Staff assigned by the project for social intervention report directly to the entrepreneur and it is difficult for them to mobilize opinion against sexual harassment and domestic violence amongst workers. The role of *naike* (workers' contractor/leaders) who are very powerful in social and economic structures in kilns and back in home villages has been understood as a barrier to dealing with cases of sexual harassment. To this end, it is necessary to work in collaboration with the entrepreneur for structural changes. Discussion on gender based violence must be made compulsory at the joint monthly meetings. However, entrepreneurs often choose not to confront contractors, as they depend on them for labour.

Even when the project finds out about domestic violence, the staff are not competent to counsel in this field. They have had some inputs in conflict mediation methodology, however, this training has now stopped, and referral links are weak. While the VSBK (and CESEF) staff have had some technical support in psycho social counselling, they need more training in this field and continuous capacity building and hand holding support.

Regarding sexual harassment at work, the project has uncovered some vulnerabilities and has been able to deal with them. For instance, the lack of secure doors on the shacks where workers live, and the place in which cash is distributed by contractors both made women vulnerable to sexual abuse. These have been addressed in some cases by having secure doors on the sheds, and by demanding wage distribution in an open place, and in the presence of women. However, these are isolated successes on a few kilns, and have to become industry practices yet even among VSBKs.

Barriers to Women's Leadership

Women work both as agricultural labourers and in the construction sector, as both are seasonal occupations. They are not considered for leadership positions due to the perception that they are seasonal workers. Further, the belief is that their primary responsibility is at home works against investing in building their capacities as leaders at the community level.

Group Formation and Organisation Building

It is difficult to organise workers in the brick kiln sector in groups and include them as members of labour unions. To begin with the work is seasonal and workers are available on site only for six months a year. Secondly, workers in the sector are mostly migrants from within the country or India, and as such have

few links with the community around them. They don't have permanent residence in the area, therefore few local organisations are interested in enrolling them. These factors keep them isolated and marginalised, even though many have been coming to the same kilns for more than ten years. In the case of CESEF, entrepreneurs are small and isolated, and workers are residents in neighbouring villages, so a greater achievement has been possible in organisation building, linkages with unions as well as skill enhancement and leadership development.

Scaling up Child Development Centres

One part of the intervention model that had developed well till 2008 was Child Care Centres (CCCs). As this intervention was acceptable to entrepreneurs, VSBK extended this activity to FCBTKs as well. However, this was removed from the set of activities implemented by VSBK, and handed over to Terres des Hommes (TdH), an international NGO that has been mandated by SDC to set up and manage these centres on traditional kilns in Kathmandu valley only[41].

Challenge of Supporting Migrant Workers

Over 92% percent of brick kiln workers are migrants, from within the country (90%) or from India. The challenges of supporting them are many. To begin with, brick making at VSBKs is seasonal work. A majority of the labourers are short term migrants. Social interventions in this context become challenging, with few NOGs and unions perceiving them as viable beneficiary groups.

Secondly, migrant workers are not able to access basic services provided by the state, such as health and education. Parents are unable to see through their child's school education because of the need to migrate from time to time. At times, children are left behind at the native village. The dropout rate from school was found to be as high as 51% (VSBK, 2011).

Wages Fixing Standards

Workers are paid according to their output (i.e number of bricks produced in a day) as opposed to the time they spend on production. Problems that affect their productivity are accidents and injuries that occur due to absence of protective gear, poor and unsanitary living conditions due to their migrant labour status that affect their health and the inability to afford enough food to meet nutritional requirements. In addition, it is not uncommon for women workers to be subjected to sexual harassment or domestic violence.

Poverty, debt, social exclusion and family disintegration are some of the key issues plaguing workers at brick kilns, especially the migrants. Admittedly, VSBKs have a far better organization and care of workers, as seen due to the interventions of the project.

Management Issues

The capacity building and handholding support has been lacking also from SKAT senior management, who could have provided the strategic overview and capacity building which would have enhanced both scale and quality of impact, not only for

[41] The intervention model for the Tdh project is the same as that of VSBK, and the coverage is 20 kilns in Kathmandu valley and Bhaktapur. The project is implemented by two NGOs, Chhimeki and Centre for Mental Health and Counselling Nepal. The project is due for an evaluation later this year, as the project comes to an end in October 2011 .

tackling gender issues but also other issues concerning labour such as decent working and living conditions and fair wages.

10.4. Suggestions for Social Interventions

The critical need for social interventions in the brick and construction sectors is to strategise well, and choose approaches that combine elements of service delivery, partnerships and rights based work to influence business practices and bring about policy changes.

There are several areas that the project already has interventions in, which can continue. These include making entrepreneurs socially responsible (by providing child care centres, OHS aids) and worker related interventions (psycho social support, awareness about nutrition, health and sanitation) In addition, it would be good to include and/or strengthen the following areas:

Sexual Harassment at Work

There are many teenage women who work on construction sites. They are part of groups who load, unload and transport green and baked bricks. These girls are often susceptible to advances by the workers and contractors, their sexual harassment and exploitation is not yet fully understood by those who work in this sector, and no measures have been designed as yet. The best way forward is to work with the VSBK association, traditional contractor and trade unions and have a code of conduct for prevention of sexual harassment and a mechanism for monitoring and addressing reported cases. Efforts should be made to formalise the code and have it accepted by all entrepreneurs of the VSBK Entrepreneurs Association. Alongside, advocacy with the traditional BTKs can be done so that they may also accept the code of conduct.

Attention to Living Facilities

Living facilities of workers have to be of a certain quality, and any future work in this field needs to work with the government to bring regulations on this issue. Adequate and safe housing is the first most important aspect of such a regulation. Other aspects include safe water, sanitation facilities, child care centres, and formal/informal education and/or vocational training for children below the age of 18.

Wage Negotiations

The most important factor to be addressed in the brick sector is exploitation of labour, which is primarily done by paying the workers a very low wage. This does not seem evident, as most entrepreneurs talk about giving good wages, and labour being scarce.

However, wages are given on the basis of output, and standards are set at levels where labourers do not get a fair wage. For instance, the payment for making and transporting of 1,000 green bricks is Rs. 350 NR. A couple work from 4 am to 11 am, and then from 2 to 6 pm to be able to make 1500 bricks. The capacity to work depends upon the number of children a woman has to care for, and the age of children, who invariably begin to help at the age of 4 to 6 years. Workers are not able to keep regular hours and work every day due to illnesses,

marriages, and other breaks, which provide further rationale to entrepreneurs for payment according to output rather than time. Thus payments made on the basis of number of bricks completely obfuscate the effective daily wage rate, gender based wage differentiation, and issues of child labour.

A time study of production levels and wage rates in the brick kilns would help to understand what is the effective wage rate an individual gets per day. It will form the basis to review the payments made for moving sand, making green bricks, moving and stacking 1000 green bricks. It will help the workers and their associations to negotiate with the entrepreneurs and get a much fairer wage rate.

Back of the envelope calculations in all brick kilns visited showed a 100% return on capital invested, and a payback period of one year at best, and 2 to 3 years in all cases. Due to the seasonal nature of employment, workers are unable to unionise effectively and demand better wages. There is a strong case for sharing profits with workers who have been returning to the same kilns for more than ten years. Profits at kilns are all made on the back of hard labour of very poor and vulnerable people, and in any future work in this sector, wage rate calculations and profit sharing needs to be an important advocacy agenda.

Savings and Credit for Workers

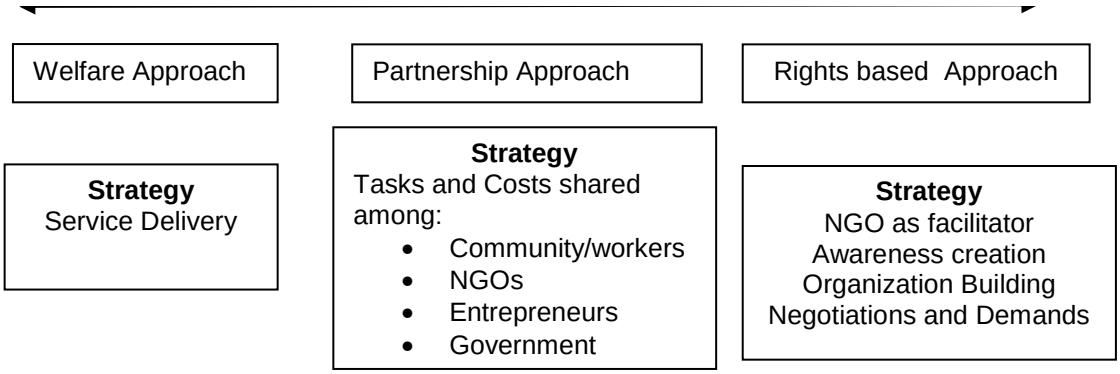
A project that works with brick kilns needs to continue and scale up thrift and credit groups, and also federate them, so that they have greater access and control over money. One financial product that can be introduced is loans for small IGAs. Their economic and social empowerment can be enhanced by introducing innovative loan and grants products, for instance, for buying machines and simple equipment, which would reduce drudgery and increase their incomes.

In summary, even though the environment is friendly, VSBK technology is expensive and therefore will continue to need technical and financial support for its promotion for another three to five years.

10.5. Reflecting on the Model for Social Development

The approaches, strategies and key activities for social development in a clean energy project in the brick kiln and construction sectors can be envisaged along a spectrum that is depicted in Figure 7:

Figure 7: Social Intervention Models



Key Activities

- Introduction of socially responsible business practices like ECD (such as providing safety gear to workers and setting up CCCs);
- Individual home visits, issue-based group discussions and mass awareness building. Promotion and education about safety at the workplace and occupational hazards, and social problems such as malnutrition, water problems and sexual violence are discussed
- Mother's forums for discussion on child health and nutrition, preventive health care practices including women's reproductive health and HIV/AIDS
- Sanitation programme
- A psycho social approach to attend to gender issues such as sexual harassment at work and domestic violence
- Skill training of workers, especially women and men masons
- Awareness creation, motivation and welfare schemes facilitated in workers's unions, under the CESEF track
- Establishment of savings and credit groups, especially under the CESEF track
- Inclusion of women entrepreneurs (especially under CESEF track) and masons for skill training and enrolment in worker associations
- Capacity building and Coaching of social mobilisers
- Social action committees and conflict resolution processes

The approach followed is not too different from that followed by ILO on its project in Nepal some years ago. This is described in Figure 8.

Figure 8: The ILO/IPEC Model

The ILO/IPEC implemented a project for removal of child labour on brick kilns and stone quarries in 1999-2000. The model of intervention included:

- Social awareness for parents, labour contractors and brick kiln entrepreneurs and their associations
- Day care centres for brick kilns workers' children of 3-5 years
- Education for children- Out of School (OSP) Programme for (10–18 years)
- Direct school mainstreaming of working children from 6-9 years
- Mobile health camps and awareness raising campaigns
- Unionisation of workers, so as to take up the agenda of minimum wages and educate on workers rights

The project was designed to intervene at the grassroots, as well as policy level. However, the inputs did not prove sustainable. The social mobilisation and education component was conducted by an NGO-Child Development Society – including trade unions for unionisation and prompting minimum and equal wage for male and female for equal work. The learning from the project was that without availability of alternative livelihoods; it is not sustainable to translate the protection from hazardous work. Further, the the inputs were not sustainableas entrepreneur commitment was not created, nor were these interventions mainstreamed into worker organisations.

The interventions that are done on the brick kiln site, necessarily requires that the entrepreneurs are collaborative and agree with the interventions, in order to be effective and sustainable. The limit of a model that works primarily through entrepreneurs is that the maximum support from them is bound to come for those activities for which they see direct benefits, such as reduction in absenteeism or increased productivity due to CCCs. Other areas, however, remain under-addressed, due to the sensitive nature of the problem, and/or due to low capacity to address these.

The VSBK project has many of the elements of earlier projects of UN agencies and other donors such as GTZ, and has experimented with other aspects of social development as well, such as combining vocational training, and building capacities of unions to include brick kiln workers as members, and to lobby and advocate their issues effectively at national and global levels. It has, however, focussed only on children of 0-6 years, and an opportunity for supporting children in the age group of 6 upwards to attend school, or adolescents to learn new technical skills has been largely missed[42].

There is also greater scope for improving technologies to improve working conditions and health of labourers on the kilns.

The social interventions on the project are framed within a partnership approach, wherein the intention is to influence the entrepreneur and work through him to

[42] The concept of peer educators seeks to reach adolescents and youth, and involves them in awareness raising and community related activities. However, this initiative has not yet developed into a full scale model for outreach and benefits for adolescents.

establish some worker friendly measures. The approach also has some elements of service delivery, such as CCCs, which are delivered with entrepreneur support, nutrition advice and counselling. It has a few elements of rights based approach, such as negotiations, and issue based meetings between workers and entrepreneurs mediated by VSBK. These latter elements have developed more recently, showing the increasing confidence of the VSBK team in representing and responding to workers' issues.

Overall Conclusion on Social Aspects

The discussion above confirms that workers in the brick kiln and construction sector are among the poorest and most exploited, and the high profits in this sector are made on the back of hard labour that is underpaid and lives in inhuman conditions. They do not have access to child care or education for their children or basic services for themselves. The legal and regulatory environment does not provide for any social protection to them, and as migrants they remain largely disenfranchised. In this context, the project interventions are highly relevant.

The project provides social support alongside technology inputs, and seeks to make entrepreneurs socially responsible. At the same time direct contact is made with workers to provide child care support, awareness, counselling and other inputs to increase productivity, health and nutrition of the family, especially children. Use of occupational safety and health awareness are promoted, among entrepreneurs as well as workers. A wide range of inputs covering a wide range of shareholders depicts a combination of service delivery and partnership approaches which do not yet adequately incorporate rights based elements.

The achievements relate to change in attitudes of both entrepreneurs and workers. Service delivery results in direct benefits to workers such as improved health and nutrition of children, reduced incidence of diseases, reduction in absenteeism and higher productivity, for which there is largely anecdotal and some quantitative evidence. The working context is very difficult, and the scale has been limited to VSBKs, but within these limitations, the project has tried many interventions, and has had limited success in initiatives such as establishing child care centres, and provision of safe drinking water.

The entrepreneurs and workers pay for some costs, such as the child care centre, protective gear, etc. However, the critical part of the project is strategising, capacity building and managing and coordinating the social support team, which needs to be done outside individual kilns. For this reason, and also because entrepreneur cooperation is conditional and limited, the social inputs cannot be sustainable and must be externally financed. Further development of the model is essential, especially to include elements of mainstreaming in government schools or providing out of school education to children in the age group of 6 to 9 and reaching out to adolescents in the age group of 10 to 18. Strategising needs to be done at three levels: enterprise, worker and entrepreneur organisations, and policy level. Given that there are few organisations working in this area, there is considerable scope for further efforts to reach out to a highly excluded group, and develop models of support to inform the larger development community.

11 Annex 5: Progress on the Logical Framework for VSBK-CESEF Programme Nepal - Phase 4

Narrative summary	Objectively Verifiable Indicators	Achievements & Comments
Goal - Impact Contribute to reduced emission of GHG & pollution in the construction sector to mitigate global warming, health and environmental degradation	➢ All Programme activities are within the National Standards;	VSBK emissions are within national standards
	➢ Occupational hazard levels at VSBK industries are within the WHO standards	While no quantitative estimates are available, workers in the firing area would face substantially reduced thermal stress and exposure to Carbon Monoxide and dust, whereas green-brick making in general is not too different from the traditional
	➢ GHG emission in Nepal is reduced	GHG emissions have been reduced proportionate to energy savings; much greater percentage reduction in black carbon has an immediate effect on climate change mitigation
Outcome 1 Entrepreneurs adopt environment friendly technology and demonstrate a socially responsible behaviour **Evaluation Team's Comment*:* Target: Partially met.**	➢ 20 EPs in brick sector adopt technologies which consume 40% less energy	Achieved 13 brick kilns have started production and 9 are under construction and will be ready by the end of 2011 40% savings in coal achieved, scope for more if internal fuel used more widely.
	➢ 25% (300) EPs in the project area from the cement based sector adopt best practices and technologies which consume 20% less energy	**Achieved:** More than 300 EPs have adopted CESEF technologies but some technologies have been disseminated before they are market-ready and "best practices" are not widely visible
	➢ Workers absenteeism is reduced	**Partially achieved:** Workers absenteeism has been reduced in most of the kilns where social programmes have been initiated, but not all kilns have these programmes
	➢ Security in the workplace is increased for women and men	**Partially achieved:** Measures are being put in place, some achievement has taken place, and more could be done
	At least 5 joint committees[43] are functioning in 5 enterprises and are leading the discuss on workers issues by 3rd year of phase 4	**Partially achieved:** At least three joint committees were functioning at the time of review.

[43] Entrepreneurs, Naikes, focal person on social action and workers representatives (mean and women)

Outcome 2 Real estate developers and individuals constructing their own houses in urban and semi-urban areas use energy efficient building materials and technologies **Evaluation team's comment: Target: Partially Met**	➢ At least 1 Real estate developer use 50% of CESEF materials and techniques in his/her projects	**Achieved:** OSHO Developer in Rupandehi is using RTB and round aggregates and CE Harmony Housing in Kathmandu is using round aggregates. Scale of uptake is minuscule compared to total potential.
	➢ 50 individuals (women and men) partly or fully apply energy efficient building material and techniques in the construction of their own houses	• More than 50 houses have used RTB.
Outcome 3 GoN has a favourable policy environment to promote clean production technologies in the brick sector **Evaluation team's comment** **Target: Partially met, though the shortfall in achievement is largely not in the control of the Project, the government's lack of capacity is an extraneous factor**	➢ 50% of operating VSBK will operate at 70% of GoN emission standards of 400mg/Nm^3	• Although emission monitoring is not done by the government and records of all VSBK are not available, the ones that have been monitored by the Project show that the government standards are being met.
	➢ Roles of sector agencies for the enforcement of environmental management is streamlined	• Declaration of VSBK as a "Non Wood Base Technology" was a major achievement but, roles of sector agencies in enforcement of environmental management is still not clear. However this is a problem of the government and not of the Project.
	➢ Responsibilities and means for enforcement of environmental compliances are decentralized to local government	• Decentralization of IEE approval has been done but not of the environmental compliance process as a whole.

Narrative summary	Objectively Verifiable Indicators	Achievements & Comments
1 Output *related to outcome 1 & 2*		
Potential and existing Entrepreneurs **know** the economic, health and environmental benefits of the VSBK technology	➢ Existing[44] VSBK kilns operate totally independent and 50% increase their output capacity by the end of year 3 ➢ 8 VSBK technology marketing campaigns conducted in collaboration with local partners[45] ➢ Clean brick production technology data are annually published and disseminated ➢ By end of year 4, 500 entrepreneurs are aware of VSBK technology and 10% to 20% got intensive counselling	➢ The kilns established in the earlier phase are operating independently ➢ 3 VSBK marketing campaigns have been conducted and more are being planned for 2011. ➢ Information and data on VSBK are available and brochures have been published. ➢ Although the exact number of EPs aware of VSBK is not known, by now many EPs have some knowledge of VSBK and intensive counselling is being given to interested EPs. ➢ **Target is in the process of being met**
2 Output *related to outcome 2*		
Potential and existing Entrepreneurs **know** the economic and environmental benefits of CESEF building materials and techniques	➢ By end of year 4, 1'500 entrepreneurs are aware of CESEF technology and 20% to 30% got intensive counselling ➢ 10 CESEF promotion campaigns conducted in collaboration with partners ➢ Clean CESEF production technology data are annually published and disseminated ➢ CESEF technologies are marketed and disseminated through alliances[46]	➢ 41500 seems ambitious but many EPs have knowledge of CESEF and have received intensive counselling. ➢ A few promotional campaigns have been organized and more will be done in 2011. ➢ CESEF technology data is being compiled. Some brochures and training manuals have been published. ➢ CESEF technologies are being disseminated through petty contractors associations, but not extensively through real estate developers and other projects. ➢ As many of the technologies are not fully ready for dissemination, they have not been marketed yet. ➢ **Target: Partially met**
3 Output *related to outcome 1*		
Partners and their workers **know** the benefit of decent working and living conditions (enterprise level)	➢ Basic infrastructure for decent work is available e.g. drinking water and sanitation, CCC in VSBK enterprises ➢ 2'500 workers (women and men) and concerned entrepreneurs are aware about occupational health and hazards and other social evils (domestic violence, sexual harassment / violence)	➢ Safe water and sanitation facilities and CCC available in some of the VSBK kilns. ➢ **Target: Partially Met**

[44] VSBK kilns constructed during phase 3
[45] OCSI, FNCCI, FNCSI, CCI, DDC, etc.
[46] Real estate developers, GoN (reconstruction), other projects, donors, etc.

Narrative summary	Objectively Verifiable Indicators	Achievements & Comments
4 Output *related to outcome 3*		
Programme produces objective source of information on energy efficient environmental friendly construction materials and technologies	➢ Annual stack emission data from brick industries are published and disseminated ➢ Study reports on energy efficient policies are submitted to MoEST ➢ Conduct public hearings on environmental pollution policies and practices ➢ A platform for policy exchange is created and 2 events organized	➢ Stack emission data from VSBK have been published but MOE has not yet established a monitoring system ➢ Public hearings on environmental pollution policies and practise have not been adequately done and platform for policy exchange has not been created. This is partially due to the lack of interest shown by the government in pollution control. ➢ **Target: Partially met (more advocacy and strategic planning is necessary)**
5 Output *related to outcome 1 & 2 & 3*		
Programme services, instruments and know-how are commercially anchored in the market	➢ Nepal programme provides technical backstopping support nationally and internationally on demand ➢ Different options for commercialization of services developed by end of 2008 ➢ By the end of 2008 the Programme is reorganised to reflect the shift from technology transfer towards the climate change problem complex ➢ Transition towards the selected option of commercialisation by the allocation of mandates to partners to move and implement achieved by the end of 2009 ➢ VSBK / CESEF programme and team are institutionalized / privatized by 2010	➢ Technical backstopping has been provided nationally and internationally by the Nepal Programme ➢ Some options for commercialization of services has been developed ➢ And there has not yet been major a shift towards the climate change problem complex. The Climate Change Division in the MOE is not aware of the project and Project Design Document for the CDM of VSBK is not yet ready. ➢ There has been a move towards institutionalization and privatization but this process is not complete. ➢ **Target: Partially met (more advocacy and strategic planning is necessary)**