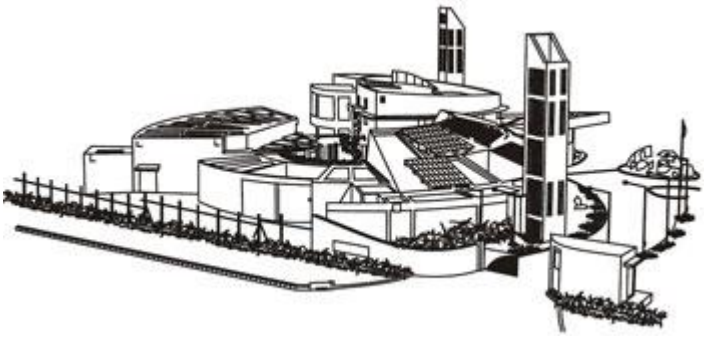
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Confederation of Indian Industry
Since 1895

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs FDEA
State Secretariat for Economic Affairs SECO



PILOT APPLICATION OF INNOVATIVE ASSESSMENT AND MONITORING METHODS FOR RESOURCE EFFICIENT AND CLEANER PRODUCTION (RECP) IN SELECTED MANUFACTURING SECTORS IN INDIA

PILOT APPLICATION OF INNOVATIVE ASSESSMENT AND MONITORING METHODS FOR RESOURCE EFFICIENT AND CLEANER PRODUCTION (RECP) IN SELECTED MANUFACTURING SECTOR

Reporting Agency	**:**	Confederation of Indian Industry
Country	**:**	India
Contract Number	**:**	3000024120 UNIDO SAP Project No. : 100050
Project Title	**:**	Pilot application of innovative assessment methods for Resource Efficient and Cleaner Production (RECP) in selected manufacturing sectors in India
Contract Period	**:**	10 January 2015 to 10 December 2015

CONTENTS

EXECUTIVE SUMMARY

United Nations Industrial Development Organization (UNIDO) has awarded CII – Sohrabji Godrej Green Business Centre (CII – Godrej GBC) to facilitate the "Pilot Application of Innovative Assessment Methods for Resource Efficient and Cleaner Production (RECP) in Selected Manufacturing in India"

The overall approach of 'Pilot Application of Innovative Assessment Methods for Resource Efficient and Cleaner Production (RECP) in Selected Manufacturing in India" is designed to provide a holistic approach to the industry on verifiable GHG emissions accounting, Material Flow Cost Accounting (MFCA) and GreenCo environmental rating system with a focus on creating awareness, capacity building and implementation of pilot studies in selected sectors as per internationally accepted methodology.

The overall aim of this project is to pilot the application of GHG accounting, MFCA and GreecCo Rating in selected manufacturing subsectors and, on basis thereof, appraise the applicability of these numerical assessment methods in the context of scaling up and mainstreaming RECP. The project activities include creating awareness, capacity building and implementation of pilot studies in selected industries per internationally accepted methodology. The following two sectors are pre-selected for implementing project activities: Pulp & Paper and Heavy Engineering.

The objectives of the GHG accounting part of the project are as follows:

- To complete GHG accounting for 10 medium to small scale enterprises from heavy engineering and pulp and paper sectors (5 enterprises in each sector)
- Upon completion of initial awareness raising and training of enterprise staff, GHG emissions for each enterprise will be quantified and mitigation options/techniques identified, evaluated and promoted for implementation

The following activities were carried out as part of the project for the GHG accounting:

- Organized five training programs on GHG accounting for Engineering and Pulp & Paper sector, training more than 200 participants to carry out GHG accounting in their facility
- Recruitment of 5 industrial facilities each in Engineering and Pulp & Paper sector for GHG emission inventorisation studies
- Organized 10 'Pilot Companies Workshop' on GHG Emission Inventorisation Methodology to discuss about the in-depth aspects of GHG accounting, data collection & quality assurance
- Carried out GHG inventorisation studies in identified 10 facilities in Engineering and Pulp & Paper Sector
- Developed an excel based tool for GHG Accounting to help SMEs carry out GHG accounting in their facilities on a sustained basis
- Identification of mitigation opportunities for each unit and submitting the detailed report highlighting major aspects of the GHG accounting

- Two webinar were organized as part of the dissemination of the GHG accounting practices. The pilot companies also shared their experience of undertaking the GHG accounting during the webinar. The webinar was attended by more than 50 international and national participants

The GHG accounting practices demonstrated by pilot companies indicates there is a good business case for mainstreaming the GHG accounting practices. In India, mainstreaming such activities can be used for assessment of baseline, assessment of effectiveness of energy efficient technologies (against the baseline data), for continual development of emission reduction initiatives taken up by any proactive SME and for the assessment of overall emission reduction from clusters & manufacturing sector SMEs.

1 INTRODUCTION

In 2009, CII with support from United Nations Industrial Development Organization (UNIDO) and Swiss State Secretariat for Economic Affairs (SECO) initiated a pilot application of GHG accounting in Indian Cement and Chemical sector. The aim of the project was to introduce holistic approach to GHG Management in the sectors and thus enable widespread adoption of GHG emission reduction practices. CII initiated the pilot in few cement companies and today more than 75% of cement companies in India are monitoring their GHG emissions and have been taking initiatives to reduce the GHG emissions. The activity and outcome of the project acted as background study to create a Low Carbon Roadmap for Indian cement industry which was launched in 2013 where CII was part of. The roadmap highlights the strategies to reduce the GHG emission intensity by 46% by 2050. As part of the project, pilots were initiated in chemical sector also, but as chemical sector is very diverse, the main streaming the activity was challenging. Building on the success of the previous project in Cement & Chemical sector, Paper & Pulp and Engineering sectors were selected for Pilot application for GHG Management.

Indian Engineering Sector consists of both large and small enterprise. Many large enterprises have been doing their GHG inventorisation, but Small and Medium enterprises are mostly unaware about their GHG emissions and other environment impacts. These Small and Medium Enterprise are mostly suppliers to Original Equipment Manufacturers' and SME's emissions constitutes significant part of Scope 3 emissions. Thus, mainstreaming GHG management practices in the sector will enable to identify emission sources and introduce RECP activities for GHG reduction.

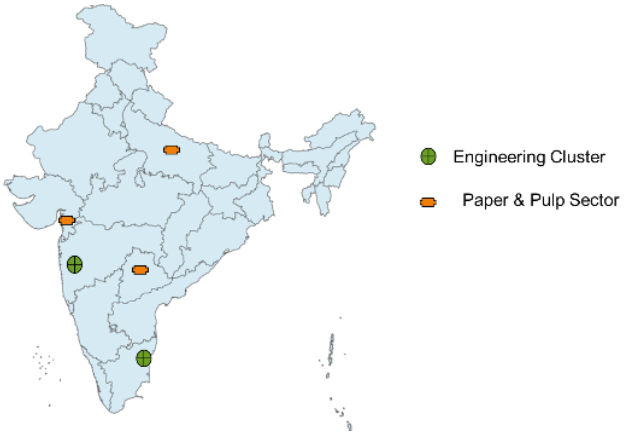
Indian Pulp & Paper Sector is one of the energy intensive sector in the country. There are few Paper Companies such as ITC Limited, BILT and Tamil Nadu Newsprint & Papers Limited who have been doing GHG inventory since last few years, but other companies have not been proactive to estimate their emissions. The Paper Sector in India has unique opportunity to become carbon neutral as demonstrated by ITC Limited which has been carbon neutral since last eight years. To become carbon neutral, the first step is to estimate the GHG Emission from operations. Considering the potential and

impact these sectors have, GHG inventorisation in ten pilot units from Engineering and Pulp & Paper Sector was initiated.

The objectives of projects are multiple. Firstly, the project aims to identify and assess the GHG emission resulting from units operations. Secondly, the development of a structured inventory of energy uses and other activities that produce greenhouse gas emissions will enable to identify areas of improvements such as energy efficiency or improved logistics operation and finally it can facilitate the development of emission reduction strategies that can provide a financial benefit as well as an environmental benefit i.e. the business case of doing GHG inventory.

2 CAPACITY BUILDING WORKSHOP

In India, the Engineering and Paper & Pulp companies are located in clusters and the workshops were organized in the clusters with objective of creating awareness on GHG accounting and energy efficiency. These workshops were designed to serve as a platform for sharing information, creating awareness and inculcate GHG accounting as an operating practice amongst SMEs. These workshops, were conducted at several strategic locations where the SME concentration was significantly higher, served as a platform for training more than 225 participants from 53 companies (Engineering and Pulp & Paper sector).



The CII – Godrej GBC team presented various modules on energy efficiency and GHG accounting. Industry experts and technology suppliers from the paper and pulp and engineering industries were also invited to present specific case studies and GHG management strategies at each of the workshops.

2.1 CAPACITY BUILDING WORKSHOPS – PAPER & PULP SECTOR

As a part of creating awareness on GHG accounting methodologies, three workshops were organised. The main objectives of these workshops was to reach out to small and medium paper and pulp mills to disseminate knowledge and raise awareness on energy efficiency, GHG measurement and management in the pulp and paper sector. The training modules focused on Energy management, energy efficiency options, Scope wise GHG accounting methodologies, broad GHG mitigation strategies and national and international case studies specific to pulp and paper mills.

CII – Godrej GBC organized three workshops on “Energy Efficiency and Low Carbon Growth in Indian Paper and Pulp Industry” at the following clusters:

- 7th April 2015 - Vapi, Gujarat

- 10th April 2015 - Hyderabad, Telangana
- 17th April 2015 - Muzaffarnagar, Uttar Pradesh

The workshops reached out to about 104 professionals across 24 paper and paper companies.

2.2 CAPACITY BUILDING WORKSHOPS – ENGINEERING SECTOR

CII – Godrej GBC also organized two workshops on "Energy Efficiency and Low Carbon Growth in Indian Engineering Industry" as proposed at the following clusters:

- 3rd April 2015 - Chennai, Tamil Nadu
- 8th April 2015 - Pune, Maharashtra

The main objectives of these workshops was to reach out to small and medium engineering outfits to disseminate knowledge and raise awareness on energy efficiency, GHG measurement and management in engineering outfits. The training modules focused on Energy management, energy efficiency options, Scope wise GHG accounting methodologies, broad GHG mitigation strategies and national and international case studies specific to engineering companies.

The workshop reached out to about 108 professionals across 29 engineering The 5 cluster based workshops were successful, both in terms of participation and evincing interest in enrolling pilot companies.

3 APPROACH FOR THE PROJECT

The cluster based capacity building workshop was attended by many industries and based on the interest shown by these industries; introductory letters describing the project background, GHG Emission Inventorisation Methodology, GHG Inventorisation benefits & seeking their participation of their respective units in this initiative was sent to select medium & small scale pulp and paper and engineering companies.

The following activities were carried out to ensure participation of companies in pilot phase:

- Promotional activities carried out by follow up by telephone, emails & several discussions for explaining the need of GHG Inventorisation to participating companies
- Key benefits of GHG emission Inventorisation explained to various levels of plant personnel
- Various clarifications, queries raised by the companies regarding GHG Inventorisation were clarified
- The workshops helped us identify the engineering and pulp and paper companies to perform GHG Inventorisation study.

Based on the interest and support for piloting the GHG accounting practices, the 5 units from each sector were selected for the study. Following units were selected for GHG accounting :

Pulp and Paper Sector

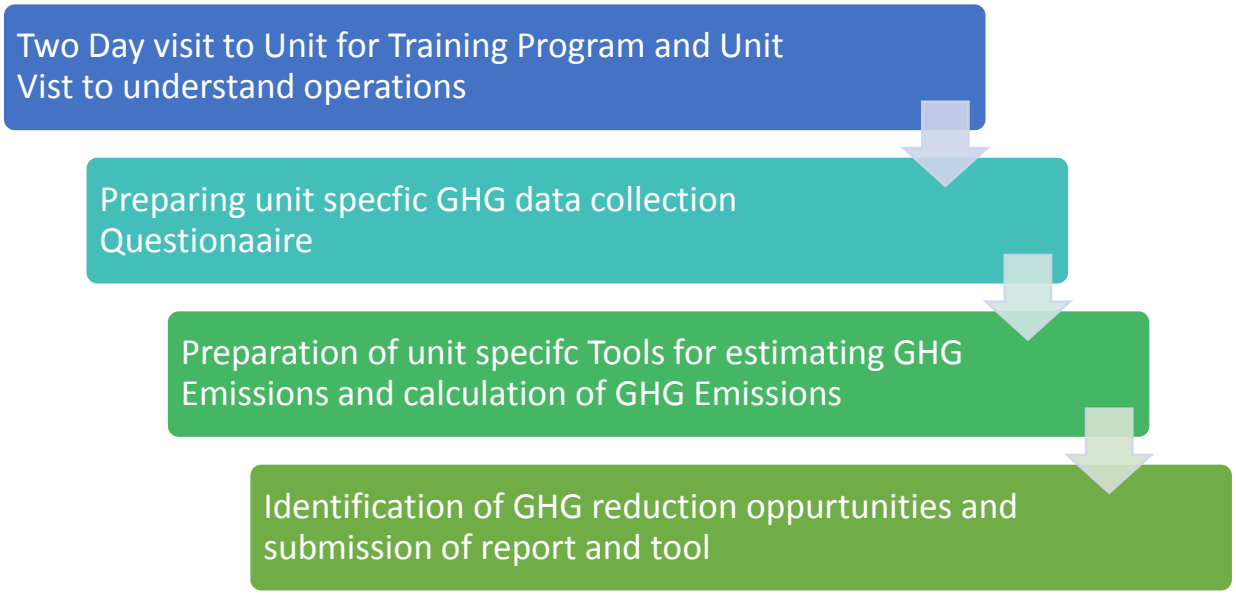
1. J K Paper, Songadh, Gujarat – Wood based paper mill
2. Sai Tirumala Papers Pvt. Ltd., Nalgonda, Telangana – Recycled paper mill

   Seshasayee Paper & Boards Limited, Erode, Tamil Nadu–Wood based paper mill
3. MWV India Paperboard Packaging Pvt Ltd, Vapi, Gujarat - Recycled paper mill
4. Yash Papers Limited, Faizabad, Uttar Pradesh – Agro based paper mill

Engineering Sector

1. Shree Ashtavinayak Glass Pvt. Ltd., Khandala, Satara- Glass processing facility
2. United Gaskets & Components Pvt. Ltd., Chakan - Automotive gasket manufacturers
3. Atharva Polymers Pvt Ltd, Ranjangaon, Pune- Polymer extrusion, casting & fabrication
4. Khutale Engineering Pvt. Ltd., Satara - Metal fabrication & machine tools facility
5. Synergy Coats, Satara - Powder Coating

After the unit showed interest, CII visited the unit and conducted the training program for creating awareness about the Carbon Footprint Study and Low Carbon Development. Following was the approach followed by CII for conducting the study at the units.



The exercise of GHG emission accounting was carried out based on internationally accepted WRI/WBCSD GHG Protocol. GHG Protocol has adopted five overarching accounting and reporting principles, which are intended to ensure GHG data represent a faithful, true and fair account of GHG emissions. The GHG inventory was carried for operations and activities in the year 2014-15 for all the pilot units.

Internationally accepted 6 Greenhouse Gases have been accounted in the pilot Pulp & Paper companies under this study. Non – CO_2 gases are converted to CO_2 equivalent using internationally recognized Global warming potential (GWP) factors which were developed by the Intergovernmental Panel on Climate Change (IPCC) to represent the heat-trapping ability of each GHG relative to that of CO_2.

GHG regulated under Kyoto Protocol
Carbon dioxide (CO_2)
Methane (CH_4)
Nitrous oxide (N_2O)
Hydrofluorocarbons (HFCs)
Perfluorocarbons (PFCs)
Sulfur hexafluoride (SF6)

4 RESULTS OF PILOT STUDIES AT ENGINEERING AND PULP & PAPER SECTOR

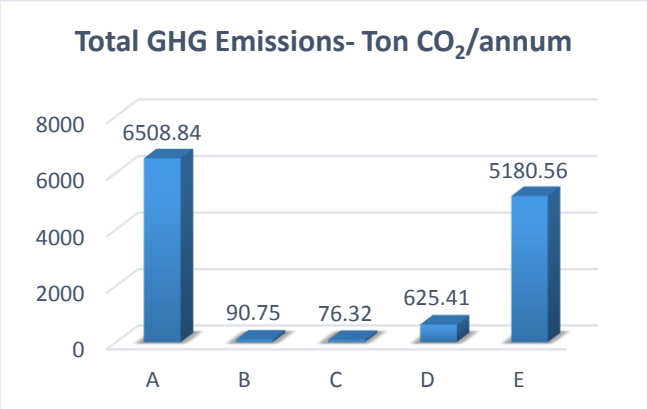
As part of the project GHG Inventorisation has been successfully completed for 10 pilot companies, 5 in each sector. The GHG inventorisation was carried out considering the following for all the units:

Sr. No	Particulars	Options	Considered for Pilot Plants
1	Organizational Boundary	1. Financial Control 2. Operational Control 3. Equity Share Approach	Operational Control
2	Operational Boundary	Gate to Gate	Gate to Gate
3	Baseline Year	1. 2012-13 2. 2013-14, 3. 2014-15	2014-15
4	Emissions Considered	-	Scope 1, Scope 2 and Scope 3 All related emissions (excluding biogenic emissions)

Potential areas to reduce the GHG emissions were also identified and suggested to the all the pilots to evolve growth in ecologically sustainable way. Following are the sector wise summary of GHG emissions and identified mitigation opportunities.

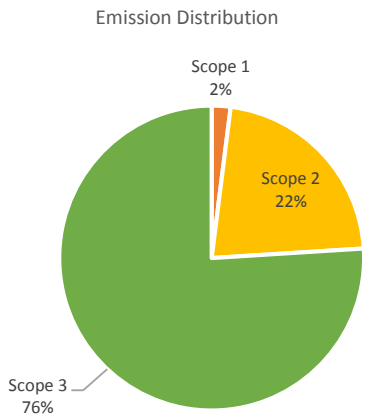
4.1 ENGINEERING SECTOR

In the units selected for the study, the operations were majorly in terms of unit operation such as cutting, coating, or further processing and the major energy consumption was in form of electricity. The major emission sources were purchase of electricity from grid and emissions associated with transport of raw material and products. The average distribution of the emissions is shown in the figure. Following is summary of overall emissions for five engineering sector SMEs:



Parameter	
Total GHG Emissions -5 Pilot SMEs Engineering Sector	12481.88 MT CO_2
Average Specific Emission Intensity	5.38 gm CO_2 Eq./₹

The major emissions from these companies are from Scope 2 and Scope 3. The scope of improvement through energy efficiency, use of renewable energy like onsite biogas plant, roof top solar plant & energy efficient lightening is considerable and these measures directly lead to emission reduction and resource efficiency. Keeping in view the scope of improvement, following emission mitigation opportunities in SMEs- Engineering Sector, are suggested.



- Improving Energy Efficiency in the process and utilities
- Improving energy efficiency in compressed air generation, distribution and usage
- Reduction of surface heat losses in furnaces and ovens
- Onsite biogas plant to replace Fossil Fuel consumption
- Installation of energy efficient lighting
- Installation of on-site renewable energy plant

In addition, long term strategies for GHG emission reduction among engineering sector SMEs are stated below:

1. Establish GHG Management System and Public Reporting for MSMEs
2. Build Green Image
3. MSMEs to take targets to reduce GHG emissions over short term (2-3 years) & long term plans (5 years) for continual progress to move ahead toward Carbon Neutrality
4. Creating new business stream for existing pilot MSMEs, For eg. Pilot companies who gained experience with implementation of Bio-gas plant/ Roof-top solar can initially facilitate its implementation in other companies (thru agencies). Later these companies can put up their additional business of bio-gas plant/ solar panel.
5. Information about the 'Green Measures' taken up by pilot SMEs may be disseminated as 'Case Study' to enhance competitiveness among SME sector.
6. GHG Accounting can be used as a tool to assess the requirement of Technology upgradation

4.2 PULP & PAPER SECTOR

The Pulp & Paper sector in India is divided into three sub sector based on the feedstock they use for manufacturing paper and are : wood based, agro Based and recycled Paper (RCF)The selection of units were done considering the coverage of all three type of feedstock for paper manufacturing. The GHG accounting was carried out in accordance with the Pulp and Paper Standard jointly developed by International Council of Forest and Paper Associations and The GHG Protocol. For the GHG Inventorisation, emission sources from all three scope were covered for estimating the GHG emissions per ton of paper. Following is summary of GHG Emissions from the units:

Plant	Tons of CO_2				Tons of CO_2/Tons of Paper
	Scope 1	Scope 2	Scope 3	Total	Emission Intensity
Plant 1 (Wood)	233677	23695	23133	280505	2.04
Plant 2 (Wood)	305533	51011	21481	378025	2.45
Plant 3 (RCF)	160946	17547	-	178493	1.46
Plant 4 (RCF)	103	2486	893	3482	0.435
Plant 5 (Agro)	882	0	14290	15,173	0.44

As in the sector, Scope 1 emissions are significantly higher, the focus for emission reduction should be on reducing process emissions as well as on overall energy efficiency improvement. Some of the suggested emission mitigation opportunities for paper pilot units are:

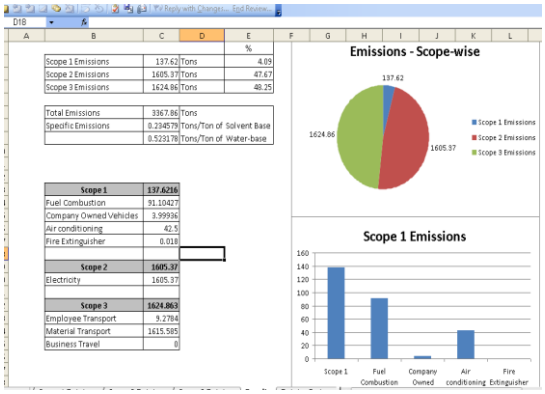
- Increasing the black liquor concentration firing concentration for power generation
- High Pressure Co-Generation System
- Improving the energy efficiency in process operations
- Exploration of onsite renewable energy
- Plantation for Carbon Sequestration and raw material supply security.

In addition to these, the best practices implemented by plant were also identified and shared among the stakeholders. Considering the combination of non- fossil fuel usage, energy efficiency improvement and adequate plantation for carbon sequestration, the sector has potential to become carbon neutral in long term.

5 GHG EMISSION CALCULATION TOOL

One of the major deliverables of this project was to develop a GHG Emission inventorization tool to estimate the present levels of GHG emissions and to monitor the reductions in future. This tool is designed to help the pilot companies inventorize their emissions on a regular basis and to utilize this tool to monitor the impact of their GHG emission reduction initiatives.

GHG emission calculation tool for SMEs was used to inventorize GHG Emissions from SMEs. Calculation tool and final GHG report was prepared and submitted to all pilot companies. Along with the final GHG Accounting and Management report, this tool was provided to pilot companies to inventorize their emissions on a regular basis and to monitor the impact of their GHG emission reduction initiatives.



The Paper & Pulp Tool (GHG Protocol) was modified according to the plant and scope 3 emission calculation was also included in the tool. The tool was shared with all the paper plants and were explained to use the tool to calculate the emissions. Each unit wise calculation tool was prepared, the final presentation was made to units.

Training was also provided to the plant personnel of SME pilot companies on the use of this tool for monitoring GHG emissions in the subsequent years.

6 CONCLUSION

Through the project more than 500 individuals in more than 60 companies have been trained on GHG accounting and RECP techniques. It is necessary to sustain these efforts carried through this initiative, as large number of the companies in the country are still not undertaking regular GHG inventory exercise. Upscaling these initiatives from pilot to mainstream is necessary to enable Indian Industrial Sector grow in an ecologically sustainable manner. Following are the sector wise impact through the study:

Engineering Sector:

The overall feedback from the units participated in the program was positive and few plants have also initiated the implementation of identified mitigation options. One of the unit was able to register with new vendor by undertaking the GHG studies.

The results of the study were presented at two forum – Vendor's meet at one of the leading automobile manufacturer plant in India and a webinar was conducted to disseminate the results of the study. The results were disseminated to more than 100 SMEs and many units have shown interest in the study. Following are the unit wise impacts after conducting the study

Unit	Impact
Khutale Engineering Pvt Ltd, Satara, MH	• The unit undertook the GHG study for first time and have taken initiatives to implement the suggested mitigation options • As GHG Invenotrisation is one the requirement of GreenCo SME rating, the unit is among first group of SME to register for GreenCo Rating • The unit has also shown interest in implementing renewable energy projects in future
Shree Ashtavinayak Glass, Khandala, MH	• The unit has undertaken the GHG inventorisation for first time and have immediately seen the benefits of the activity • They have registered with new vendor (who mandated GHG inventorisation as part of vendor qualifying criteria) • They have also registered for GreenCo rating System • They implemented LEDs and roof top solar power plant to reduce GHG emissions further.
United Gasket & Components Ltd., Chakan, MH	• The unit had understood the impact of GHG emissions from their logistics operation • They have initiated the mitigation measures in logistics operation by optimising the loading in inbound and outbound logistics
Dissemination of Results	• The project results were disseminated at two platforms: o Tata Motors Vendor Meet- More than 75 SMEs participated, do-it-yourself GHG tool was also shared among the participant companies o Webinar – 35 participant form 30 companies participated in webinar. • Tata Motor's units located in other part of country are also interested in capacity building of their vendors for GHG inventorization. • Presentation was shared with all the participants and speakers.
Overall Impact	Through this program, more than 200 participant from more than 100 companies were trained for undertaking the GHG inventorisation and were explained the benefits for undertaking the exercise. Results from pilot companies are very encouraging indicating the potential of mainstreaming the pilot application A best practices manual for GHG management practices comprising of 14 case studies form engineering companies and SMEs have been compiled and will be shared among the stakeholders for spreading awareness and facilitating the replication in other units.

Paper & Pulp Sector:

Through this project activity, many units have taken initiatives for performance improvement and were also made aware about the best practices implemented by the pilot paper & pulp units. The results of the study were disseminated through webinar and more than 35 national and international delegates participated in the webinar. They feedback from the participants were positive and have resulted in many queries and possible collaborations. Following is the unit wise impact created through study:

Unit	Impact
Seshasayee Paper & Boards Limited	• The unit had once undertaken the GHG study, but through this study more clarity on methodology and inclusion of emissions source were provided (eg. Lime kiln, imported pulp, etc.) • The unit has committed to take target for GHG reduction and is exploring science based targets. The unit has also completed inventory of remaining scope 3 categories • The results of the study at the unit was shared with a Government Agency undertaking low carbon emission strategy for India • The unit has also started exploring the sequestration from wood planation and trying to complete the comprehensive inventory • The unit is also undertaking LCA study to understand overall impact and not limited to GHG only
J K Paper Limited, CPM	• The unit has initiated the Group Level GHG accounting and other unit of J K Paper Limited has decided to undertake the GHG inventorisation • The unit is also considering the implementation of best practices implemented by other units in the sector
Yash Papers Limited	• The GHG intensity of the unit is among the lowest in pilot companies participated in the project • The unit is only using rice husk and other biomass based fuel for meeting the heating and power requirements • Such model can be showcased and upscale wherever / whenever possible.
Dissemination of Results	• The results of pilot studies were disseminated through webinar and more than 35 stakeholders participated in the study. The results were shared in form of presentation with all the stakeholders for their reference.
Overall Impact	The Paper & Pulp sector is very well poised to be on path of low carbon development considering the sequestration and renewable energy usage. As the results from the sector are encouraging and positive, a stakeholder meeting is planned for initiating Low Carbon Development Roadmap for Indian Pulp & Paper Sector.

Project Deliverables

GHG Emission Accounting has been successfully completed for 10 pilot companies. Potential areas to reduce the GHG emissions were identified and suggested to all the pilots to follow the low carbon development path.

Objective of this project has been met while several SME's were well sensitized and huge amount of dissemination has taken place in addition to around 200 organizations and about 100 SMEs (vendors) have been trained to do GHG emission inventorisation.

CII – Godrej GBC is glad to mention that all the deliverables committed under the project were achieved. Some of the major outcome of the project is listed below:

- Completion of GHG inventorisation studies at 5 Engineering and 5 Pulp & Paper units
- Extensive information sharing and knowledge transfer on GHG emission reduction through various information capacity building workshop was undertaken
- Ten training programmes on GHG emission inventorisation for technical team of 10 pilot plant's was done.
- Developed excel based tool for the pilot units to keep track of their GHG emissions in following years.
- The findings and experience of the project was shared through webinar for both the sectors. More than 60 participants from engineering and pulp & paper sector attended the webinar. Project findings was presented and pilot companies shared their experience reagrding implementation of GHG accounting project at their units.

CII – Godrej GBC would thank UNIDO and SECO for their support in funding this project. This project is successful in terms of participation and successful implementation of GHG accounting in pilot companies makes a case to mainstream it for overall sector.

Based on the interest created among the pilot companies, CII Godrej GBC would assist pilot units in implementing suggested emission reduction opportunities and to inventorize GHG emission in the forthcoming years.

7 WAY FORWARD

It is extremely vital to sustain the efforts carried out in this initiative as indicated more than 80% of plants in the country are still not undertaking regular GHG inventory exercise. Upscaling these initiatives and training the trainers are two essential ingredients to ensure success of this initiative and furthering the larger cause of making Indian Industrial sector grow in an ecologically sustainable manner.

Engineering Sector

The recommendations made thru this project can be upscaled in engineering sector SMEs to pave low carbon development pathway for the manufacturing sector. SMEs need to be encouraged to initiate small onsite environment friendly measures. One time investment can reap long term benefits for SMEs, whereas payback period for technologies like roof-top solar / biogas plant is approx. 6 months to 2years.

GHG accounting of pilot companies and emission reduction opportunities stated, will be helpful for the pilot companies to reduce their emissions as well as to leverage upon the selected schemes from Ministry of Micro, Small and Medium Scale Industry, Government of India. Use of these Government schemes may facilitate mainstreaming of Resource Efficient & Cleaner Production (RECP) in manufacturing sector SMEs.

Paper & Pulp Sector

GHG Emission Accounting has been successfully completed for 5 pilot companies which constitutes around 3-4% of overall capacity in India and around 10% of the plants in India (other than pilot units) are already doing accounting, which results in 15% of plants in sector undertaking yearly inventory exercise to understand their emission. This indicates there are large number of companies who still have to undertake GHG inventory and through this project more than 100 personnel have been trained to do GHG inventory. Potential areas to reduce the GHG emissions were identified and suggested to the all the pilots to evolve growth in ecologically sustainable way. Carbon Sequestration can play a major role in making the sector Carbon Neutral.

NOTE: ***This UNIDO-RECP project (2015) details and findings will be disseminated at large thru newsletters, webinars, journals and other publications.***