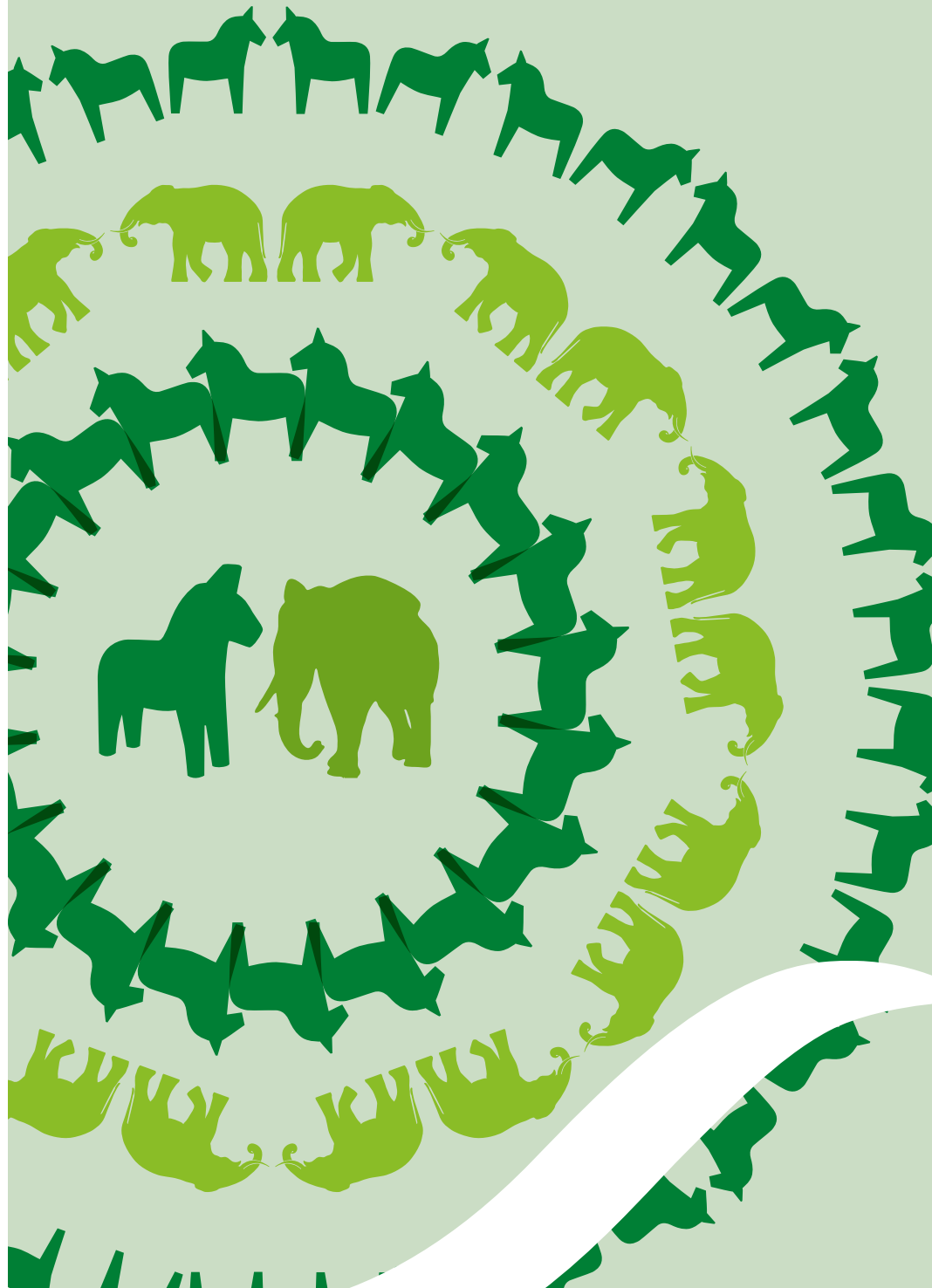


Working paper: Communicating Energy Efficient Behaviour



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Preface

This final report describes the cooperation between two national agencies regarding energy efficiency, the Bureau of Energy Efficiency (BEE) in India and the Swedish Energy Agency (SEA). The cooperation that is reported here has mainly been funded by the Swedish International Development Cooperation Agency (Sida) – ID 55040202.

The bilateral collaboration between the agencies has covered several forms of policy and measures to increase energy efficiency in buildings, industry, and appliances.

Additional involved partners have been the Swedish Environmental Protection Agency (S-EPA) and five Swedish consultancy firms; CIT Energy Management AB (CIT EM), Projektengagemang, ÅF Infrastruktur AB, SP Technical Research Institute of Sweden (SP) and Kan Energi Sweden AB.

The project started in April 2012 and ended last December 2013. Further documents delivered from the project can be found on the website www.energimyndigheten.se.



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1 Executive summary

When the energy production in a country is too low to give all inhabitants the possibility to use energy consuming products, energy efficiency is a cost effective and fast way to help solving that problem. In India 360 million people do not have access to electricity.

The cooperation between two national agencies working with energy efficiency in Sweden, the Swedish Energy Agency (SEA), and in India the Bureau of Energy Efficiency (BEE), aimed to share knowledge on improving the energy efficiency in the following four different areas; Buildings, Industry, Appliances and Policies.

1.1 The most important results

WP1 Buildings:

The three subprojects for buildings focused on testing some methods in India that had been successful in Sweden. The methods had the objectives to reduce energy consumption in buildings, to measure and verify the consumption and to collect information for analysing the total energy use for buildings in the country.

Two Indian buildings are investigated and can now serve as good examples. Tools and training materials have been developed for implementing a method to support reduction of energy consumption in existing buildings (BTC method).

Increased interest among different stakeholders on implementing the BTC method in their buildings and spreading the concept has been noticed. The process of creating a new Indian code for measurement and verification in buildings has started.

The STIL2 subproject was lifted out from this Sida financed project why the results will not be described in detail in this report. A method to present the energy use in a specific building category on national level is finalised for Indian buildings and training material has been developed. This Partner Driven Cooperation has continued outside this project.

WP2 Industry:

Energy management system is a useful tool to help industry work with energy efficiency. ISO 50001 is an international standard for implementing such a system. The two subprojects for industry aimed at sharing experiences within these areas.

A large potential for long-term, sustainable relations between several participating organisations has been developed. In particular, the contacts established between organisations with the same roles in both countries, i.e. the accrediting agencies in Sweden (SWEDAC) and in India (NABCB) to handle implementation of the new international standard for Energy Management Systems, ISO 50001.

Industries participating in the workshops had good opportunities to establish contacts and share experiences, both within India and between Sweden and India. Both the Swedish Pulp and Paper industry and Steel industry participated in the workshop on Energy Management Systems together with Indian industry.

Contact was also established with a partner that was not initially involved in the cooperation, the Confederation of Indian Industry (CII) that helped organizing the workshops as a part of their conference. Apart from the cooperation within the project, SP Technical Research Institute of Sweden (SP), Swedish Energy Agency, SWEDAC and SCA (Swedish Pulp and paper industry) have had an informal meeting with two representatives from CII, discussing ideas on possible future cooperation.

WP3 Appliances:

Energy efficient appliances are important ways to lower the costs for all consumers in a country with lack of energy. To facilitate international business it is also important to try to have common energy performance rules in the countries. The three subprojects for appliances aimed at unifying the work.

BEE got the opportunity to deeply understand the ecodesign and energy labelling process in European Union (EU) when attending a Consultation Forum meeting in Brussels. This forum covered heating and cooling products, and high temperature process chillers. Consultation Forums are part of the process to develop ecodesign (typically setting MEPS – Minimum Energy Performance Standards) and labelling requirements in the EU. Member States and European stakeholders such as industry, consumer organisations and NGOs participate. The product area was selected because of its high relevance for BEE's current activities in product regulation and labelling.

The Consultation Forum meeting was followed up with a face-to-face meeting with officials from the European Commission, as well as a meeting with Clasp Europe, an expert NGO working with standards and labelling. One meeting was set up with ECOS (the European Environmental Citizen's Organisation for Standardisation), another European NGO focusing on consumer and environmentally relevant standardisation.

A routine for follow-up has been suggested from SEA. This includes a simple manual to guide BEE officials to follow the ecodesign process independently by using European information sources and portals. This also provides simple information on how the EU process works. Coordination of regulation for products in India and in EU should be of great value for both parts.

WP4 Policies for energy efficient behaviour:

Information dissemination and behavioural issues are important parts of agencies' work with energy efficiency. Swedish agencies have worked with these subjects for several years and within this subproject the experiences should be transferred to the Indian agency.

BEE now has got a broad picture of how Sweden is using policy instruments in order to promote an energy efficient behavior and mind-set.

BEE has shown an interest in building a long-term partnership with Sweden in the area of policy for energy- and climate efficient behavior.

1.2 The biggest challenges

The biggest challenge in this project has been to overcome the communication barriers – both with regards to technology, language and culture.

On-line meetings often had technical problems and poor quality, and made it difficult to have direct communication. Email communication was difficult when both parts were blocked in SPAM-filters. However, the direct personal contact experienced in India showed very positive and productive results.

Communication was improved at the end of the project with the assistance of a local representative working for the Swedish partner.

During a period of exchanging director general at BEE, we experienced unclear executive mandate for the Indian partner. Changing of staff in both agencies caused difficulties. Another challenge, caused by the Swedish consensus tradition, has been to interpret and understand the lack of response from the Indian partner on proposals of dates for the agreed activities.

It was not always easy to understand the decision making process among Indian partners. It was shown already during early stages of this project that some processes take time, especially concerning the gathering of relevant information and involvement of the relevant stakeholders. One big challenge was that BEE had problems to get approval for their officials to come to Sweden and participate in expert Workshops.

It was a challenge to combine the Swedish need for control and planning in advance with the Indian flexible culture of short planning horizons and rapid changes in planning.

The timeframe for the project was too limited to manage the inevitable delays. One reason is that it took one year to negotiate the application with Sida.

1.3 Possibilities for long term relations

This cooperation will certainly lead to a long term and sustainable relation between different Swedish and Indian partners. The good contacts and trust established with BEE during the course of the project will definitely be an advantage for future cooperation. A list of twenty six different suggestions of future collaboration has been put together by the both energy efficiency agencies. We will together prioritize the list and decide a level of continued collaboration between the agencies. Some of the Swedish consultants have found new customers in India and the accrediting agencies in both countries have also an increased interest in collaborating.

2 Purpose and objectives of the project

2.1 Background

Both Sweden and India act within a larger framework and context where energy efficiency is a means of solving issues related to economic efficiency, energy security, environmental conditions and to climate change. These issues include many countries and stakeholders and are in many cases long-ranging well beyond the one and a half year project carried out here. The project was structured as a way for Sweden and India to act in a more supportive and concerted manner.

India is facing power-shortages more and more frequently. The power-sector is not keeping pace with the economic development. The obvious way of reducing this problem is to decrease demand. Therefore, the Bureau of Energy Efficiency (BEE) was established. Several innovative programs have been put into place by BEE.

Sweden on the other hand is facing the EU goal of 20% energy efficiency to 2020. Swedish industry and Swedish consultants have developed technologies and methods to meet the goal. However lessons from BEE's programs would also be beneficial for Swedish Energy Agency (SEA).

The Indian and Swedish governments signed a MoU on India-Sweden renewable energy cooperation between The Ministry of New and Renewable Energy, Government of the Republic of India and The Ministry of Enterprise, Energy and Communications, Kingdom of Sweden, on 5th November 2009. Based on this agreement and the SEA's priorities for bilateral cooperation and energy efficiency technologies, SEA approached the BEE in order to investigate mutual interests.

SEA decided to start a project together with BEE with three objectives (agency cooperation, facilitate business cooperation and BEE capacity building). The capacity building of BEE is covered by this project financed by SIDA.

BEE's motive for working together with SEA as opposed to other countries such as US, France etc. is that they found some really interesting results in Swedish projects. A larger amount of projects were presented when the Director General visited Sweden and from these projects BEE selected what they found the most interesting. Sweden has over a long time acquired unique competence in the key areas, energy efficiency in industry (especially electricity), methods of analysing electricity demand in commercial and public buildings and experience from programs for energy efficiency, including EU programs.

BEE is a small organisation and for that reason India needs to use experiences from other countries. BEE is very interested in Swedish operational methods. SEA commissions a variety of consultants to support the stakeholders in the adaption

to sustainability that is needed, which might be a model for BEE. Another motive for BEE is that SEA has been closely involved in the EU development of several directives such as the ecodesign and labelling directives. Understanding these new rules in Europe will be important for all industries seeing Europe as a future market.

During the inception phase the Swedish Environmental Protection Agency (S-EPA) was also included in the discussions. The reason for this being S-EPA's experience from environmental management and labelling, climate effective lifestyles as well as and policy implementation.

It was anticipated that SIDA's catalytic support for this project should be the foundation for a future cooperation between the three agencies. As personal contacts are established and mutual understanding of the conditions are achieved cooperation will be easier. SEA and S-EPA can together give a more complete picture of the Swedish work with climate issues, for example by including both environmental aspects and energy efficiency aspects.

Within this collaboration project BEE has tested the Swedish agencies' operating methods. The main objective was:

Increased energy efficiency in India through a capacitated Bureau of Energy Efficiency.

The long term result of this objective is that it will contribute to environmental protection and climate change mitigation strategies, thus contributing towards a socially, economically and environmentally sustainable development in India.

As a facilitator SEA has played a catalytic role in enabling collaboration that has led to partnerships of mutual interest between stakeholders in Sweden and in India. In the table below collaboration within each subproject is shown.

COLLABORATION AND NETWORKING	1a	1b	1x	2a	2b	3a	3b	3c	4
Agencies									
BEE/SEA	X ¹	X	X	X	X	X	X	X	X
BEE/SEA/S-EPA									X
SWEDAC/NABCB				X	X				
Swedish/Indian local governments							–		
S-EPA, SEA/Indian local and regional governments							–		–
BEE/EUCOM						X			
Companies									
Indian/Swedish Industry				X	X	X			
Energy Service companies/ Indian Building owners	X	X	X						

¹ "X" means Collaboration that did happen, "–" means Planned collaboration that did not happen.

2.2 WP1 Buildings

The purpose of this Work Package (WP) is to promote development in the building sector and influence both design practices and training of staff in order to increase energy efficiency in the complex building and refurbishment processes. The cooperation between Sweden /SEA and India /BEE aimed to share knowledge on improving the energy efficiency in the existing building stock.

2.2.1 WP1a 50% Energy reduction

Sub-outcome: BEE has knowledge of how to use BELOK Total Concept working method (BTC method) for promoting energy efficiency in commercial buildings.

Indicator: BELOK Total Concept working method (BTC method) has been tested on Indian building owners.

This subproject aimed, in cooperation with the Indian partners, to introduce and demonstrate how the BELOK Total Concept (BTC) method can be practically implemented and further disseminated in India. BTC method is a working method for improving energy efficiency in existing buildings and applies a refined systematic approach to work with energy issues in a building with the aim to achieve maximum savings in a cost efficient way. The results from the projects in Sweden show that it is possible to achieve energy savings up to 50–60 % within the profitability frames set by the building owner. A Network of Commercial Building Owners has been established.

The more strategic objective of this project was to enhance major energy performance improvements in the non-residential building stock in India and to resolve barriers for finding economically profitable solutions for investments for energy performance improvements in the building sector. This project can also facilitate the development of services provided by Energy Service Companies (ESCOs) and other energy service providers and consultants in India.

For the successful implementation of the BTC concept in India the project was divided into the following phases and actions to be carried out during the time frame of this project:

- Evaluation of the local conditions and prerequisites for carrying out the demonstration projects based on the BTC method in India and involvement of local key actors and cooperation partners;
- Carrying out one demonstration project with the BTC method application in India;
- Support with knowledge transfer and training to different interest groups on BTC method implementation.

In the current project the BTC method has been introduced in two selected non-residential buildings in India to show how it can be implemented in practice. The demonstration project involved implementation of the first step of the BTC method, which includes detailed energy audit on site, identifying energy saving measures, calculating their savings and cost and forming a package of measures that, as a whole, fulfills the property owner's profitability demands. It was possible to fully report the package of measures for one demonstration building. For the second one it was somewhat more challenging to receive all the necessary information in time and therefore a project report with proposed measures and recommendations for continuation has been handed over.

Besides carrying out demonstration implementation, a two day training event was carried out in New Delhi with the aim of providing support in the form of knowledge and information needed for the Indian partners and the different interest groups to implement the BTC method on their own. The training targeted the main stake holders, property owners and consultants involved with the future BTC method implementation. A positive feedback was received from the participants. Additionally, ideas for future cooperation were discussed with BEE.

2.2.2 WP1b Measurement and Verification (M&V)

In the WP1b project, the following outcome was decided:

Sub outcome: BEE knows how to follow-up actual performance in new buildings compared to requirements in the building codes.

Indicator: One following-up tool adapted to Indian conditions, has been tested on at least one new building.

To support the outcome, the following objectives were agreed upon in the beginning of the project:

Item	Objectives
1	Workshop 1 – Presentations and discussions.
2	English summary on relevant parts of Sveby Standard
3	Adaptation of Sveby standard to Indian requirements, demonstration building
4	Adoption of Sveby standard to India, Pool of verifiers
5	Training material/manuals, Workshops

The cooperation between Swedish and Indian energy authorities (SEA and BEE) is targeted to share knowledge on improving the energy efficiency in buildings.

The aim for project 1b “Measurement and Verification” is to transfer knowledge on the Swedish verification trade standard on building energy use (Sveby).

In this project, relevant parts of the Sveby standards have been translated and as a first version adapted to Indian conditions. Six documents and the verification tool are included.

Information on two non-residential buildings has been used to fill in the Sveby verification tool, clarifying the need of more measurement data on a yearly basis, which was not possible to create within this project.

Three seminars with participants from Sweden and India were held within the project, two in India and one in Sweden. The first seminar in India was to inform staff from BEE and United Nations Development Program (UNDP) about the Sveby standards, and how they are applied in Sweden. Discussion also included a discussion on implementation for India and updating the working plan for the project. The second seminar was held in Sweden with an official from BEE, with continuing information exchange and implementation discussions. The third seminar in India took place with BEE, UNDP and external participants (property owners, consultants, power companies etc) where more details in the verification and benchmarking process were discussed. Additionally, ideas for closing this project and future tasks for cooperation was discussed with BEE.

2.2.3 WP1x STIL2- Conclusion

Sub outcome: BEE has knowledge of basis and method for potential assessment of energy efficiency in buildings in India.

Indicator: BEE has a plan for potential assessment of energy efficiency in buildings in India based on results from Indian STIL2 project and from Swedish STIL2 project evaluation.

For planning reasons it is good for an Energy Efficiency Agency to have a hint of the energy efficiency potential in the country. This makes it easier to prioritise what new policies to introduce.

The main part of this subproject was lifted out to be financed by the Swedish Energy Agency (SEA) because of the extended application process with Sida. The very small part that remained was to translate Swedish documents that describe different evaluations and experiences from the STIL2 project in Sweden.

BEE managers were interested in going on with the STIL2 method, which also took place outside this project, financed by SEA. The delivery from the continued project is also presented in this report as a result of the partner driven cooperation.

2.3 WP2 Industry

Sub outcome: BEE has the knowledge to disseminate methods used and the experience made in Swedish companies to efficiently implement ISO 50001.

Indicator: Workshops in India in collaboration with BEE and NABCB with participation of Swedish companies have been arranged. Industries in India have contact with Swedish companies that have successfully implemented Energy Management Systems.

The two general purposes of the subproject were the following:

- to promote establishment of Energy Management Systems (EnMS) in Indian Industry.
- to exchange experiences from Energy Management Programmes.

These two purposes were to be achieved partly by the elaboration of written material to be disseminated by BEE (Part A), partly by organizing and carrying out workshops in India in cooperation with BEE (Part B).

Part A included the preparation of two reports. The first one should describe the Swedish certification system for EnMS including the roles of different actors involved. The second one should describe how Swedish companies in practice have been working with implementing EnMS. This includes both successful strategies for the system implementation as such as well as identification and compilation of energy efficiency measures done by companies in Sweden. The latter was focused on industry sectors of high relevance for Indian industry.

Part B included the realization of two workshops in India with different target groups and therefore different goals. One workshop should address the certification structures in Sweden and India respectively and experiences made in both countries. The other workshop should address examples of implementing EnMS in Swedish and Indian companies with focus on successful strategies and methods.

The project was carried through by the Swedish Energy Agency, SP Technical Research Institute of Sweden (SP) and the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) in close cooperation.

The project was intended to support increased energy efficiency in Indian industry through capacitation of the Bureau of Energy Efficiency (BEE) in India. The focus was on exchanging experience from successful methods of implementing Energy Management Systems (EnMS) in Swedish and Indian industry. Therefore, a workshop was arranged at the Energy Efficiency Summit 2013 in Hyderabad. This event is arranged every year by the Confederation of Indian Industry (CII), and is the core meeting point for energy management activities within Indian industry. This year, about 500 Indian companies attended the Summit.

Also, an informal workshop on certification of EnMS was held in connection with the Summit. In this, representatives for BEE, CII, NABCB and the Indian standardisation committee met with the Swedish delegation to discuss topics of common interest. The meeting concluded that there are mainly two possible future bilateral cooperation areas where the need is obvious: the design and implementation of efficient incentive programs for energy efficiency improvement as well as capacity building of consultants in EnMS for supporting the companies that want to implement EnMS.

Informal discussions between the Swedish delegation and representatives for CII showed that there is a mutual interest for technical bilateral cooperation, primarily in the areas of biogas production and utilisation, gasification and district cooling.

2.4 WP3 Appliances

2.4.1 WP3a MEPS & Labelling

There are different methods to help consumers with technical and practical support when the measures are profitable but complicated. Labelling and MEPS- Minimum Energy Performance Standards are two examples of tools.

Sub outcome: General: Routines are established for a systematic follow-up of the EU-work regarding minimum energy performance standards (MEPS). Indian policy makers use the ecodesign work at EU-level as an input to the preparation of Indian policies.

Indicator: Documented routines and use of European work as input when developing MEPS and/or energy labelling.

2.4.2 WP3b Technology Procurement of LED (Light-Emitting Diodes) Street Lighting

There are various methods that can be applied when the industry does not supply the market with enough development and innovation. One method where the purchaser has the possibility to influence the requirements is the Technology Procurement.

Sub outcome: BEE knows the process for Technology Procurement theoretically and part of the process in practice.

Indicator: Decision has been taken and choice of Technology Procurement Group is established.

The technology procurement process was decided to be started within one area, LED Street lighting. Information was to be shared on technology procurement and on how to develop a project in order to allow a faster development of energy efficient products in India. Also other technical parts of the lightning systems, such as dimmers and lighting systems in a systematic perspective should be covered.

This subproject should contain a lot of coordination with other initiatives in Sweden in India and with some international organisations to make sure the work is efficient.

2.4.3 WP3c LED specifications

The general purpose of this subproject was to establish specifications on lighting quality and energy efficiency for LEDs and to establish a manual/guide for procurement.

Sub outcome: BEE has developed criteria for testing LED lighting in cooperation with the international organisation SEAD¹.

Indicator: LED Specification and plan for testing LED is available.

Expected results are in addition to the guidelines a report on existing specifications and guides.

2.5 WP4 Policies

To develop and build capacities to deal with the energy issues close to end users.

The expected outcomes the sub project was that;

Sub outcome: Key energy/climate policy competence has been transferred to Indian expertise and to BEE to promote increased acceptance for energy efficient and low carbon life-styles in India.

Indicator: Policy experts and BEE Workshop inquiry.

Sub outcome: BEE knows how the system with Energy and Climate Advisors in municipalities in Sweden is constructed.

Indicator: Information exchange agencies meeting.

¹ SEAD – Superefficient equipment and appliances deployment. SEAD is a cooperation within Clean Energy Ministerial (CEM).

At the overall kick-off meeting of the cooperation the scope was limited to policy for communication, i.e. to inform and demonstrate energy and climate efficient behaviors and mindset.

At the first sub-project meeting a common project plan was developed and agreed upon.² Three overall outputs were defined:

- Working paper: Policy initiatives at SEA and SEPA in order to stimulate energy and climate efficient behavior.
- Background note: Energy efficiency initiatives and outreach activities by BEE.
- Knowledge exchange in jointly selected areas.

² Project Plan WP4: Communicating energy and climate efficient behaviors, Feb 2013.

3 Project wide results

3.1 WP1 Buildings

3.1.1 WP1a 50% Energy reduction

Conclusions

Objectives where fulfilled.

Baseline:

- 1 The prerequisite conditions for carrying out an energy performance improvement project based on the BELOK Total Concept (BTC) method in India is not known and can be somewhat different in India due to differences in building codes and building practices.
- 2 No energy efficiency improvement methods similar to the BTC method exist in the Indian market. In order for the Indian partners to have an understanding of the concept of BTC method a “hands-on” project was needed to demonstrate how the BTC method is implemented in practice.
- 3 In order to spread BELOK Total Concept on a broader scale in India it is necessary that the applications are in accordance with the developed concept and that good quality of the results can be assured. This means that the different stakeholders and key actors need to have sufficient knowledge on how to carry through a project based on the BTC method. By developing relevant information and training materials and carrying out trainings it will be assured that applying the BTC method in India has the necessary prerequisites.

Activity:

- 1 Evaluation of the local conditions and prerequisites for carrying out the demonstration projects based on the BTC method in India and involvement of local key actors and cooperation partners. Introduction was made to Indian partners about BTC method and checklists formed for gathering the required information and needed support for practical implementation. Selection and pre-analysis of a demonstration building and involvement of local key actors.
- 2 Carrying out a demonstration project with the BTC method applications in India. The demonstration project involved carrying out the first step of the BTC method implementation in two selected demo buildings. An in-depth energy audit has been carried out on site in cooperation with the local key actors in order to analyse the current situation with the building and its technical systems and identify all possible energy saving measures. An energy balance of the buildings has been simulated with software tools and energy savings of identified measures were calculated. After local consultants provided information about the investment costs for carrying out the identified measures, a package of measures was formed that fulfilled profitability frames set by the building owner.

In one of the demonstration buildings there are a number of remaining questions and details to be clarified and verified before a package of measures can be formed based on BTC method. These remaining questions have been listed and handed over to the project partners in India.

- 3 Required information material was prepared, guidelines and tools developed for applying BTC method in India. Training materials developed for training the different interest groups on how to implement the BTC method on their own.

A two day training course carried out in New Delhi for the different stakeholders and key actors. The training course had 18 participants representing property owners, property managers, ESCOs, consulting engineers and BEE representatives. The first day was targeting property owners and decision makers in the real estate field, ESCO companies, those interested in energy topics in general and also to all working directly with energy savings, i.e., energy experts, energy auditors and consulting engineers. The second day involved the consultants and energy experts who will be carrying out the Step 1 and Step 2 in the BTC method in practice.

Has led to:

- 1
 - a) Overview of the local conditions and prerequisites for carrying out BTC method demonstration project in India.
 - b) Initially one demonstration building was proposed by BEE, but during the visit to India one additional building was selected.
 - c) Relations with local key actors were established.
- 2
 - a) One demonstration pilot project, where the implementation of Step 1 in the BTC method has been carried out and cost efficient energy saving package of measures formed.
 - b) Based on demonstration pilot project valuable information has been gained on the possibilities and recommendations for the future national applications of the BTC method.
- 3
 - a) Development of information materials for further BTC method applications in India and materials for trainings.
 - b) Detailed information and guidelines available in India about BTC method and its applications, including:
 - Guidebook in English including: general information about the BTC method; practical information and checklists addressed to different stakeholders and key actors on how to carry out a BTC project; roles and responsibilities of different stakeholders in different steps of the methodology.
 - Feasibility calculation tool *Totaltool* for easy applications of BTC in India.
 - Basic training material targeting the different stakeholders and key actors in the BTC method applications.

- c) Increased interest among different stakeholders on implementing the BTC method in their buildings. This was reflected in the participant feedbacks.
- d) Increased interest among project partners on carrying out additional reference projects and spreading the concept on a broader scale.

3.1.2 WP1b Measurement and Verification (M&V)

Conclusions

Objectives where fulfilled

Baseline:

- 1 Very limited mutual understanding between Swedish and Indian prerequisites and building codes.
- 2 The prerequisite conditions for measurement and verification of energy performance in buildings is non-existing.
- 3 The present Indian Energy Conservation Building Code (ECBC) is only prescriptive, and could be fulfilled in the design stage of the building process. There is a need for energy performance benchmarking to find out how well the prescriptive code works.
- 4 Verification by measurements does not exist in India and there is a lack of people who are educated in verification of building energy performance.
- 5 The Pool of verifiers and the BEE staff need further training to be able to teach others on the measurement and verification procedures.

Activity:

- 1 Workshop 1 – Presentations and discussions of prerequisites for adaptation.
- 2 English translation of the measurement and verification parts of the Swedish Sveby Standard.
Six reports and documents as well as an Excel tool have been translated.
- 3 Adaptation of Sveby standard to Indian requirements and apply to at least one demonstration building. Training of BEE officials to understand the requirements and process for adaptation of standard.
- 4 Adoption of Sveby standard to India, creation of Pool of verifiers.
- 5 Training material/manuals, workshops for verifiers.
Training material was prepared in the form of presentation file (PPT), and a report including the translated material, together with the verification tool, used on two Indian buildings. One workshop in India with ECBC professionals and BEE staff.

Has led to:

- 1 a) Clarification of the Sveby standards for BEE and UNDP staff.
b) Basic knowledge about the Indian codes and the possibilities of adaptation.
- 2 a) BEE staff obtained increased knowledge about the Sveby system, which includes an energy performance contract model, energy simulation input guidelines, measurement requirements and a verification procedure including a verification tool.
- 3 a) The lack of feed-back from the Indian partners, has resulted in more translations than was intended from the beginning. Decisions had to be made by the Indian partner on area, energy use etc. for the benchmarking rules. The Swedish definitions are not directly applicable.
b) The Sveby verification tool has been used on two buildings, clarifying the need of more measurement data on a yearly basis, which was not possible to create within this project. The protocol should be developed (simplified) to better suit the Indian conditions and ambition level of ambition.
- 4 a) The adoption process in creating a new Indian code for measurement and verification is longer than the time-frame for this project and this should be done by the Indian partner with the translated and adapted material as a starting point. They have started the work but so far, the result is unknown.
b) There exists an external Indian group of ECBC experts that potentially could be used for verification by measurements. The translated Sveby standards have been sent to this group.
- 5 a) Development of training material for further application in India.
b) 16 professionals and BEE staff participated in a workshop, where the training materials were sent out in advance. Mainly, difficult parts in the adaptation were discussed.

The upcoming challenge is now for the Indian partner to fine-tune the method and spread the use of it.

3.1.3 WP1x STIL2 Conclusion

Conclusions

Objectives where fulfilled.

The translations of Swedish results from similar project are delivered. Continued Partner Driven Cooperation has resulted in deliveries described in chapter 13.

3.2 WP2 Industry

Conclusions

Objectives where partly fulfilled.

The workshops were very successful.

The report did not completely contain what BEE expected. One reason could be communication difficulties based on language.

Baseline:

Discussions of main frames for the cooperation and specifically the preparations of the workshops arrived at the conclusion that the certification system for EnMS in India today is quite well implemented, and that about 15 Indian companies had obtained ISO 50001 certificates. Therefore, the prime area of the work should be on the experience from companies that have implemented ISO 50001 and focus on the following topics:

- The methodology used in implementing ISO 50001.
- Problems encountered during the implementation and how these were solved.
- Examples of routines for purchasing, design and planning of new equipment, processes and products.
- Examples of useful software.
- Examples of “before and after state”.

Activities:

- 1 Workshop – Presentations and discussions of energy management systems and the international standard ISO 50001. The most relevant and interesting industry, from an Indian point of view, pulp and paper, steel and cement industry participated.
- 2 The elaboration of the two written reports (Part A) was during the course of work changed into one common report.

Has led to:

- 1 Possibilities for bilateral Industry contacts and accrediting agencies contacts. On the Swedish side, SCA AB, one of Sweden’s largest forest products companies, and Höganäs AB, a Swedish company manufacturing steel powder on a global range, presented their experiences. The workshop was arranged as a part of the Energy Efficiency Summit 2013(EES 2013) on the 21–24st of August in Hyderabad. This was arranged by Confederation of Indian Industry (CII), and welcomed a vast number of representatives for about 500 Indian companies. The Indian accreditation body, NABCB, will be contacted directly by the Swedish partners, including SWEDAC.

An informal meeting between CII and the Swedish delegation took place. The role and activities of CII was shortly presented in five main areas: proactive work in order to improve the basic conditions for the Indian industry, recycling of material, Green Buildings, renewable energy and recycling, quality, safety and availability of water. The most important industry sectors for CII are: pulp and paper, sugar industry and thermal power plants. About 65 % of India’s energy use is coal based.

- 2 The certification process in India and the infrastructure for this have been well established during the very recent years in India. Because of a delayed start of this project the need for a separate report on this was prioritized lower between the cooperating partners. The resulting common report or brochure was distributed to the participants in the workshop arranged in India.
- 3 Some planned translations of Swedish documents were also obsolete because of the delayed start of the project.

3.3 WP3 Appliances

3.3.1 WP3a MEPS & Labelling

Conclusions:

Objectives where fulfilled.

Baseline:

There is a scheme for labelling products on energy efficiency in India today that BEE is in charge of. The scheme is first voluntary (until a certain percentage of the market has joined), then the scheme is made mandatory.

Mandatory products are (November 2013):

Refrigerators, Light sources, Air conditioning and Distribution transformers

Voluntary products are (November 2013):

Direct cool refrigerator, Industrial motors, Pumps (for different purposes), Ceiling fans, Domestic gas stoves, Water heaters, Colour TVs and Washing machines

To be able to label a product, testing standards and procedures are necessary. In Europe (and Sweden) similar work is made within the framework of the Ecodesign and Labelling Directives. It should be noted that the European process is organised differently in the sense that many product groups are the subject of so-called ecodesign regulations alone (i.e., minimum energy performance standards, or MEPS). Typically only those products aimed for the consumer market are energy labelled. However, both processes are usually dealt with in parallel and the same testing standards and product definitions are applied regardless of whether a product is subject to MEPS alone or to energy labelling as well. Since the Indian and the European process are rather similar, the process of labelling and setting minimum energy requirements on products could gain from cooperation between BEE and SEA.

Activity:

In the work plan we agreed on the following activities in this task:

- 1 BEE to follow four different products/product groups within ecodesign.
- 2 From suggestions to meetings with industry etc.

- 3 BEE to participate in a Consultation Forum in Brussels on 25 September covering central heating products using hot air to distribute heat, other than CHP. This basically covers Lot 21. (Consultation Forums are part of the process to develop ecodesign and labelling requirements in the EU. Member States and European stakeholders such as industry, consumer organisations and NGOs participate.) The product area was selected because of its high relevance for India in general and in particular for BEE's current activities in product regulation and labelling.
- 4 The Consultation Forum meeting was followed up with a face-to-face meeting with officials from the European Commission, as well as a meeting with Clasp Europe, an expert NGO working with standards and labelling. On 26 September, a meeting was set up with ECOS, another European NGO focusing on consumer and environmentally relevant standardisation.
- 5 Adapt performance/requirements from ecodesign to Indian situation.
- 6 Specify proposals for Indian legislation.
- 7 Suggest routines for follow-up of EU ecodesign work.

Has led to:

- Documents from the four selected groups were sent by SEA to BEE. The products were:
 - Commercial and professional refrigeration
 - Large air conditioning products: chillers and ventilation products/systems
 - Pumps for waste water
 - Large pumps
- The Consultation Forum participation provided a direct hands-on experience on how the EU regulatory process works and made it much easier to appreciate the contents of proposed regulation documents in the future. Discussions with the European Commission helped further to bring in a global perspective. This is particularly important given the even increasing internationalisation of market for efficient products.
- Minimum performance requirements for products are necessary to create stable and predictable conditions for the market, thus contributing to both innovation and growth of companies and less energy consumption for end users.
- These documents described the products, the market and also included a definition of the product.
- A routine for follow-up has been suggested by SEA. This includes an interactive manual to guide BEE officials follow the process independently by using European information sources and portals such as the eceee ecodesign web portal (<http://eceee.org/ecodesign/products>). This also provides simple information on how the EU process works.

3.3.2 Wp3b Technology Procurement of LED Street lighting

Conclusions:

Objectives were not fulfilled.

Planning phase went on as expected.

Choice of technology was decided to be LED street lighting but

no Indian technology procurement group was formed and

no specification in India was developed.

Knowledge transfer to BEE about the Swedish way of working with technology procurement is not totally fulfilled.

Baseline:

Sweden has a long tradition of using technology procurement as a method for speeding up innovation and introduction of energy efficient products on the market. The purpose of this part of the project was to simultaneously carry out technology procurements in Sweden and India to implement the method in India (learning by doing). India did not have any experience in technology procurement when the project started.

To transform the market by using technology procurement, one needs to aggregate demand for energy-efficient products by establishment of an initial buyers group. Successful technology procurement leads to the commercial availability of new technologies. The new products are then available on the market not just for the initial buyers but for all buyers seeking energy efficient alternatives.

Activity:

Coordination with two more initiatives in Sweden within this area and plans for the Swedish part of the procurement has started. Coordination with the international initiatives CEM and SEAD has also started. In February 2013 a Swedish delegation went to Delhi to start the work with the Indian procurement together with a representative from Department of energy in USA. The reason for coordination was to find organisations in India and in Sweden to take over when this project ends. The first discussions showed that street lighting was an area where both nations identified a need for better equipment. The next step was to conduct a pre-study with the purpose to analyse the market, the energy efficiency potential, suppliers and buyers on the market etc. The following content in the pre-study was agreed:

- 1 Description of the suggested products and/or systems
- 2 Identify a buyers group
 - a Organisations, companies, public agencies
 - b Experts
 - c Specify the different roles of participants
 - d Letter of Intent

- 3 Potential for energy efficiency in the product/system
 - a Energy potential
 - b Costs, profitability
- 4 Non Energy Benefits
- 5 Market
 - a Today
 - b Potential for long term market
 - c Future market trends
- 6 Evaluation
- 7 Interest of buyers
- 8 Supporting policies
- 9 Appropriate technical and market characteristics to start a technology procurement

The process has for different reasons been faster in Sweden than in India. Sweden is now preparing the pre-study, but in India it has not started. When realising that the time frame was too short to get any result from the procurement a decision was made in June 2013 to stop this subproject. Two months later BEE gave the information that they now wanted to go on with the Indian procurement. Maybe this will be an important continuation after this project. The Swedish specification developed by the Swedish procurement group might be useful for India. We have agreed to share the pre-study result and India can then follow the process and start up later on.

Has led to:

- Identification of a common area for technology procurement – street lighting
- Contents of pre-study defined
- Technology procurement as a tool introduced to BEE

3.3.3 WP3c LED specifications

Conclusions:

Objectives where fulfilled.

Baseline:

India has developed a performance standard for Compact Fluorescent Lamps (CFLs). This standard is different compared to the lighting performance standards in EU, which are cutting across all lighting technologies. Instead, the Indian standard specifies minimum energy performance and quality criteria for this specific technology. Following the example of the CFL standard, India is now considering to adopt a similar standard for LED lamps.

Activity:

In the work plan we agreed on the following activities in this task:

- 1 BEE to follow study the EU standard for non-directional lamps (Regulation 2009/244).
- 2 Project to provide an overview of most international LED standards and recommendations/performance specifications.
- 3 Apply relevant parts from EU and international standards on the planned Indian standard.

Has led to:

- An overview of relevant EU and national LED standards has been developed (and will be reviewed).
- A short summary document on how the conceived Indian standard relates to international standards. The purpose of the document is not to propose specific performance levels or criteria, but rather to highlight important lessons learned from transferring standard from one region to another.

3.4 WP4 Policies

Conclusions:

Objectives where partly fulfilled.

Working papers as summaries of the policies in both countries were produced and discussed at a project meeting in India. Key areas for specific knowledge exchange were then commonly identified.

The planned BEE exchange visit to Sweden and the final common activity in India were however not possible to perform due to the lack of personal resources/changed priorities at BEE. BEE officials' could not get the approval to travel to Sweden. The second part of the overall outcome, BEE has a good understanding about the Swedish system with Energy and Climate Advisors, has therefore not been met.

The Swedish Energy Agency has, during the final project evaluation in December, understood that BEE still has an interest to finalize the project in accordance with the original plan, but in a different context/constellation in 2014.

Activity:

Key Swedish energy/climate policy competence about communicating energy and climate behavior has been summarized in a working paper and transferred to BEE expertise.³ Ongoing energy efficiency initiatives and outreach activities at BEE was summarized by BEE in a background note⁴. The both documents were used as

³ Working paper: Communicating energy efficient behavior – policy initiatives in Sweden; Final Dec 2013.

⁴ Background note: Energy efficiency initiatives and outreach activities of BEE – draft Feb 2013.

a basis for defining areas of common interest. Three areas were jointly selected for further knowledge exchange:

- 1 How regional energy and climate advisors are deployed and trained in Sweden.
- 2 Knowledge about specific communication tools and training material developed and used by energy and climate advisors.
- 3 Architecture and strategic thinking for efficient communication and outreach activities.

A program for a first exchange visit in Stockholm was developed in agreement and BEE delegates were invited to Stockholm to meet with key experts at SEA, SEPA and the Interactive Institute Swedish ICT.⁵ During the planned BEE visit to Stockholm a project meeting was also planned in order to further develop the final common activity in India based on the experiences gained.

⁵ Workshop in Sweden: Invitation and visiting program, March 2013.

4 One concrete example



The results of the current project have led to increased interest among BEE officials to continue with developing and implementing the BTC method in India. The results from the pilot implementation as well as the feedback received from the participants during the training session demonstrated the need and interest of having a working method like BTC that can make a major impact on improving energy performance of existing buildings in India and encouraging property owners and investors to carry out major energy retrofitting projects. After training sessions possible future cooperation ideas were discussed with the BEE officials.

There is a strong interest among the Indian partner's to form a cooperative network containing the different stakeholders and key actors (e.g. like BELOK type of network in Sweden that has initiated the Total Concept development). This cooperation aims at enhancing the capabilities of Indian property owners and experts to work with the energy efficiency improvement projects. Additionally, the network could act as a reference and expert support group for promoting the energy performance improvements on a broader scale in India, e.g. promote the reference projects among property owners and experts outside the network.

5 The overall goal of Swedish Development Aid: Poverty Reduction

The results of the current project can facilitate the increase in market share of energy efficient appliances nationally in India and can be the market driver for the development of services provided by ESCOs and other energy service providers and consultants. This would provide more job opportunities as well as support the economy of India in general. Since the building stock in India will be increased considerably during the next 5–10 years, power supply for the building stock and energy issues increasingly becomes a strategic issue for India.

Improving the energy performance in buildings, especially for electricity, will lead to improved economy for building owners. At the same time investments in infrastructure for energy distribution will be reduced and it will be easier to keep up with the rapidly growing amount of buildings.

This project helps the process of achieving energy efficient buildings in all of India and will provide job opportunities for consultants and other energy experts.



Street lighting is not common in rural areas in India, nor is electricity supply. By providing new efficient lighting, possibly with solar panels, outdoor lighting can come to the benefit of more people and lead to more secure mobility.

The ecodesign process is not directly helping to improve the life of poor people. However, product standards and minimum performance requirements are necessary to create stable and predictable conditions for all actors in the society, and to help focus efforts and funds away from energy purchases to energy services which generate wealth and well-being.

Increased knowledge about energy efficient products and lifestyles empower people, both rich and poor.

6 Challenges

6.1 Communication barriers

The biggest challenge to meet has been to overcome the communication barriers technical, language and culture.

One of the biggest challenges we faced involved communication and finding a common understanding of each other's expectations on the way of working during the project process and expectations on outcomes. This can be partly explained by cultural differences but also by the long distance between the two countries. It was not always easy to manage the meetings and communication online. However, the direct personal contact experienced in India showed very positive and productive results.

On-line meetings often had technical problems and poor quality, thus making it difficult to have direct communication. Fruitful discussions did occur when meeting in person.

Email communication was difficult because both parts were blocked in SPAM-filters in each other's IT-systems from time to time. That is very hard to detect and can cause irritation when one part is waiting for an answer while the other part answers the same questions several times.

Communication was improved at the end of the project with the assistance of a local representative working for the Swedish partner.

6.2 Cultural differences

Great delays occurred as a result of lack of dialogue between the parties. Differences in routines regarding feed-back on working materials. Expectations from the Swedish part did not happen.

In WP4 the biggest challenge, despite the communication problems mentioned above, was that BEE had problems to get approval for their officials to come to Sweden and participate in the expert Workshop. Officials on the Indian side were not fully coordinated and we received contradictory messages.

Another challenge has been that the Swedish consensus tradition caused difficulties to interpret and understand the lack of response from BEE on proposals of dates for the agreed activities. In order to improve the communication an Indian consultant in New Delhi was hired, but communication was not the problem in this case. It is also difficult to comply with the Indian culture of short planning horizons and rapid changes in planning. Experts at Swedish agencies are often tied up in several projects and need to be engaged in advance.

Another challenge in some of the subprojects involved communication and finding a common understanding of the tasks ahead.

At times it was difficult to plan the different tasks in this project in detail, as it was not always easy to understand the decision making process among Indian partners. It was shown already during early stages of this project that some processes take time, especially concerning the gathering of relevant information and involvement of the relevant stakeholders. Therefore, not all tasks were possible to finish during the project period. This concerned for example one of the demonstration buildings, where a number of questions and details still need to be clarified and verified before a package of measures based on BTC method can be formed. These remaining questions have been listed and handed over to the project partners in India so that they can finalise the project.

A significant challenge was to arrange workshops in India that many company representatives would find interesting to attend, with all the practical details surrounding such an arrangement. From finding possible dates to venues and deciding on the agenda – and to actually having the same idea of what a workshop was – language barriers and cultural differences were often observed, and both Swedish and Indian participants learned a lot during this process. With patience, and through the contacts of the Indian participants, it turned out very well as the workshops could be co-arranged with the Energy Efficiency Summit, which contributed to the large number of participants and successful workshops.

6.3 Staffing

Change of staff in both the Swedish and the Indian agencies caused difficulties in continuity resulting in delays and misunderstandings.

The biggest challenge regarding LED standards has been to decide which of the many performance standards and specification documents to include in the overview documents. It also took long time before the project team understood the fundamental differences in the technology specific Indian performance standard and the more crosscutting, technology neutral EU minimum performance standard. Whereas the EU standard primarily aims at phasing out the worst performing technologies, the Indian standard aims at safeguarding a minimum quality of a certain type of products that have a large implication for energy efficiency.

Discussions on adaptation and adoption of the measurement and verification standards turned out to be complicated.

During a period of exchanging director general at BEE, we experienced unclear executive mandate for the Indian partner. This made it difficult to decide on meetings in Sweden with participation of Indian partners.

6.4 Timeframe

The timeframe to carry out this project has been too limited. In order to see the concrete results from implementing a working method like BTC and in order to disseminating the method on a broader scale in a country like India will definitely require longer time.

Money does not always seem to be the key problem for BEE, rather the time. Their mission is huge compared to their number of officers which leads to that their possibilities to work with external projects are limited. To hire an Indian based consultant already in the beginning of the project might have helped to overcome this problem.

The biggest challenge regarding the MEPS and Labelling subproject has been the difficulty of knowing well in advance when an EU consultation forum meeting was to be held. They are announced only about 4 weeks in advance and the planning horizons were thus short. This timeframe was very short for Indian representatives as travel decisions were taken by the Ministry. After the decision was made, telling who should travel, visa had to be applied for that person.

The start of the project had some unexpected challenges regarding the application to Sida. The staff in Swedish Energy Agency spent a whole year and more than 500 hours on trying to formulate an application that could be accepted by Sida. Both agencies had huge problems in understanding each other. Finally a consultant was hired to sort out the expectations.

This delay caused that some of the suggested activities were obsolete when the project started.

7 Lessons learned

7.1 Communication

The main lesson learned is that the most vital thing for assuring a good project process is to quickly establish robust and reliable forms of communication. The direct personal contact experienced in India showed very positive and productive results. Personal contacts and meetings with Indians are essential to understand each other's expectations and way of working and creating a trust between the partners. Better communication is essential to improve the mutual understanding.

Project Place, Skype and video conferences all had technical problems and clearly limited our chances having creative discussions. It is of highest importance to work hard to get the communication going at an early stage of the project, and to increase the interface between Swedish and Indian experts. Also to minimize the overhead and, as early as possible, initiate and proceed with concrete activities and relevant examples of common interest. Face to face meetings are important.

Beware of spam filters, don't trust email. Use the telephone directly if emails aren't answered. Make sure that the cooperation partner, internally, is coordinated on how to work with the project.

Both parties have learned to appreciate the importance of how the processes in the respective regions are described. Semantics matter! For instance, the word "standard" can mean very different things until a clear definition is agreed upon. It is also very important to respect the differences in how the process is managed in respective region. Sweden and India can indeed learn from each other, but experiences are not always directly transferable.

7.2 Cultural and social background

It is also very important to understand cultural and social background since office culture and hierarchy of decisions in India differs very much from Sweden. One example of differences in office culture is that meetings often changed times with short notice. However, this was much improved when the local contact started working for the project. The good contacts and trust established with BEE during the course of the project will definitely be an advantage for future cooperation.

Different prerequisites between Sweden and India in economy, culture, size, climate and development of energy efficient buildings made it challenging to apply the Swedish code, the so-called Sveby system, to Indian conditions. It was necessary to decide on the basic definitions, i.e. which area and energy use definitions should be used for the benchmarking process. It was very difficult to establish a discussion on this topic and no decisions were made by the Indian partner. Maybe a more proactive approach by suggesting these definitions would have been more successful in the limited time available for the project.

7.3 Situation can change quickly

At the time of application to Sida, the international standard on EnMS, ISO 50001, was quite new and many countries outside Europe had little or no experience of certifying EnMSs in industry. Thus, the scope and the goals of the project included knowledge sharing about how to set up routines for accreditation and certification of ISO 50001. However, as the project started it was quickly discovered that India had been very active in this area already, and that a certification scheme was already in place. It even turned out that the first company in the world to be certified according to ISO 50001 was actually from India. As a consequence, the focus turned from capacity building for building up the system, to sharing of experiences of both countries' certification schemes, of incentive programs and of the actual implementation processes and results at companies. Thus, an important lesson learned from this project was that the situation can change quickly, and that not all parts included in the project during the application phase are necessarily relevant when the project starts.

7.4 Contacts in the country makes it easier

Arranging a workshop in India showed the necessity of Indian contacts. Early on it became clear that in order to facilitate a workshop which a large number of Indian companies could attend, it was necessary to find a context, where people with the same needs and interests gathered to take part in a number of coordinated activities. It would not have been possible to arrange the workshop as a separate event somewhere in India, where company representatives would have to travel for this only. BEE proposed a solution in that the workshop should be included in the Energy Efficiency Summit, where a large number of companies usually take part. This would naturally necessitate the engagement of CII, the organisation responsible for the summit. An inquiry on this was positively answered, and the marketing and organizing resources of CII could therefore be successfully utilized for the workshop.

The resulting successful planning, marketing, organisation of the workshop as well as the participation of a large number of companies would hardly have been possible without this very fruitful cooperation between CII and BEE.

To hire an Indian based consultant already in the beginning of the project might have helped to overcome some communication problems.

8 Partner driven cooperation

Future collaboration between BEE and SEA has been suggested within several areas. These suggestions are in the process of being prioritized and motivated by BEE and by SEA.

8.1 WP1 Buildings

8.1.1 WP1a 50% Energy reduction

The Indian partners got very interested in the BTC method implementation and its potential for achieving major energy reduction in non-residential building sector. There is an interest from the BEE side to continue work with the selected demonstration buildings that were part of this project.

There is also an interest to carry out more case studies to develop even more India specific guidelines and tools. BEE's biggest challenge in this is finding sufficient funding. They wish to discuss possibilities for further support from Sweden to continue with the work that has been started and also support in developing India specific software tools and training materials.

Additionally, there has been a discussion on other possible projects that can support improving energy performance in Indian building stock, e.g. a reference study how to best implement solar cooling, implementation of BTC method on new buildings. The good contacts and trust established in this project with BEE officials would definitely support possible future cooperation and it is strongly recommended to aim at a continuation of this cooperation. There is also the possibility to involve more actors in this cooperation, e.g. Swedish technology providers, and establish partnerships with Indian consultants and Energy Service Companies (ESCOs).

8.1.2 WP1b Measurement and Verification (M&V)

Although this project has come to an end, BEE is interested in continuing the fine-tuning of the measurement and verification process and to further educate the pool of verifiers. Also, applications in the form of case-studies and demonstrations are considered important.

There were consultant companies in India participating in the last workshop that expressed an interest in learning more about the Swedish verification process and measurement requirements.

8.1.3 WP1x STIL2- Conclusion

The main part of STIL2 project was lifted out from the Sida financed project because of the extended time that was spent on application to Sida. This resulted in two successful STIL2 projects that were financed by Swedish Energy Agency. Remaining issues regarding a web portal for STIL2 will be taken care of by BEE together with the Swedish consultant. Training of BEE officials for management of STIL2 projects might be needed in the future.

8.2 WP2 Industry

The cooperation within WP2 has a large potential to lead to long-term, sustainable relations between several participating organisations. In particular, the contacts established between organisations with the same roles in both countries will be able to lead to continued cooperation, for example the contact established between SWEDAC and NABCB. Also, companies participating in the workshop had good opportunities to establish contact and share experiences

Contact was also established with a partner that was not initially involved in the cooperation: the Confederation of Indian Industry (CII). CII arranged the Energy Efficiency Summit and helped organize the ISO 50001 workshops as a part of the conference. Apart from the cooperation within the project, SP, National Energy Board, SWEDAC and SCA had an informal meeting with two representatives from CII, discussing ideas on possible future cooperation.

8.3 WP3 Appliances

8.3.1 WP3a MEPS & Labelling

The cooperation has indeed the potential to lead to long-term and sustainable relations. The EU ecodesign and labelling regulatory program is a continuously ongoing process. The problems faced by India are very similar to those faced by the EU and its member states. Information exchange could be continuous and some sort of forum could be established for exchanging information on a regular basis. There is to date, however, no decision on such a forum.

8.3.2 WP3b Technology Procurement of LED (Light-Emitting Diodes) Street Lighting

As BEE has now showed new interest in technology procurement a workshop in Delhi regarding the technology procurement process has been suggested.

8.3.3 WP3c LED specifications

The cooperation of LED standards will fit into other international cooperation forums. For instance, the Swedish Energy Agency is very actively involved in the International Energy Agency's 4E SSL Annex⁶, dealing with LED performance requirements, testing and accreditation. India has participated as an observer and the work to develop a standard overview feeds directly into this process.

8.4 WP4 Policies

BEE has indicated an interest to build a long-term partnership in the area of policy for energy and climate efficient behaviors with Sweden. The planned workshops regarding communicating energy efficient behaviour and outreach to households in Sweden and in India should be planned again but with clear instructions and approval at all levels in advance.

⁶ <http://ssl.iea-4e.org/>

9 Benefit to the partner organisations

For the Indian part getting an insight of Swedish way of working with energy efficiency has been inspiring.

It is believed that for the Indian partners the main benefits have been to learn about and try out the BTC method which was shown to have a great potential to lower the energy use of their building stock. They have also learnt about the Swedish way of verifying and benchmarking the energy performance of buildings in trying to find rules that work towards measurable energy efficiency in buildings.

For the Swedish part, the cooperation has provided good experience and insight on how to work with Indian organizations. This has led to well established relations that form a good base for future cooperation. The involvement in international capacitating projects gave experience and the project has definitely increased our understanding of implementation of Energy Management Systems (EnMS) in very different environments. This is of great benefit for Swedish auditing services as well as for Research and Development activities aimed at developing new general approaches of implementing EnMS in primarily small and middle sized enterprises.

The project has also given a deeper understanding of the energy system in a rapidly increasing economy with a very large number of people. Also, it has given some insights in the issues encountered in energy management in the buildings and the industry sector in a tropical climate. This will for example be directly useful in the efforts to include India in International Energy Agency (IEA's) Heat Pump Centre.

The project has resulted in a deeper understanding of the importance of continued work with energy and climate effective behaviour in India.

Finally, the work has brought some very important experience of cooperating with people from different cultural environments, which we all will benefit from both professionally and personally in the future.

10 Side effects/spin off effects

The project has increased our understanding about policy initiatives and needs in India. This knowledge can be used in other international cooperation projects and negotiations. The project has strengthened the relationship between SEPA and SEA in the area of policy for behavioral change, which is valuable for future national and international projects.

CIT Energy Management (CIT EM) has obtained several useful contacts in India during this cooperation project which hopefully can lead to future cooperation. CIT EM believes that experience, lessons learned and personal contacts created can also provide valuable input to other Swedish companies who want to establish themselves in India.

ÅF has an Indian office since a few years. This cooperation has high-lighted possibilities to export competences in building energy management to India.

The fact that BEE is in a position to develop Swedish pilots into national full scale implementation schemes supports ÅF and other Swedish building management consultants to further establish on the building energy management scene in India.

It also felt based on personal contacts that the Indian partners got inspired of the BTC method and are very interested to implement it on a broader scale.

Also getting an insight to the Swedish way of working with energy efficiency has been inspiring. This was clearly understood during the visit of BEE secretary Mr. Bhaskar J. Sarma to Stockholm. There is a strong interest from the Indian partner's to form a cooperative network containing the different stakeholders like BELOK (Procurement group for commercial buildings) type of network in Sweden.

Discussions took place both between CII and the Swedish partners and between all involved partners at the second workshop in WP2-Industry, on ideas for further cooperation. The areas deemed to be most interesting to CII were concluded to be biogas production and utilisation, gasification, recycling, reuse, waste water treatment, hydraulic systems and district cooling (a huge potential in India).

The European Commission (EC) is working actively to reach out to international partners. Although this cooperation is between India and Sweden, direct contacts between the EC and BEE were established. EC is, for instance, planning an international conference in 2014 and now wants to invite a high-level speaker from India.

The Super-efficient Equipment and Appliance Deployment (SEAD) initiative seeks to transform the global market for efficient equipment and appliances. Both India and Sweden participate in the efficient lighting collaboration within SEAD. During a SEAD telephone conference the technology procurement tool was introduced to the participating delegates representing Australia, Canada, France, India, Japan, Mexico, UK and US. Apart from introducing the method the purpose was also to invite more countries to join the specific procurement on street lighting.

The work to gather international standards supports BEE's considerations to join the International Energy Agency (IEA) 4E SSL Annex.

11 The thematic priorities

It is expected that some of the Swedish company and agency policies for gender equality, for sustainable development, especially environment concern, and policies for democracy and human rights can serve as actual examples of how such general political policies can be internalized in Indian state and company policies. Gender equality and participation of women

In the particular area of LED standards and energy labelling no particular recommendations have been made. However, LED enables affordable lighting, which is an important area for women since it enables greater security in the dark hours. LED lamps can also enable children to study and thus improves the literacy rates. This in turn is good for gender equality. LED lamps are also very appropriate for off grid lighting, so the LED standard may help to speed up the acceleration of lighting in areas currently off the grid, again providing lighting for study and safety of women.



Projektengagemang has an equality policy. From the Indian side, more than half of the participants were women, although most of the senior staff and leaders were men.

The consultant team in Sweden, Kanenergi working with Appliances in the project consists of a majority of women (2/3) and thus serves as a positive example.



At the industry workshop the Swedish representatives for Pulp and Paper industry and for SWEDAC accrediting agency were women.

Of the two persons from the CIT EM team working with Buildings in this project one was a female expert. Women working in engineering is still not so common in India, but very common in Sweden. During the practical work in this project and during

representation in India it was noticed in a number of circumstances that a female expert from Sweden created a lot of astonishment and surprise. Hopefully female

representation generated positive inspirational impact on local women in India who were met as part of this project, as well as changing possible prejudgment people may have regarding women and their competence in engineering.

11.1 Environmentally sustainable development

Energy production gives rise to many environmental problems such as climate change and air pollution. The ongoing climate change can cause various problems such as raising temperatures, rising sea levels and changes in precipitation patterns which can cause flooding and draught.

This project has been highly relevant from the environmental perspective since energy use is strategically important for India. Therefore, improving energy performance of a building stock and in new construction has a very high relevance to sustainability goals.

Cutting energy use through minimum energy performance is one of the most important strategies to reduce environmental impact and to promote sustainable development since it provides for more affordable energy services.

11.2 Democracy and Human Rights

Maybe it's not a human right to have electricity but it ought to be. In India 360 million people do not have access to electricity. If the people who have electricity could use it more efficiently there should be more left over for the rest.

12 The perspective of the poor and the rights perspective

The poverty perspective is considered as saving energy and electricity will reduce the cost for the poor and thus give space for other needs.

Increased energy efficiency is fundamental in meeting the challenge of providing affordable energy services. Energy is now heavily subsidised in India and these subsidies are a problem for public budgets. By cutting the energy demand of products, it will be easier to phase out energy subsidies and balance budgets. More efforts can be spent on meeting the needs of the neediest.

LED enables affordable lighting, which is an important area for women since it enables greater security in the dark hours. LED lamps can also help supply, which enables children to study and thus improves the literacy rate which in general is good for gender equality. LED lamps are also very appropriate for off grid lighting, so the LED standard may help to speed up the acceleration of lighting in areas currently off the grid, again providing lighting for study.

Increased knowledge about energy efficient products and lifestyles empower the consumer to make economic and ethical favorable choices. An efficient national strategy and architecture for communicating household energy efficiency is contributing to this.

Poor people are disproportionally affected by environmental degradation due to their vulnerability and low capacity to cope with external shocks such as floods and droughts. Many of them live under miserable conditions which makes it difficult to cope with temperature extremes and to avoid both outdoor and indoor air pollution. Environmental sustainability is thus important for all human beings and particularly the neediest. These problems have been addressed indirectly in this project by the aim to increase energy efficiency in India and thus decrease climate change.

13 Final deliveries

The final deliveries will be found at the Swedish Energy Agency's website www.energimyndigheten.se

13.1 Reports

WP1a	BTC method summary including two examples of buildings
WP1b	Sveby standard summary
WP2	Brochure: Swedish experiences from Energy Management Systems in Industry
WP3a	Guide to follow the EU process on ecodesign and energy labelling
WP3c	LED specifications relevant for Indian use

13.2 Translations and work material

WP1a	BTC method guidebook
WP1x	The Swedish Energy Agency evaluation
	Evaluation of Improved energy statistics – A memorandum on the overall conclusions (Swedish project)
	Improved energy statistics in buildings and industry
WP2	The Swedish delegation to the Energy Efficiency Summit 2013
	Agenda Company workshop Aug 21
WP4	Work document “Communication Energy Efficiency Behaviour
	BEE Background note
	Project Plan
	Visiting programme Sweden

13.3 PPT Presentations

WP1a	Presentation 1 – BTC training in India Introduction to BTC
	Presentation 2 – BTC training in India Economic principles
	Presentation 3 – BTC training in India Carrying out different steps
	Presentation 4 – BTC training in India roles and responsibilities
	Presentation 5 – BTC training in India Carrying out Step 1
	Presentation 6 – BTC training in India Using building energy software
	Training in brief – CIT EM
WP1b	Sveby India tutorial
WP2	by Mr Thomas Björkman, National Energy Board of Sweden
	by Mr Eddie Åkesson, SP Technical Research Institute of Sweden
	by Mr Ramani Iyer, CII Godrej
	Energy Management Light

13.4 Spin off deliveries not included in the project (financed by Swedish Energy Agency)

Following deliveries were not included in the project described in this report, but can be seen as a result of the collaboration that started with the project.

As a result from the discussions of a method (STIL2) to present the energy use in a specific building category on national level, a conclusion project started with funding from the Swedish Energy Agency. A full scale implementation manual has been developed in 2013 and advises in detail how to implement the STIL2 on full-scale in India for one year, one building category. The estimated total number of categories (number of years) in India is 5–7.

Reports

STIL2	Implementation manual STIL2
	Example of time allocation for audits
	Instructions for STIL2 India protocol
	Proposed agenda for training of STIL2 auditors
	Signed letter
	STIL2 India Pilot Study
	Template letter to building owners
	ToR for webdesigner STIL2 India

Presentations

STIL2	Training material for STIL2 India auditors
	Training material for STIL2 India management

Indo-Swedish collaboration on energy efficiency, 2011-2014

The Swedish Energy Agency and the Bureau of Energy Efficiency (BEE) cooperates within the field of energy efficiency. The overall objectives are to establish agency cooperation, to facilitate business cooperation and to enhance capacity building. The project focuses on energy efficiency measures and management in industry and in buildings, and on minimum energy performance standards and labelling. The agencies also share experiences on communication strategies and outreach activities for more energy efficient behaviour.

The Indian and Swedish governments signed a Memorandum of Understanding on Indo-Swedish cooperation within the field of renewable energy in 2009.



Bureau of Energy Efficiency
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