Development of National LCA Database Roadmaps, including further development of the Technical Helpdesk for National LCA Databases

Deliverable D 2.2 Report on baseline assessment and stakeholder mapping in India

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Life cycle assessment (LCA) in India

Introduction and background

Life Cycle Assessment (LCA) is a systematic set of procedures for compiling and examining the inputs and outputs of materials and energy and the associated environmental impacts directly attributable to the functioning of a product or service system throughout its life cycle. The first LCA study in India was conducted for steel in 1999 by National Environmental Engineering Research Institute (NEERI) followed by other studies in cement, jute, coal, paper and pulp. The studies were driven by Ministry of Environment, Forests and Climate Change (then MoEF), National Council for Cement & Building Materials (NCCB) Faridabad, and Manufacturing Associations. Indian academics and researchers have also been working an publishing on LCA topics for several years. Since 2015, a lot of LCA activity has taken place under the *Sustainable Recycling Industries* (SRI) project, funded by the Swiss State Secretariat for Economic Affairs. Activities of this project included setting up a Regional Centre for LCA, holding a series of capacity building programs, and data collection for life cycle inventories (LCIs) in nine sectors including electricity generation and distribution in India, cement and concrete industries, coal mining, agricultural products, textile, waste treatment technologies, iron mining and steel production, water supply, and freight transport. Of late, with the inclusion of LCA in ISO 14001 requirements, LCA consultants are reporting a lot of queries from industry for conducting LCAs.

LCA in industry and the private sector

Many manufacturing companies in India are conducting LCAs on some of their products Main driving factors for this activity is to establish or improve corporate image and brand value, reduce environmental impacts, and reduce risk. Other factors which have encouraged corporates to take up LCAs include demand from customers and sustainability innovation.

Companies like Tata Motors Limited, Godrej & Boyce Mfg. Co. Ltd., Mahindra & Mahindra, JK Tyres & Industries Limited, ITC Limited, Eaton Corporation, Lucas TVS, Sagar Cement, Vasvadatta Cement, Myhome industries, Zuari Cement, SPB Papers, have dedicated LCA teams within their organizations to conduct the LCA studies. These studies are mostly focused on a particular product or process to improve resource efficiency and reduce costs. Some companies that do not have their own teams hire external consultants or organizations like the Confederation of Indian Industries (CII) to conduct the LCA study for them.

In the past, a few industry associations took up LCA studies in their respective sectors under government or foreign aided projects. For example, NCCB undertook LCA study of cement sector under a MoEFCC-funded project in 2005. The Jute Manufacturers Development Council also performed an LCA of jute bags with support of Ministry of Textiles in 2005.

The sectors in which LCA studies have been conducted in India include steel, automobile, cement, plastic, fertilizer, heavy engineering, fast-moving consumer goods (FMCG), transport, coal, packaging, paper, agriculture sector, refinery, solar PV, commercial buildings, bio-materials. List of various LCA studies done in India so far are mentioned in Appendix C.

There are certification schemes, like the ‘Green Company Rating system’ (GreenCo Rating), which are internalizing a life cycle approach in their rating process in the vision to be a catalyst for greening Indian industry.

LCA in regulations and public policy

The National Voluntary Guidelines (NVG) issue in 2011 by the Ministry of Corporate Affairs, Government of India include a reference to the life cycle concept through Principle 2 which states “Businesses should provide goods and services that are safe and contribute to sustainability throughout their life cycle”. In its latest circular CIR/CFD/CMD/10/2015 dated November 04, 2015 Securities Exchange Board of India (SEBI) has reiterated implementation of the guidelines through the format to guide Business Responsibility Reporting as part of Annual Report of listed companies. Though these guidelines do not explicitly require LCA studies to be conducted, they implicitly create a need for them and hence for LCA database. As life cycle concepts become more familiar, the guidelines can be catalytic in increasing the demand and use of Indian LCI datasets.

LCA in research and academia

About 50 universities in India are reportedly using openLCA and a number of ecoinvent free academic non-OECD country licenses. Several courses including LCA topics are currently being offered in India. Table 1 provides details of the courses reported by LCA practitioners in NEERI and CII networks, and by resource persons conducting the courses.

Table 1: LCA related courses reported at Indian academic institutes

Course Name	Institution	Remarks
Sustainable Manufacturing	Birla Institute of Technology and Science, Pilani	LCA is an integrated part of this course
Life Cycle Management	IIM Lucknow (Noida Campus)	Half credit as part of Sustainable Management Post Graduate Course
MBA and PhD	IIT Bombay	LCA is part of sustainability course work
Introduction to Sustainability Principles	IIT Bombay	
Certificate Course	IIT Kharagpur (NPTEL)	8 weeks
MBA	K.J. Somaiya Institute of Management	LCA is part of sustainability course work
MBA and PhD	National Institute of Industrial Engineering	LCA is part of sustainability topic in syllabus
Life Cycle Assessment	National Program on Technology Enhanced Learning (Govt of India)	Certified Online Course
MSc	SIES Nerul	LCA is part of course work
Life Cycle Assessment	Swayam (Govt of India)	Certified Online Course
Sustainable Engineering	VNIT Nagpur	Part of a course work

LCA communities

India has LCA communities through membership of the Life Cycle Initiative hosted by UN Environment, India LCA Alliance (ILCAA) operated by Federation of Indian Chambers of Commerce and Industry (FICCI), and Indian Society for Life Cycle Assessment (ISLCA) established by National Ecology and Environment Foundation (NEEF). dedicated to promoting

LCA activities. CII itself acted as the Regional Centre for LCA under the aforementioned SRI project. The list of the workshops held by these communities are mentioned in appendix D. More details about the communities can be found on their respective websites.

National LCA data

Capacity for collection and management of LCA data

Under the SRI project, open programs on developing LCI datasets were conducted in 2015 where industry, academia, and LCA service providers/consultants received basic training on developing an using LCI datasets. Subsequently, resource persons from CII and FICCI were trained more intensively during the course of several projects for actual data collection and submission to the ecoinvent database.

LCA consultants including thinkstep, PRé consultants/SIPL Pvt. Ltd., i-point, and CII also have inhouse expertise for LCA data collection, review and management. As part of their business activities, they provide trainings for expanding local capacity and expertise, and work on developing regionalized LCI data. The UNEP-hosted Life Cycle Initiative has also conducted several workshops on LCA related topics and commissioned two LCM-CMM pilot projects in India.

LCA data collection and availability

There are mainly two LCA databases - ecoinvent and thinkstep GaBi – that have significant number of LCI datasets from India. The Indian LCI datasets available in ecoinvent were generated through data collected from the various companies in that sector from all over India. In some informal sectors, data has been generated by taking manual readings from the producers. The collected data was monitored and reviewed to ensure its reliability and accuracy. These datasets are accessible through the ecoinvent database. The table below represents sector wise datasets available specific to India.

Table 2: Availability of Indian LCA datasets

Sectors	Approximate No. of datasets	Database
Agriculture	25	ecoinvent
Cement manufacturing	47	
Coal and lignite	9	
Iron and steel	8	
Plastics	8	
Power and energy	36	
Textiles	35	
Transport, construction materials, electronics and general components	227	Gabi Database Extension XXI

Table 3 shows a list of Indian products on which LCAs are reported to have been carried out. The same are being confirmed.

Table 3: Indian products on which LCAs are reported	
Product	**Company Name**
Automobile	Mahindra
Automobile	Tata Motors
Cement	ACC Cement
Fabric /Yarn/Fibre	Aditya Birla
Food	CSIR-CFTRI
Furniture	Godrej Interio
Jatropha	NREL, USA
Textile	Birla Cellulose

LCA data needs

During the first stakeholder consultation carried out on 4-December 2018 under the present project, the following sectors were identified as priorities based on interest expressed by stakeholders: Steel, aluminium, plastics packaging, textiles, automotive parts, electric vehicles, gems and jewellery, hydropower, and biofuels.

Preceding national LCI database initiatives

Under the UNEP hosted Life Cycle Initiative Phase 3 program (2012 – 2017), flagship on global capability building, a series of workshops and training programs were held in India back-to-back with FICCI's annual conference on Life Cycle Management. These included a workshop on LCA database development guidance (Shonan guidance principles). These programs, supported by other LCA related activities of FICCI and few other organizations have succeeded in popularizing LCT as a concept and rendering it much more familiar over the last 5-6 years.

In 2015, FICCI had undertaken a series of consultations with stakeholders to develop appetite for national LCA database. However, there was not much interest shown by stakeholders at that time as LCA was not seen as a priority by policy makers or by Indian companies (except for few companies that were supplying to overseas buyers who specifically asked for LCA study results). A very useful idea discussed in this forum was that of taking up policy studies to drive development of data, i.e. work one part of larger policy project can answer questions and also develop data at the same time. Going forward, the potential for taking up data collection in sectors where policy studies are currently needed could be a good starting point for initiating database development, as sought in the present roadmap project.

In 2016-17, under the SRI project, with CII as a key implementation partner in India multiple activities were undertaken to develop LCI datasets through the improvement of local and regional expertise. The activities included local capacity building together with private and public institutions as well as the informal sector, facilitating stakeholder consultation for the development of sustainability criteria for secondary materials and actual development of LCI datasets by local experts.

Stakeholder mapping

Stakeholder groups

Typical stakeholder groups for developing roadmap for a national LCI database in India would involve government and policy makers, industries, academic and research institutions, technology supplier and associations. A complete list of stakeholders is provided in Appendix A.

Government (Public Policy)

Ministry of Environment, Forests and Climate Change (MoEFCC) (envfor.nic.in/) is the nodal ministry for environmental policy in India. At present, their interests in LCA databases are very limited as the immediate connection between LCA studies and policy decisions is not clearly established. Currently there is no strong need for LCA databases expressed by MoEFCC and other line ministries.

National Institution for Transforming India, also called NITI Aayog (https://www.niti.gov.in/) is the premier policy 'Think Tank' of the Government of India, providing both directional and policy inputs. While designing strategic and long-term policies and programmes for the Government of India, NITI Aayog also provides relevant technical advice to the Centre and States. In 2017, NITI Aayog in collaboration with the European Union delegation to India and with support of GIZ India released the Strategy on Resource Efficiency, which is now being followed through with line ministries. Currently the focus is on four sectors: steel, aluminum, construction & demolition waste, and e-waste. The sectoral strategy papers include references to LCA. (The development and use of LCA databases for these sectors is therefore expected to be of interest to NITI Aayog and the concerned line ministries. Therefore, NITI Aayog has been identified as a key government / policy making stakeholder for this project, as it can be a potential connect to funding sources and other line ministries who could be key users of LCA data for policy making in their respective sectors.

In addition to the above apex agencies, there are 29 state departments looking overseeing the environmental function in their respective states. Their activities are mainly focused on pollution control, permissions and compliances related to environmental regulations.

There are a large number of autonomous research institutes (NEERI itself being one of them) that represent the policy-making perspective as these institutes are called upon to provide technical advice and deliver projects in their respective areas of expertise. The key institutes belonging to this group have been identified in the research institutes and academia section.

In general, the perception of LCA has geo-political connotations, and in the past some apprehensions around the use of such data against national interests in global supply chains have been expressed.

Industry

Industry plays an important role in supplying data for developing datasets and implementing LCA in India. Some industries recognized LCA to be an important element in their sustainability journey and formed LCA teams with in their organization to conduct inhouse LCA studies. These industries include Tata Motors Limited, Godrej & Boyce Mfg. Co. Ltd., JK Tyres & Industries Limited, ITC Limited and Mahindra & Mahindra Limited, etc. Few other industries like Honeywell, ACC Limited, Essar Steel, Jindal Steel & Power, SAIL and L&T Special Steels and Heavy Forgings, etc. are conducting LCA studies in their processes with help of consultants like

CII. All these industries would be helpful in bringing the challenges in use of LCA in Indian industry and providing the inputs to develop an efficient roadmap for India.

Research institutes and academia

The research institutes, especially those who work closely with government, play a crucial role in persuading government departments to use LCA study results to guide actions aimed at creating environmental benefits. For example, CSIR-NEERI works closely with Central Pollution Control Board (CPCB) and National Green Tribunal (NGT – a judicial body); CSIR-CFTRI works closely with Food Safety and Stanards Authority of India (FSSAI).

Similarly, academia plays a key role in developing LCA expertise by educating students through courses, M. Tech and Ph.D. projects. The institutes that are presently involved in LCA activities in India include IIT-Bombay, IIT-Kharagpur, Visvesvaraya National Institute of Technology (VNIT), The Energy and Resources Institute (TERI), Birla Institute of Technology an Science (BITS)-Pilani, Delhi University, National Institute of Industrial Engineering (NITIE).

Technology suppliers

Technology supplier group includes thinkstep, PRé consultants/SIPL Pvt. Ltd., i-point, and GreenDelta. They have expressed keenness to share their experience of working with Indian industry and support initiatives to develop Indian LCI data. Being aware of the challenges related to collection of data, reliability of data and skills needed for generating the datasets, and having set up platforms of their own, this experience will be helpful in developing the LCA roadmap for India.

Industry associations

Almost all the industries in India both small and large have their own sectoral associations. These associations will be of a great help in taking forward LCA in specific sectors. Few associations have already conducted some LCA studies in their sectors. For example, All India Glass Manufacturer's Federation have done LCA of container glass and comparison with alternate packaging mediums (PET, beverage carton, Aluminum can and pouch) and demonstrated that glass is the safest packaging material on the market in terms of potential migration into food and drinks with longer shelf life. This stakeholder group will consist of associations like

- Chemicals and Petrochemical Manufacturers Association
- Consumer Electronics and Appliances Manufacturers Association
- All India Plastic Manufacturers India
- National Council for Cement and Building Materials
- The All India Glass Manufacturers' Federation
- Indian Centre for Plastics in the Environment will be part of the stakeholder group

These associations will be supporting the other stakeholders in developing the national LCA roadmap for India.

In addition, Federation of Indian Chambers of Commerce and Industry (FICCI), one of India's top national chambers is a key stakeholder as it operates the India LCA Alliance and has established its annual LCM Conference as the only series that brings the national and global life cycle communities together. Through the ILCM platform, FICCI is engaged in mainstreaming Life Cycle Thinking and developing national capacity to use life cycle approaches for assessing and improving sustainability performance.

Organisation of the national LCA community

The Indian Life Cycle community consists of three broad categories: members of the Life Cycle Initiative, members of FICCI operated ILCAA, and members of NEEF operated ISLCA. Of these, ILCAA is the most active community with regular exchanges on social media and annual opportunity to meet at the Indian LCM Conference, the last edition of which was held in October 2018 at Mumbai, India. A brief on ILCAA is provided below.

ILCAA is a loose network of individuals interested in LCA developments in India. Set up in 2012, the Alliance is operated by FICCI and registration is free. It has members from India as well as other countries. Individuals attending LCA relate events conducted by FICCI are automatically registered as ILCAA members. In addition, others interested in becoming members can do so on request. ILCAA Members receive regular newsletters with information on LCA related events organized by FICCI and other opportunities of interest. The Alliance website is www.indialca.com. The more active and expert members of ILCAA can contribute significantly to the roadmap development and early implementation activities.

International connections and collaborations

ILCAA has a history of strategic partnership with the Life Cycle Initiative hosted by UN Environment. In this respect, both CII and FICCI have good connections that can be leveraged for expert advice on specific issues that could come up during the roadmap development.

Conclusions & Recommendations

Conclusions

- In the past, LCA studies have been conducted in various sectors under projects funded by Indian government / international organizations
- Currently, Indian companies are conducting LCA studies both inhouse as well as with support of industry associations, consultants, and service providers
- India has the Greenco industrial rating scheme, in which 75 out of 1000 points are dedicated for LCA implementation
- The Life Cycle Initiative, ILCAA and ISLCA communities are present in India which work towards general capacity building on LCA
- As part of SRI project, Indian LCI datasets were developed for nine sectors, which are currently hosted in the ecoinvent database
- In addition to ecoinvent, thinkStep GaBi is also hosting Indian datasets in various sectors
- Indian academic institutions and research organizations are undertaking LCA activities and publishing their research work

Recommendations

The initial baseline assessment findings documented in this report need to be followed up with deeper, small group or one-on-one discussions with stakeholders who have shown interest in the development of Indian LCI data. In this context, specific needs and expected contributions of different stakeholder groups are outlined below.

Within the research and academic community, LCA is a topic of significant interest. There are several academic courses that include LCA topics, and a significant number of LCA studies are also being published in refereed journals. However, this community is currently not likely to raise large funds for developing a national database. If another agency initiates such a project, they can put in data collection effort and also use the data in further studies, relying mainly on academic purpose free/low cost licenses.

Within the corporate sector, many large companies private as well as public, are undertaking LCA studies for their internal decision-making. In general, the data they collect and generate remains internal and is not available for other studies. In the past, attempts to get a few companies together to develop sectoral data did not make much headway due to data confidentiality issues and apprehensions against data finding its way to agencies that may raise compliance related questions. However, as these companies grow more mature in their assessments, new collaboration opportunities may be possible with sectoral industry associations taking the lead.

Within government ministries and departments, direct attempts to draw them towards database development projects have not succeeded in the past, as they do not see value in a standalone database development project. One possible way could be to support them with assessments that can help answer policy questions they are currently dealing with and in the process generate data. An organization like NEERI being a government entity itself, can be positioned to approach other government agencies such as pollution control boards, state environment departments, etc. for access to relevant data. Some of the key policy issues at this point in time include resource efficiency in steel, aluminum, C&D waste, and e-waste sectors, air pollution (particularly in more than 100 cities/towns), large-scale introduction of electric vehicles, ban on single use plastics, and substitution of fossil with bio-fuels. Added to these are national priorities on improving cleanliness and sanitation, encouraging local manufacturing, as also the general thrust at increasing exports. Accordingly, key sectors identified during the first meeting of stakeholders were: steel, aluminum, plastics packaging, textiles, automotive parts, electric vehicles, gems and jewelry, hydropower, and biofuels. Going forward, deeper discussions are needed with agencies addressing questions around key national priorities to explore possibilities of collaboration to evaluate solutions and develop LCI datasets in the process.

Appendix A - List of stakeholders

As on 4th December, 2018

Sector	Stakeholder	Involvement	Contact established
I Government agencies and other autonomous agencies under Government's administrative control	NITI Aayog	Direct	Participated on 4th Dec
	Ministry of Environment, Forests an Climate Change (MoEFCC)	Direct	Invited
	Central Pollution Control Board	Direct	Invited
	Maharashtra Pollution Control Board	Direct	Participated on 4th Dec
	Line Ministries associated with NITI Aayog's Resource Efficiency project: Steel Mines Urban Development Electronics	Direct	No (To be stablished through NITI Aayog)
	Other Line Ministries: Textiles Medium & Small Ent Transport Commerce Heavy Industries Consumer Affairs	Indirect	No (Identified uring 4th December meeting)
	National Council for Cement & Building Materials (NCCB)	Direct	Invited
	National Green Tribunal (NGT)	Indirect	Participated on 4th Dec

Sector	Stakeholder	Involvement	Contact established
IIa Industry (Private Companies)	SABIC	Direct	Invited
	India Glycols	Direct	Invited
	Tata Motors Limited	Direct	Invited
	Godrej & Boyce Mfg. Co. Ltd.	Direct	Invited
	JK Tyres & Industries Limited	Direct	Invited
	ITC Limited	Direct	Invited
	Mahindra & Mahindra Limited	Direct	Invited
	Eaton Corporation	Indirect	No
	Lucas TVS	Indirect	No
	Sagar Cement	Indirect	No
	Vasvadatta Cement	Indirect	No
	Myhome Industries	Indirect	No
	Zuari Cement	Indirect	No
	SPB Papers	Indirect	No
	Aditya Birla	Indirect	No
	Godrej Interio	Indirect	No
	Birla Cellulose	Indirect	No
	Honeywell	Indirect	No
	Essar Steel	Indirect	No
	Jindal Steel & Power	Indirect	No
	L&T Special steels and heavy forgings	Indirect	No
IIb **Industry (Public Sector Companies)**	Steel Authority of India (SAIL)	Direct	No
	Coal India (CIL)	Indirect	Yes
	Indian Oil Corporation (IOCL)	Indirect	No
	National Thermal Power Corporation (NTPC)	Indirect	No

Sector	Stakeholder	Involvement	Contact established
III **R&D institutes and Academia**	CSIR-CFTRI	Direct	Participated on 4th Dec
	IIT-Kharagpur	Direct	Invited
	IIT-Bombay	Direct	Invited
	IIT-Madras	Indirect	Participated on 4th Dec
	The Energy and Resources Institute (TERI) &	Indirect	Invited
	TERI School of Advanced Studies	Direct	Invited
	Delhi University	Indirect	No
	VNIT-Nagpur	Indirect	Invited
	National Institute of Industrial Engineering (NITIE)	Indirect	No
	BITS-Pilani	Direct	Invited
	Gujarat Environment Management Institute (GEMI)	Indirect	No
IV **Service Providers & Consultants**	ThinkStep (Gabi)	Direct	Invited
	Pre Consultants	Direct	Invited
	OpenLCA (GreenDelta) (represented in India by RSM)	Direct	Participated on 4th Dec
	i-point	Direct	Participated on 4th Dec
	Quantis	Direct	No
	Stenum Asis	Direct	Participated on 4th Dec
	RSM Advisory Services (also represents GreenDelta in India	Direct	Participated on 4th Dec

Sector	Stakeholder	Involvement	Contact established
V **Industry Associations**	Chemicals and Petrochemical Manufacturers Association	Direct	Invited
	Consumer Electronics and Appliances Manufacturers Association	Indirect	Invited
	All India Plastic Manufacturers India	Direct	Invited
	The All India Glass Manufacturers' Federation	Direct	Invited
	Indian Centre for Plastics in the Environment	Direct	Invited
	Jute Manufacturers Development Council	Indirect	No
	Federation of Indian Chambers of Commerce and Industry (FICCI)	Direct	Yes
VI **International Organizations**	GIZ	Indirect	No (To be contacted through NITI Aayog)
	UN Environment	Indirect	No
	UN Development Program	Indirect	No
	World Bank	Indirect	No
	Asian Development Bank	Indirect	No

Appendix B - Stakeholder engagements

The first stakeholders meeting has already been organized on December 4th, 2018 at NEERI Nagpur. Over the next 2 months, meetings with other stakeholders who are interested in contributing but could not travel on December 4th will be organized to understand their potential contribution. Additional stakeholders identified in this document but with whom adequate communication could not be established before December 4th will also be contacted during this period. Based on potential contribution and empowerment of concerned individuals/ their organizations to take steps for establishing a national database, the National Database Working Group (NDWG) will be formed towards the end of January 2019. Further meetings and interactions between January and May 2019 will be planned in consultation with NDWG members.

Appendix C – LCA studies conducted so far in India

- LCA in steel sector sponsored by CSIR-NEERI with MoEFCC supported by International Iron and Steel Institute (IISI) in 1999-2002.
- LCA of PP-HDPE woven sacks vis-à-vis jute/paper sacks by IIT Delhi in 2002
- LCA in cement sector by NCCB under aegis of MoEFCC in 2005
- LCA for jute bags by Jute Manufacturers Development Council, Ministry of Textiles in 2005
- LCA update for steel sector organized by WSA in 2007
- Jatropha LCA study was completed in collaboration with NREL, USA, focusing on use of Jatropha bio-diesel vis-à-vis petroleum diesel for rail transport in 2008
- First ISO 14040/44 compliant comparative LCA study for container glass versus PET, beverage carton, aluminum can and pouch for AIGMF by PE International in 2012
- Hydrogen transportation using liquid organic hydrides: A comprehensive life cycle assessment, carried out as part of MNRE project by CSIR-NEERI in 2018
- LCA studies in steel, automobile, plastics, polymers, fertilizer, heavy engineering, FMCG, packaging, paper, cement, light engineering and chemicals, done internally by corporate sector an on on pavement, wastewater treatment, refinery, solar PV, commercial building, bio-materials, by academicians and research institutes over last ten years (Source: Conference proceedings)

Appendix D – List of workshops on LCA in India

- The first Indian life cycle assessment and management conference (ILCM 2012) organized by FICCI and the UNEP/SETAC life cycle initiative, New Delhi, August 21-23, 2012 followed by annual editions in 2013, 2014, 2015, 2016, 2017, 2018.
- Asian regional workshop on life cycle cost assessment of infrastructure projects. UNU-FLORES and TERI University, New Delhi, December 18-19, 2013.
- Knowledge sharing workshops on use of life cycle approaches to meet sustainability challenges organized under SRI project at GEMI, IRMRA, NCCB, TERI SAS, NEERI, NIFT-TEA through international consortium comprised of ecoinvent, FICCI and Quantis
- 2012 – UNEP/SETAC Life Cycle Initiative Training workshops on Global Guidance Principles for Life Cycle Assessment Databases and LCM-CMM through FICCI
- 2013 – Bureau of Energy Efficiency, Govt of India Workshop on Sustainable Development and LCA/M through FICCI
- 2013 – UNEP/SETAC Life Cycle Initiative Workshop on Water Footprint through FICCI
- 2014 – UNEP/SETAC Life Cycle Initiative workshop on Sustainable Public Procurement and Life Cycle Costing through FICCI
- 2015-2016 – TERI School of Advanced Studies BLISS (Building Learning in Sustainability Science) Sessions on Fundamentals of Life Cycle Thinking under Switch Asia programme by Dr Sanjeevan Bajaj
- 2016 – UNEP/UNITAR e-learning course “Introduction to SCP in Asia” 3rd edition by Dr Sanjeevan Bajaj
- 2016 – TERI University SCP Masters Course Sessions on Life Cycle Thinking and Systems Approach and Strategies for Sustainable Behaviours and Lifestyles by Dr Sanjeevan Bajaj
- 2016 – FICCI Workshop on Internalizing Life Cycle Thinking in Business Strategy
- Ongoing sessions on LCA in FICCI’s IRCA approved Lead Auditor Courses on ISO 14001 (3-4 courses per year) by FICCI Consultants

References and resources

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