



# **Report of consultations with key stakeholders on 'Readiness for development of Indian LCA database'**

**January 2016**

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UNEP/SETAC Life Cycle

### Contributions

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## Abbreviations

|         |                                                      |
|---------|------------------------------------------------------|
| BIS     | Bureau of Indian Standards                           |
| CEE     | Centre for Environment Education-Ahmedabad           |
| CRB     | Centre for Responsible Business                      |
| FICCI   | Federation of Indian Chambers of Commerce & Industry |
| ILCAA   | India LCA Alliance                                   |
| ILCM    | Indian Conference on Life Cycle Management           |
| LCA     | Life Cycle Assessment                                |
| LCA/M   | Life Cycle Assessment/Management                     |
| LCI     | Life Cycle Inventory                                 |
| MICA    | Mudra Institute of Communications-Ahmedabad          |
| MoEF&CC | Ministry of Environment Forests & Climate Change     |
| MoSPI   | Ministry of Statistics & Programme Implementation    |
| SETAC   | Society of Environmental Toxicology and Chemistry    |
| UNEP    | United Nations Environment Programme                 |

## Project Background

Life Cycle Assessment (LCA) can be an important tool to reduce environmental impacts from growing industrialization. Identifying the most significant causes of environmental impacts along supply chains can be invaluable in improving the sustainability of a product and/or production process. However, the data requirements for LCA studies are quite high - detailed production inventories of all processes along the life cycle need to be evaluated. Such activities can be undertaken only if locally relevant Life Cycle Inventory (LCI) datasets are available. The cornerstone of LCA is LCI, which refers to the quantification of material, energy and other flows associated with a product system under the scope of study. The increasingly internationally intertwined supply chains necessitate considering developments beyond single country. Therefore, availability of more, higher quality, interoperable background LCI data is the key to implementation of life cycle based tools. Meeting minimum requirements for data set interoperability in terms of common elementary flow lists, core data formats, LCI methods, review and documentation-coordinated among major national database developments and major databases around the world are considered to be cornerstones for long term success.

The development of reliable LCI data typically requires considerable expert time inputs and expense, requirements that have generally impeded the application of LCA in India. The lack of widely available, critically reviewed, comprehensive LCI databases is the main reason why LCAs in India are frequently dismissed as expensive and time consuming. Although there are some LCI databases in market today, access to the information contained in them is generally restricted or protected by copyright agreements, or the data are otherwise not verifiable. Most of the datasets available in existing databases have also been developed outside of India, mostly in Europe. While they can be initial proxies for Indian processes for exploratory purposes, they are not representative enough of the Indian situation when it comes to applications requiring more accuracy. The development of a national LCI database will contribute in remedying this situation and enhance the usability of LCA in general.

FICCI has been working over the last four years to familiarize Indian stakeholders with Life Cycle Thinking and mainstream the use of Life Cycle Assessment/Management (LCA/M) tools for improved decision-making by managing socio-economic and environmental impacts of business decisions. FICCI's work includes organizing an annual Conference-Indian Conference on Life Cycle Management (ILCM) in India, conducting various awareness programs and training workshops on LCA/M, creation and management of India LCA Alliance (ILCAA), and pilot projects on LCM/LCT. Specifically on the database issue, FICCI had organized a full-day capacity building workshop on Global Guidance Principles and LCA databases back-to-back with ILCM 2014. Issues related to LCA databases have been coming up at all ILCM conferences and related events. Since then, FICCI has been discussing the topic at various forums and during one-on-one meetings with relevant stakeholders. Among these, the discussions during the 18<sup>th</sup> meeting of CHD 34<sup>1</sup> held on July 2, 2015 are considered significant. During this meeting, Committee Chair advised industry associations to take up database development work. Pursuant to the advice, FICCI held

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<sup>1</sup> CHD stands for Chemical Division and CHD 34 stands for Environment Management Sectional Committee formed by Chemical Division, Bureau of Indian Standards.

consultations with its members and experts working in this area. The discussions have led to an understanding that considerable groundwork in India is needed to develop readiness for creating what can truly be considered as a national database. With this understanding, FICCI has taken up a project on **‘Developing readiness for creation of Indian LCA database/datasets’** with support from UNEP-SETAC Life Cycle Initiative.

## Project Activities

As part of project activities, FICCI held numerous one-on-one meetings and group consultations with key stakeholders. The objective of the one-on-one meetings was to provide background information to each stakeholder in line with their mandate and priorities, their exposure to LCT and LC approaches, the relevance of LCA to their work tools, and their potential role in contributing to LCA data development and usage. The objective of group consultations was to facilitate exchange of views on how readiness for creating national LCA database/datasets may be developed and build a common understanding among those present on how to move towards such creation.

To start with, five broad categories of stakeholders were identified -Indian Government, Indian academia, Indian industry, Indian consultants, and International experts. Specific organizations and individuals within the five categories were identified based on FICCI and UNEP’s prior knowledge of Indian professionals and international experts working on LCA/M as part of their current role. In every meeting, in addition to discussions on developing readiness for Indian LCA data, participants were also requested to recommend other organizations or individuals who should be consulted on the issue. All organizations/individuals recommended by the participants were contacted by mail or phone. The ones who responded were included in the next round of meetings and consultations.

The consolidated findings from the one-on-one meetings and group consultations were finally presented to the Project Advisory Committee (PAC) comprised of representatives from organizations expected to play most relevant and crucial roles in the roadmap development. The PAC was co-chaired by Additional Secretary, Trade Policy Division, Ministry of Commerce, Government of India and Secretary General, FICCI. Background note circulated to PAC members is attached as Annex I slide deck used for the meeting is attached as Annex II.

## Discussion Outcomes and Next Steps

Based on the first consultative meeting held on September 16, 2015, key issues were identified on which stakeholders had expressed their views and raised questions. These issues were used as the basis for repeated rounds of discussions with more stakeholders between September 2015 and January 2016. From the discussions, it became clear that there are no strong drivers perceived by any of the Indian stakeholders for taking up a major initiative to create an Indian LCA database at this point in time. There are multiple reasons behind this, and based on FICCI’s analysis of stakeholder views, the following are the most important ones:

1. LCA is not a mainstream tool for improving sustainability performance in India
2. Complexity and cost of LCA database and lack of visible linkages with immediate problems
3. General lack of data availability and data-driven decision-making

Table 1 shows the top five issues identified by the PAC, key findings on these issues put together from all discussions, and recommendations on which FICCI has already started work. Findings shown in Table 1 are derived from stakeholder views and ideas detailed in Annex III.

| Table 1: Discussion outcomes and next steps                                      |                                                                                                                                                                                                                                                                                                                     |                                                                                                                          |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Issue                                                                            | Findings                                                                                                                                                                                                                                                                                                            | Next Steps                                                                                                               |
| 1. Need and expected benefits of Indian LCA database/datasets                    | The need is most strongly expressed by academic researchers and LCA tool providers, but practically no demand for LCA studies (and hence for LCA data) from potential users                                                                                                                                         | Research on which sectors' commercial interests are being (or are likely to be) affected by lack of LCA data and studies |
| 2. Opportunity to answer policy questions and also develop data at the same time | The potential for an LCA study to provide insights for waste management/prevention found support from an organization working with the informal sector in managing waste                                                                                                                                            | Pilot data collection exercise to demonstrate how LCA data can be used for policy-making                                 |
| 3. Fast track development of Indian datasets                                     | Data collection can be approached in two ways: (1) Primary data collection (2) Collation of secondary data in LCA format                                                                                                                                                                                            | Conceptualization of a joint project with specific data owners to collate their data                                     |
|                                                                                  | Solution has to be low-cost and simple enough to be understood by decision-makers                                                                                                                                                                                                                                   | Conceptualization of a simple, low-cost initial solution                                                                 |
| 4. Industry interest in LCA studies                                              | Two reasons for interest: (1) Mandated by foreign buyers to provide LCA data, and (2) LCA results used to enhance brand image and recognition. Some interest to support initiatives for spreading awareness about their LCA work, but not enough to participate in or support national dataset development activity |                                                                                                                          |
| 5. Apprehensions on misuse of data                                               | Some stakeholders apprehend that such data could be used to favor foreign commercial interests as against national interests                                                                                                                                                                                        |                                                                                                                          |

Considering the above, trying to persuade any Indian government or industry body to fund a database development project in the near future will not be very fruitful. This is not to say that no Indian data can be collected or generated at this point in time, but only that creating an Indian LCA database is not a

priority issue deserving large-scale immediate funding. Therefore, till the time specific funding tied to Indian datasets development is not forthcoming, the best strategy will be to generate opportunities to answer policy questions and also develop data at the same time, and collate secondary data in LCA data format. Recommended activities on these lines over the next two years is shown in Table 2.

| <b>Table 2: Recommended activities for Indian LCA database development 2016-18</b>                                          |                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Activity</b>                                                                                                             | <b>Organizations</b>                                                                         |
| Consider and incorporate as appropriate project results with work of Committees/ sub-committees on LCA-related standards    | Bureau of Indian Standards                                                                   |
| Establish potential linkages with INDC and SDGs                                                                             | MoEF&CC                                                                                      |
| Generate opportunities to answer policy questions and also develop data at the same time and study secondary data available | Industry associations, businesses engaged in Clean India/Waste Management activities         |
| Take up specific project with data collection/collation to answer specific policy question                                  |                                                                                              |
| Establish business model for further development and maintenance of data repository                                         |                                                                                              |
| Develop low-cost data repository model                                                                                      | Industry associations, data owners, international experts, academic institutions, IT vendors |
| Populate data repository with available data                                                                                |                                                                                              |
| Establish potential for lack of national LCA datasets to adversely impact country competitiveness                           | Ministry of Commerce                                                                         |
| Evaluate relevance of data repository for future studies                                                                    | Sectoral Ministries                                                                          |
| Approach additional partners for specific studies to answer policy questions and also develop data at the same time         | FICCI and partners                                                                           |



## Annex I: Background note circulated to Project Advisory Committee members

### Life Cycle Data for Competitive Advantage in Global Supply Chains and Informing Domestic Policy for 'Zero Effect'?

#### Life Cycle tools have multiple applications

As global concerns over environment and sustainability intensify, developed countries are finding more reasons to prefer local products and raise question marks on globally traded goods, especially those produced in developing countries. In this sense, our access to “green” markets is restricted by our inability to demonstrate the sustainability performance of our products, more so in the wake of reports about polluting production technologies and poor/unsafe working conditions.

At the same time, if we look inwards, Indian cities and towns are struggling for years to find ways to responsibly manage the ever-increasing amount of trash. Air pollution and water contamination are no less of a problem. There is substantial emphasis being placed by Government of India on cleanliness under the Swachh Bharat (Clean India) Mission (SBM). However, there is little clarity on how sustainable the achievements might be once the campaign mode is over.

In both contexts, i.e. global competition and domestic ‘effect’, one of the tools that could be used to assess (and consequently improve) sustainability performance is **Life Cycle Assessment (LCA)**. LCA is a quantitative assessment of environmental impacts<sup>2</sup> of a product through its entire life cycle, right from extraction of natural resources to end-of-life disposal, i.e. cradle-to-grave. LCAs have been the basis of policy interventions such as extended producer liability, product labelling, substance bans, etc. There are ISO standards on how such LCAs may be conducted.

#### Life Cycle Assessment studies need background data

LCAs are considered to be “data hungry” as all flows from and to the environment of all processes must be considered. Many of these processes may be for utilities and other common services for which data can be collected by one entity and used for multiple studies by multiple entities. In the LCA lexicon, such data is called ‘background data’. In India, LCAs are often dismissed as being very expensive and time consuming mainly due to lack of widely available, critically reviewed, comprehensive background data.

#### LCA studies on Indian products often use non-Indian data

Most LCAs conducted by Indian or foreign organizations on Indian products use background data from global databases developed outside India, mostly in Europe. While these can be initial proxies for exploratory purposes, they are not representative enough of the Indian situation when it comes to applications requiring more accuracy. Recognizing this limitation, many developed country organizations (database providers, governments<sup>3</sup>) are funding activities to collect and store data from India (and other

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<sup>2</sup> Work on developing ‘Social LCAs’ is going on, but in general, S-LCA methodologies are still under development.

<sup>3</sup> The Swiss government has funded a project in India through Swiss database provider ‘ecoinvent’. The project commenced in November 2015. Software providers ‘thinkstep’ and ‘Simapro’ have also collected some data on Indian processes. This data is hosted in their software and is not available for free.

developing countries) which can be used for LCA studies to inform global supply chain decisions. Globally, creating and maintaining LCA databases is a big business and such databases are mostly accessible with commercial software licenses which are quite expensive. As of now, there is no Indian company of scale operating in this area.

### **Many developing countries are creating local databases**

Several developing countries<sup>4</sup> are creating their own local datasets/databases. There is no Indian initiative yet to develop LCA datasets. As mentioned in the footnote, limited data from India has been collected so far, and whatever is collected is not hosted by any Indian organization. The issue of developing an LCA database hosted by an Indian organization (e.g. a government department or an industry association) has come up at several forums but there is no clear roadmap yet.

### **Common understanding is needed for developing Indian datasets**

FICCI has been working on LCA capacity development in India since 2011 and is currently engaged in a project to develop common understanding among key stakeholders on basic issues concerning the creation of Indian datasets. Going forward, FICCI is keen to take up initiatives for Indian LCA datasets being created and hosted in India and guidance is being sought on how a roadmap for the same might be developed.

#### **PAC Meeting Agenda**

|                   |                                                     |
|-------------------|-----------------------------------------------------|
| 12.00 – 12.05 hrs | Welcome remarks                                     |
| 12.05 – 12.30 hrs | Presentation by project team on work done so far    |
| 12.30 – 13.00 hrs | Comments and observations by PAC members            |
| 13.00 – 13.30 hrs | Framing of issues based on PAC-members observations |
| 13.30 – 14.00 hrs | Agreement on next steps facilitated by project team |
| 14.00 hrs onwards | Closing remarks                                     |

*\*Lunch will be served during the meeting*

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<sup>4</sup> Including Brazil, China, Malaysia, Thailand.

## Annex II: Slide deck used for Project Advisory Committee meeting

### Readiness for Creation of Indian LCA Data leading to

- Competitive Advantage in Global Supply Chains
- Sustainable Production & Consumption Policy

Project Advisory Committee Meeting  
January 06, 2015




**FICCI QUALITY FORUM**



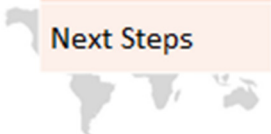
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### Discussion Points



**FICCI QUALITY FORUM**

|                        |                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Genesis</b> | Offshoot from FQF's work in capacity building on Life Cycle Approach for Sustainable Consumption & Production                                                     |
| <b>Progress so far</b> | Issues framed on the basis of multi-stakeholder consultations with Indian Industry, Life Cycle experts from India and abroad, and potential Indian data providers |
| <b>Next Steps</b>      | To be decided                                                                                                                                                     |

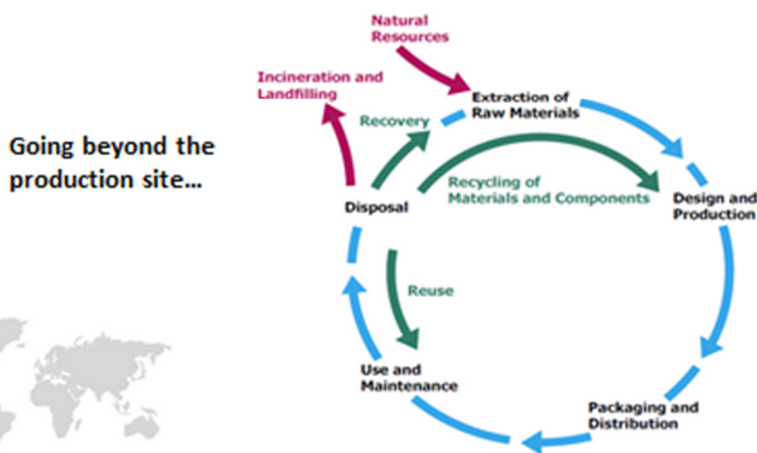


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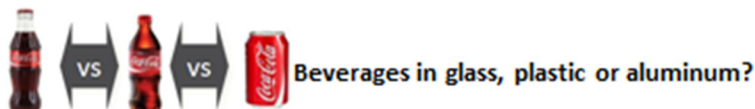
## Life Cycle Approach

|                            |                                                                                                                                                           |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Life Cycle Approach</b> | Consideration of economic, environmental & social impacts of a product or system over its entire life cycle, i.e. cradle-to-grave instead of gate-to-gate |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|



1

## LCA helps make better choices



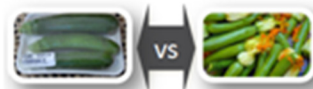
Paper or plastic grocery bags?



VS

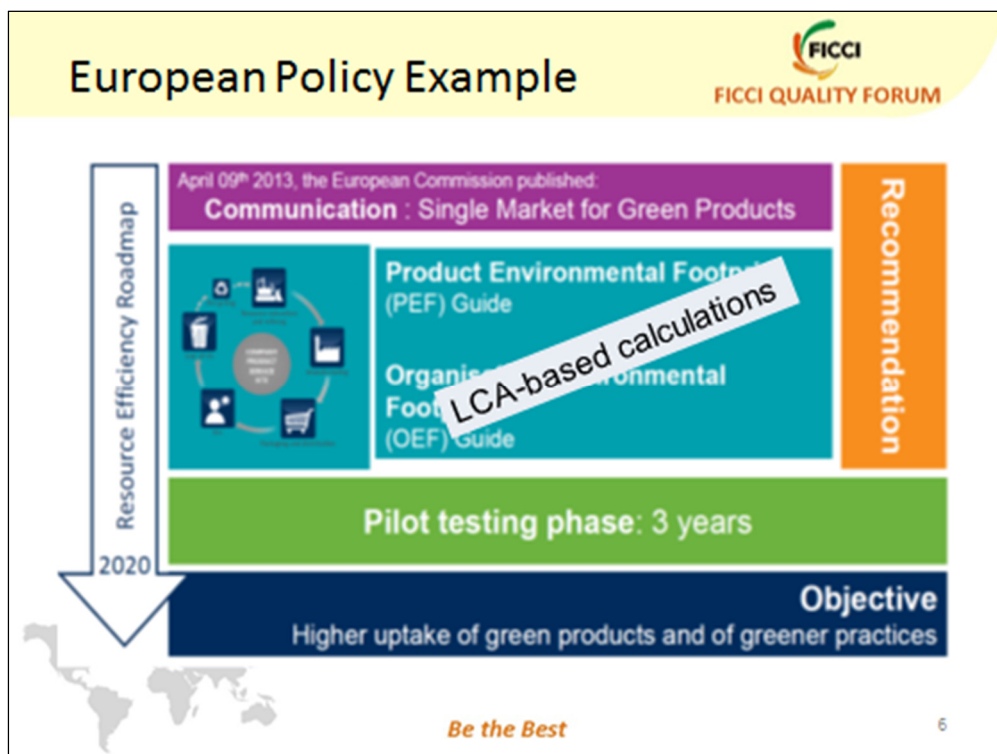
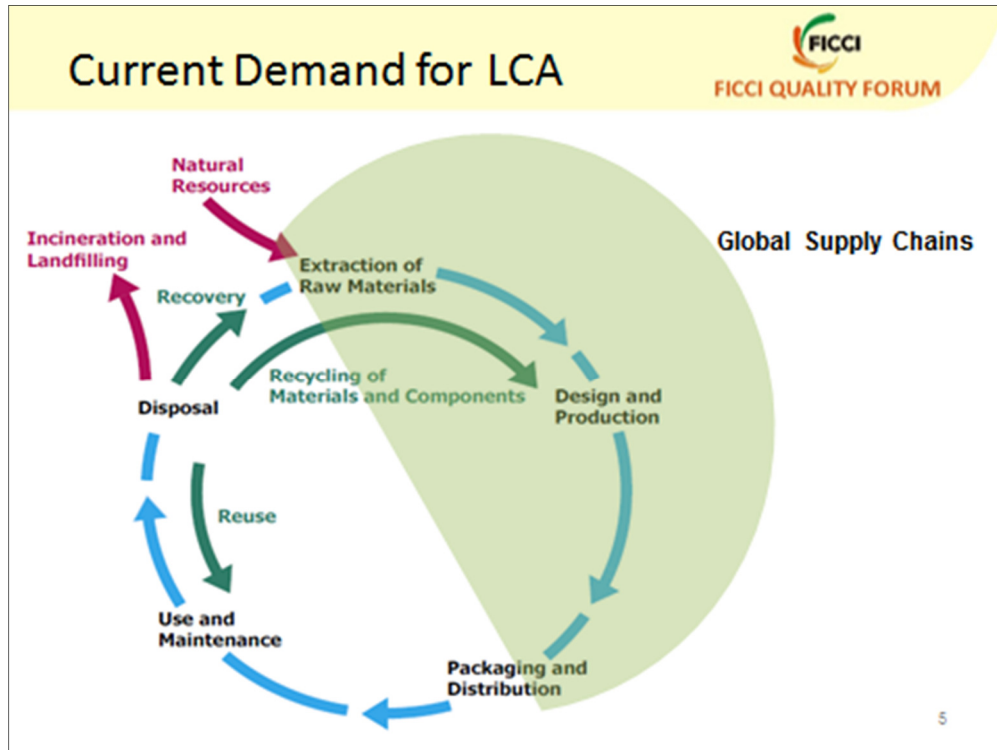
Electric or gasoline cars?

Organic from abroad or non-organic local food?



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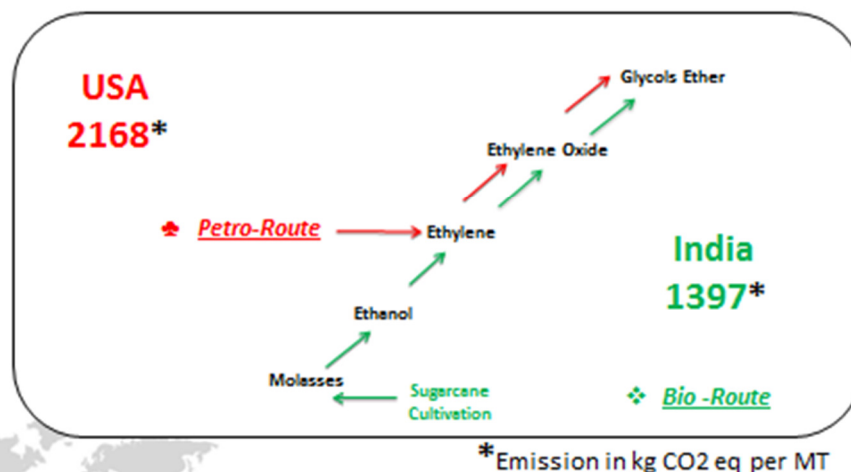


## Indian LCA Example



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### (Bio) Glycol Ether Export from India



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## LCAs are 'data hungry'



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- All flows (material, energy, emissions, impacts) from and to the environment along the product life cycle must be considered
- **Background data:** Many of the above flows may be for utilities and other common services for which data can be collected by one entity and used for multiple studies by multiple entities
- In India LCAs are dismissed as being expensive and time consuming due to lack of easy access to reliable/complete background data

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## Indian LCA data status



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- Organizations from developed countries are funding activities to collect and store data from India to inform trade policy
- LCAs on Indian products use background data from global databases from outside India (mostly Europe) which is not representative of the local conditions
- Some developing countries (Brazil, China, Thailand, Malaysia) are creating their own national databases



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## Project Genesis



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\*Project is supported by UNEP

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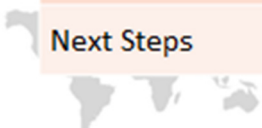
10



## Discussion Points

  
**FICCI QUALITY FORUM**


|                        |                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Genesis</b> | Offshoot from FQF's work in capacity building on Life Cycle Approach for Sustainable Consumption & Production                                                     |
| Progress so far        | Issues framed on the basis of multi-stakeholder consultations with Indian Industry, Life Cycle experts from India and abroad, and potential Indian data providers |
| Next Steps             | To be decided                                                                                                                                                     |




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## Issues framed

  
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|                               |                                                                                                                        |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>What change do we want</b> | Reduce barriers and increase facilitators to implementing and operationalizing Life Cycle Approaches in India          |
| What is the status now        | Lack of awareness and knowledge about importance of Life Cycle Approaches<br>Lack of easily accessible Indian LCA data |
| What do we want it to be      | Enhance awareness/knowledge*<br>Make Indian LCA data available to those who have knowledge and want to use LC tools ?  |
| How will we get there         | Who will be partners for developing Indian data and what role will each partner play                                   |

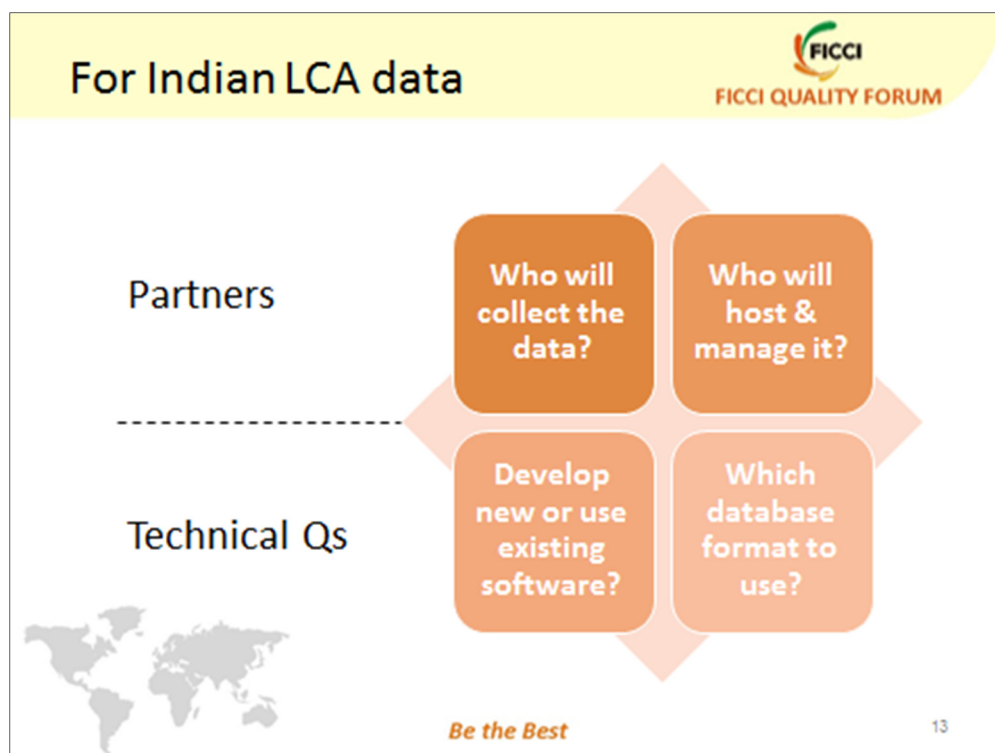


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\* FICCI is doing this through the Annual Indian Conference on Life Cycle Management





| Financing                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FICCI QUALITY FORUM                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| National Database Example (Year Est.)              | Funding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Ecoinvent-Switzerland (1992)                       | <ul style="list-style-type: none"> <li>Initially funded by Swiss federal offices: Energy, Agriculture, Environment, Forests and Landscape, Roads.</li> <li>Housed in Swiss Federal Laboratories for Materials Science and Technology</li> <li>Current income from sale of database for commercial purposes (€ 3800 for single licence 10,300 datasets).</li> <li>Current data collection project (India, South America, South East Asia) supported by Swiss State Secretariat for Economic Affairs (SECO).</li> </ul> |
| German Network on Life Cycle Inventory Data (2004) | <ul style="list-style-type: none"> <li>German Helmholtz Association (HGF) - Germany's largest scientific organisation funded with initial budget of (€ 240,000 /a for max. 3 years).</li> <li>Database can be accessed for free.</li> </ul>                                                                                                                                                                                                                                                                           |
| U.S. Life Cycle Inventory Database (2003)          | <ul style="list-style-type: none"> <li>Database created by National Renewable Energy Laboratory.</li> <li>Supported by US Ministries (Ag, Energy, Env. Prot. Etc.), Industry associations, research institutes.</li> <li>Currently, supported by some 35 organizations (ministries, companies, institutes, foundations).</li> <li>Database can be accessed for free.</li> </ul>                                                                                                                                       |

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| Financing                                          |                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FICCI QUALITY FORUM                                |                                                                                                                                                                                                                                                                                                                                                                                 |
| National Database Example (Year Est.)              | Funding                                                                                                                                                                                                                                                                                                                                                                         |
| Ecoinvent-Switzerland (1992)                       | <ul style="list-style-type: none"> <li>Initial Forests</li> <li>House Techn</li> <li>Curre for sir</li> <li>Curre supp</li> </ul>                                                                                                                                                                                                                                               |
| German Network on Life Cycle Inventory Data (2004) | <ul style="list-style-type: none"> <li>German Helmholtz Association funded with initial budget of (€ 240,000 /a for max. 3 years).</li> <li>Database can be accessed for free.</li> </ul>                                                                                                                                                                                       |
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## Hosting and Managing

  
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| National Database Example, Year                    | Type of organization                              | Hosting and Managing Team (Number of members)                                                                                                                                                                                |
|----------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecoinvent-Switzerland (1992)                       | Non-profit company                                | <ul style="list-style-type: none"> <li>Staff (8)</li> <li>Ecoinvent board (5)</li> <li>Editorial board (5)</li> <li>International advisory council (20)</li> </ul>                                                           |
| German Network on Life Cycle Inventory Data (2004) | Independent research centre                       | <ul style="list-style-type: none"> <li>Staff (3)</li> <li>Partners</li> <li>Government ministries (3)</li> <li>Companies &amp; industry associations (11)</li> <li>Universities &amp; research organizations (25)</li> </ul> |
| U.S. Life Cycle Inventory Database (2003)          | Team in the National Renewable Energy Laboratory. | <ul style="list-style-type: none"> <li>Staff (2)</li> <li>Advisory committee (11)</li> </ul>                                                                                                                                 |



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## Hosting and Managing

  
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| National Database Example, Year                    | Type of organization                              | Hosting and Managing Team (Number of members)                                                                                                                      |
|----------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecoinvent-Switzerland (1992)                       | Non-profit company                                | <ul style="list-style-type: none"> <li>Staff (8)</li> <li>Ecoinvent board (5)</li> <li>Editorial board (5)</li> <li>International advisory council (20)</li> </ul> |
| German Network on Life Cycle Inventory Data (2004) | Independent research centre                       | <ul style="list-style-type: none"> <li>Staff (3)</li> <li>Partners</li> <li>Government ministries (3)</li> </ul>                                                   |
| U.S. Life Cycle Inventory Database (2003)          | Team in the National Renewable Energy Laboratory. | <ul style="list-style-type: none"> <li>Staff (2)</li> <li>Advisory committee (11)</li> </ul>                                                                       |

Funding to a team/centre for LCA database development and maintenance



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## Software- Collect data



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| National Database<br>Example, Year                       | Software to<br>collect data                                                                                                | Advantages                                                                                                                                                                            | Disadvantages                                                                                                       |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Ecoinvent- Switzerland<br>(1992)                         | Ecoeditorv3                                                                                                                | <ul style="list-style-type: none"> <li>Free to use</li> <li>Ecoinvent is also starting a project to collect data so should be having workshops on how to use this software</li> </ul> | <ul style="list-style-type: none"> <li>Format is complex but comprehensive</li> <li>Steep learning curve</li> </ul> |
| German Network on Life<br>Cycle Inventory Data<br>(2004) | TO DO                                                                                                                      | TO DO                                                                                                                                                                                 | TO DO                                                                                                               |
| U.S. Life Cycle Inventory<br>Database<br>(2003)          | Microsoft<br>Excel/Open Office<br>to store data in<br>Ecospol format<br>(.xls or .xml) in<br>accordance with<br>ILCD rules | <ul style="list-style-type: none"> <li>MS Excel is part of MS office which most PC users use</li> <li>Format is simple</li> </ul>                                                     | <ul style="list-style-type: none"> <li>Non-comprehensive</li> <li>Slightly older than ecoeditor</li> </ul>          |

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## Availability of LCI databases in softwares



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|                  | ecoinvent                                          | GaBi                                    | USLCI            | ELCD                          | Quantis<br>water<br>DB | WFLDB                                               |
|------------------|----------------------------------------------------|-----------------------------------------|------------------|-------------------------------|------------------------|-----------------------------------------------------|
| SimaPro          | X                                                  |                                         | X                | X                             | X                      | In the future yes, for the moment only for partners |
| GaBi             | X                                                  | X                                       | X                | X                             |                        |                                                     |
| Quantis<br>SUITE | X<br>(v2.2 only)                                   |                                         | X                |                               | X                      | In the future yes, for the moment only for partners |
| Others           | OpenLCA,<br>Umberto,<br>Earthsmart,<br>Excel, etc. | OpenLCA,<br>soon in<br>Umberto,<br>etc. | OpenLCA,<br>etc. | OpenLCA,<br>Soda4LCA,<br>etc. |                        | Excel                                               |

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## Data collection: typical data in 3 phases

FICCI QUALITY FORUM

| Production                                                                                                                                                                                                                                                      | Use                                                                                                                                  | End of life                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Kg Material X</li> <li>Kg Material Y</li> <li>kWh electricity</li> <li>MJ Heat</li> <li>Transports</li> <li>Production volumes</li> <li>Special emissions</li> <li>Production infrastructure</li> <li>etc....</li> </ul> | <ul style="list-style-type: none"> <li>Energy consumption (e.g. kg fuel/km)</li> <li>Maintenance</li> <li>Life expectancy</li> </ul> | <ul style="list-style-type: none"> <li>Disposal procedure</li> <li>Recycling processes</li> <li>Materials recycled</li> <li>Remaining waste disposed</li> <li>...</li> </ul> |

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## Data collection challenges

FICCI QUALITY FORUM

- Can be the most time consuming part of an LCA
- May require extensive (and clear) communication with experts.
- Be critical about the data received – compare with other projects/ literature when possible.
- Use well structured data collection platforms
- Identify and collect data what is needed and not what we want

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## Regionalization


- Some processes are strongly dependent on local factors (electricity mixes, agricultural processes, etc.)
- Often, LCI databases focus on European data
- Regionalized data is necessary for a more thorough understanding of local systems
- When data is not available, adaptation is the only solution, it introduces further uncertainty in the system



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## LCT and related terms

|                             |                                                                                     |                                                                                                                                                                                                            |
|-----------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Life Cycle Thinking (LCT)   |  | Thinking that considers economic, environmental & social impacts of a product or system over its entire life cycle, i.e. cradle-to-grave instead of gate-to-gate<br>Thinking beyond the production site... |
| Life Cycle Management (LCM) |                                                                                     | Management (reduction/balancing) of impacts of a product or system over its complete life cycle                                                                                                            |
| Life Cycle Assessment (LCA) |                                                                                     | Quantification of impacts of a product or system over its complete life cycle using standard accounting methods (IT tools will also be needed)                                                             |
| Life Cycle Inventory (LCI)  |                                                                                     | Input-Output material and energy flows throughout production, consumption, and end-of-life disposal                                                                                                        |
| Life Cycle Impacts          |                                                                                     | Environmental (emissions to soil, air and water) and Social impacts (on workers, consumers, suppliers, local community and society)                                                                        |



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### Annex III: Detail of stakeholder views and ideas

| Discussions during the meetings summarized and presented using a variant of the 5Ws framework |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Why Questions (Answers to these will feed into 'What')                                        | Responses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Do we need Indian LCA database</b>                                                         | <ol style="list-style-type: none"> <li>Mostly Yes. In some cases, the agreement was conditional. The list of conditions is given below: <ul style="list-style-type: none"> <li>If India wants</li> <li>If it contributes to achievement of national development goals/SDGs</li> <li>If it contributes to achievement of INDCs</li> <li>If it can be done through a simple, low-cost solution</li> </ul> </li> <li>Not necessarily, major supply chains and products in global database (such as ecoinvent) can be used</li> <li>No if it requires investing huge amounts of money and very specialized trainings upfront without clear demonstration of benefits</li> </ol>                                                                                 |
| <b>Potential benefits mapped to specific stakeholders/groups</b>                              | <ol style="list-style-type: none"> <li>Foreign buyers and foreign governments – to assess supply chain performance</li> <li>Domestic policy makers – to reduce pollution/adverse effects from actions of: <ul style="list-style-type: none"> <li>Domestic producers – separate ways to deal with large vs small companies</li> <li>Foreign producers – the issue has been flagged but there is no clear direction on how to deal with it</li> </ul> </li> <li>Domestic businesses – to strengthen access to 'green markets'/to demonstrate environmental performance</li> <li>Domestic consumers/consumer organizations – to make informed choices</li> <li>Academia/researchers – to develop and disseminate sustainability knowledge/education</li> </ol> |
| <b>Linkages that could strengthen the business case for Indian LCA database</b>               | <ol style="list-style-type: none"> <li>Linkages with CSR and corporate law can be identified</li> <li>Linkages with Sustainability Standards – Voluntary/Mandatory</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Potential benefits in general</b>                                                          | <ol style="list-style-type: none"> <li>For national promotion of LCA, making it their LCA and not a foreign import</li> <li>India has many unique production processes which justify a national database</li> <li>For building authentic inventory, using Indian data rather than other country data for LCA studies</li> <li>For developing sector specific standards</li> <li>To facilitate LCA studies, research, capacity building and benchmarking</li> <li>To determine and manage actual social and environmental impacts of business/economic activities – e.g. new approach of a "cluster LCA" approach published in JIE (e.g. tannery sector eco-innovation on materials for collective recycling)</li> </ol>                                     |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Concerns and Inhibitors</b> | <ol style="list-style-type: none"> <li>1. Quality of data collection, selection, hosting, prioritizing, vetting, monitoring, maintenance, updation processes</li> <li>2. Data characteristics/attributes- authenticity, reliability, type, usefulness</li> <li>3. Access issues-Indian stakeholders capacity to utilize data, who all can access the data for what purpose, cost of accessing data</li> <li>4. It appears that databases are useful in theory, but in practice LCA datasets cannot be of much use unless the way in which they are derived, and their limitations are understood by users, and this is not easy.</li> <li>5. Inhibitors to readiness for developing datasets: <ul style="list-style-type: none"> <li>• Lack of legislative backing</li> <li>• Lack of engagement of stakeholders on a mass level</li> <li>• Technicality of database development</li> <li>• Data confidentiality issues</li> <li>• Capability of the organization for taking up database development work</li> </ul> </li> <li>6. Commercial interests of consultants and database providers being served without real improvement in quality of decision-making</li> </ol> |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <b>Who Questions (Answers to these will feed into 'When')</b> | <b>Responses</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Where will the database reside, who will maintain</b>      | <ol style="list-style-type: none"> <li>1. At present no agency/ body which is a repository of data collection in India is there</li> <li>2. Indian association (like India LCA Alliance (ILCAA)/FICCI should take up the activity of database hosting/ collection</li> <li>3. ecoinvent has initiated a project for collection of Indian data, this could be an option. There is a perception that the ultimate goal of this project is to develop market for ecoinvent database in India.</li> <li>4. A national non-profit (e.g. LCA Society in Australia) initially provided links to downloadable files, now the data is displayed and also accessed from some LCA software</li> <li>5. Jointly by MoSPI (the nodal agency for Indian statistical data including coverage and quality aspects), MoEF&amp;CC &amp; NITI Aayog (dealing with data related to GHG emissions for international climate negotiations and SDGs respectively)</li> </ol>                         |
| <b>Potential Stakeholders &amp; their Roles</b>               | <ol style="list-style-type: none"> <li>1. Involvement of R &amp; D institutes who will generate data such as TERI, Development Alternatives, NEERI, CSIR etc.; FICCI and CII can work as facilitators along with UNEP</li> <li>2. Have a diverse network of collaborator- Institutes, and users who may also provide datasets: this allows for a smaller risk of crash</li> <li>3. Total collaboration with a neutral body taking lead, Roles: TERI-technical; collection of data, FICCI/CII-engaging with Industries</li> <li>4. Need to include broad group of sectors and not let one industry hijack the method for particular purpose</li> <li>5. Agriculture Institute, building industry and property owners through Green Building Council (Australia example)</li> <li>6. Independent consultants and companies are also potential stakeholders and can play a role in providing data and other support functions such as independent third party reviews</li> </ol> |



| Who Questions (Answers to these will feed into 'When') | Responses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>How do you see yourself contributing</b>            | <ol style="list-style-type: none"> <li>1. TERI University ready to take up Indian database work and can be a part of a pilot project</li> <li>2. BIS to take lead and place issue before its relevant committee, it is currently seeking industry inputs in relation to PCRs</li> <li>3. FICCI to continue providing ILCM platform as focal point for discussions, pilot projects, and capacity building programs</li> <li>4. thinkstep and Simapro India ready to provide technical support for capacity building as and when necessary</li> <li>5. thinkstep is providing free access to some/limited sections of their to be launched Indian datasets</li> <li>6. ecoinvent has already started a project on capacity building of Indian stakeholders on data collection and management</li> <li>7. Consultants who have participated and contributed in earlier LCA studies can be engaged as experts</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Government role</b>                                 | <ol style="list-style-type: none"> <li>1. Government should come up with some policies/ guidelines to incentivize/encourage industries</li> <li>2. Government initiation on commissioning of LCA studies to be used for decision making and for consumer awareness</li> <li>3. For designing and testing policies. An LCA can comprehensively evaluate the environmental impacts of technologies/subsidies/practices encouraged by certain policies</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Capacity development</b>                            | <ol style="list-style-type: none"> <li>1. TERI University is already developing course curriculum in SCP including LCA/M, which can act as hub for capacity building through training programmes</li> <li>2. ecoinvent has already started a project for capacity building on database development</li> <li>3. Various online options are also available, few examples are as follows: <ul style="list-style-type: none"> <li>• <a href="http://www.treehugger.com/clean-technology/free-lca-online-course-offered-by-harvard-school-of-public-health.html">http://www.treehugger.com/clean-technology/free-lca-online-course-offered-by-harvard-school-of-public-health.html</a></li> <li>• <a href="https://www.coursera.org/course/introtolca">https://www.coursera.org/course/introtolca</a></li> <li>• <a href="http://www.elo.iastate.edu/professional-development/life-cycle-assessment-fundamentals/">http://www.elo.iastate.edu/professional-development/life-cycle-assessment-fundamentals/</a></li> <li>• <a href="http://www.circularecology.com/life-cycle-assessment-training.html#.VkiSTtIrJdg">http://www.circularecology.com/life-cycle-assessment-training.html#.VkiSTtIrJdg</a></li> <li>• UNEP SETAC LCI at <a href="http://www.lifecycleinitiative.org/">http://www.lifecycleinitiative.org/</a></li> </ul> </li> </ol> |

| How Questions                                                                                         | Responses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Database protocol/<br/>Coordination with international efforts/<br/>Link to existing protocols</b> | <ol style="list-style-type: none"> <li>1. International format can be used</li> <li>2. International approaches, but with discussion and education of industry as to why the approaches are this way</li> <li>3. Flexibility and interoperability important aspects to be considered</li> <li>4. Key issues for a national database include: consistent + flexible datasets (not following one single reporting scheme such as ILCD or ecoinvent)+data confidentiality issues</li> <li>5. Embed maintenance and updation in the design of the database</li> <li>6. It is important to learn about what other countries that have just started their own National data collecting operations are doing. Few countries have already set up their national databases and some are on the way. <ul style="list-style-type: none"> <li>• For example USA has its own U.S. Life Cycle Inventory Database at <a href="http://www.nrel.gov/lci/">http://www.nrel.gov/lci/</a></li> <li>• thinkstep has adapted this database for GaBi users and added 300 of its own GaBi U.S. process data.</li> <li>• The Athena Institute in Canada at <a href="http://www.athenasmi.org/our-software-data/lca-databases/">http://www.athenasmi.org/our-software-data/lca-databases/</a></li> <li>• Australia also has its own database at <a href="http://alcas.asn.au/AusLCI/">http://alcas.asn.au/AusLCI/</a></li> <li>• Switzerland started its national database as ecoinvent which now has 10,300 datasets from around the world</li> <li>• Commercial databases such as GaBi developed by thinkstep, ProBas at <a href="http://www.probas.umweltbundesamt.de/php/index.php">http://www.probas.umweltbundesamt.de/php/index.php</a></li> </ul> </li> </ol> |
| <b>Data Collection</b>                                                                                | <ol style="list-style-type: none"> <li>1. Policy studies can drive developing data – part of larger policy project can answer questions and also develop data at the same time</li> <li>2. A decision needs to be taken <ul style="list-style-type: none"> <li>• If it is necessary to build a unique database software (from scratch) specifically for India specific LCI data</li> <li>• If it is possible to use a pre-existing database software that is already available?</li> </ul> </li> <li>3. Data collection can be approached in 2 ways. One being primary data collection and the other being collating of the data already available. The second type can be conducted through web search tools and can be a very promising beginning to kick start the database development work.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Data quality control</b>                                                                           | <ol style="list-style-type: none"> <li>1. Individual company might be biased or might have a perspective while collecting data</li> <li>2. Deal with this through two reviews – one technical by expert in sector, other procedural – does it conform to database specifications</li> <li>3. Look at options of (i) getting averages from a sample of companies that use the same industrial process and (ii) compare collected data to similar datasets from other countries</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Challenges</b>                                                                                     | <p>Biggest challenge is maintenance and updation of database</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Priorities in terms of products, materials and processes to be studied</b> | <ol style="list-style-type: none"> <li>1. ecoinvent-Already identified-Electricity, Transportation, Building and construction, Coal mining</li> <li>2. thinkstep-Will be launching Indian LCA DB (~300 datasets) focusing on building; transport; chemicals in Nov 2015</li> <li>3. For major agricultural commodities</li> <li>4. Identify low-hanging fruit: where datasets can be more quickly created so we achieve critical mass</li> <li>5. Ecoinvent already has around 100 dataset for India on <a href="http://www.ecoinvent.org/support/documents-and-files/documents-and-files.html">http://www.ecoinvent.org/support/documents-and-files/documents-and-files.html</a>. However, all these files have data that is extrapolated from the global datasets and not based on primary data. These data sets could be a good starting point.</li> </ol>                                                                                                                                                                        |
| <b>Capacity Development messages</b>                                          | <ol style="list-style-type: none"> <li>1. Mid to long term capacity development with the data that is already available</li> <li>2. Coaching and training CEOs on sustainability, provide insights that can be conveyed to CEOs on principles of LCM</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Costs</b>                                                                  | <ol style="list-style-type: none"> <li>1. Budget should not only include the aspect of data collection and maintenance but also for people working for database, links to creating a business model for the database (need to pay salaries for the people updating and documenting datasets)</li> <li>2. Start putting things together without massive investment</li> <li>3. Example of establishing India GHG portal where Shakti Foundation provided the initial funding to establish and now following self-sustaining model through membership fees</li> <li>4. Government to provide financial assistance</li> <li>5. For funding it may be advisable to also look for some domestic funding to avoid apprehensions on misuse of the data against national interests. For this, a quick study on how other developing countries have funded and developed local datasets will be useful.</li> <li>6. We should look for a low-cost solution that meets our needs and not blindly ape what other countries are doing</li> </ol> |