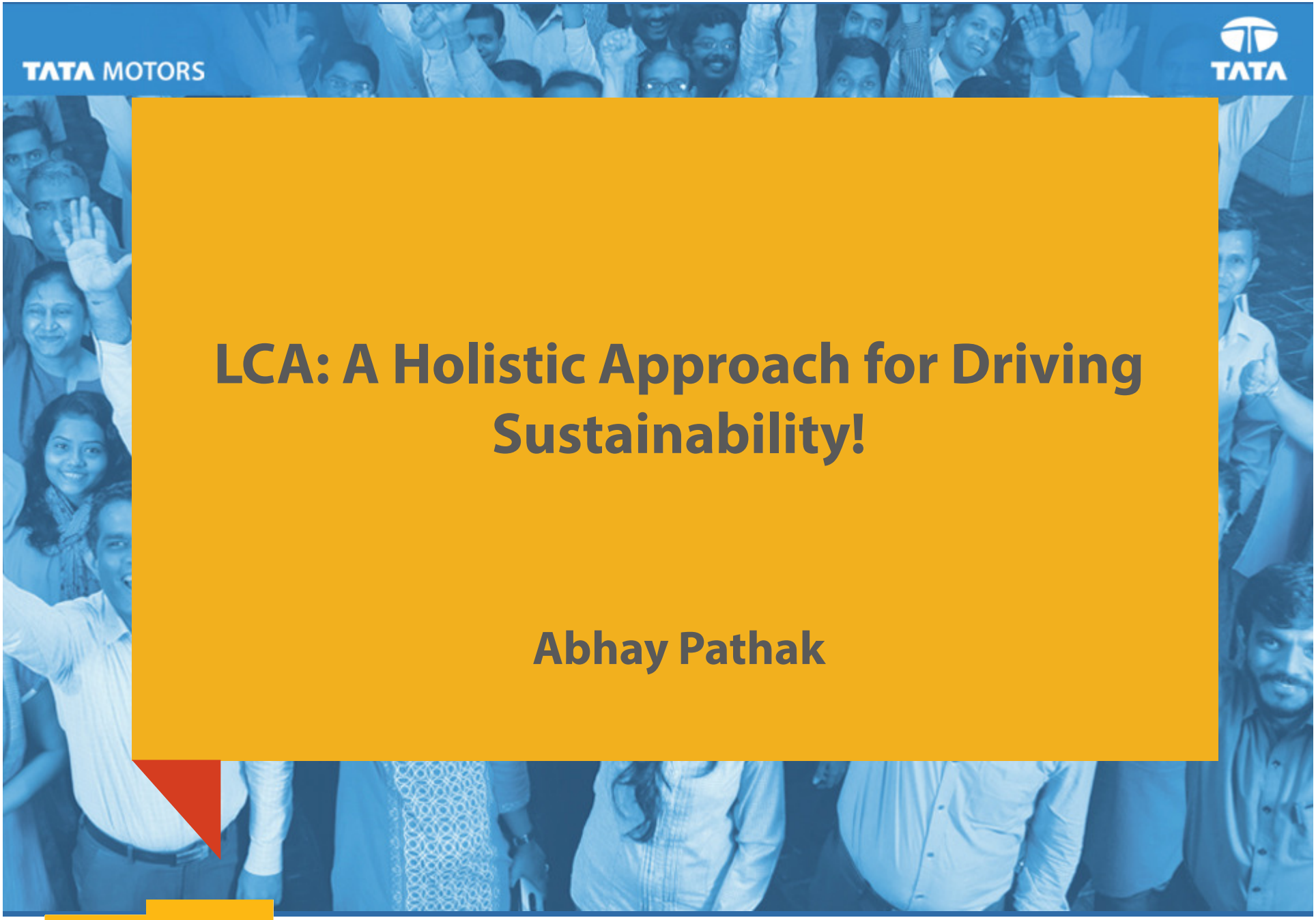
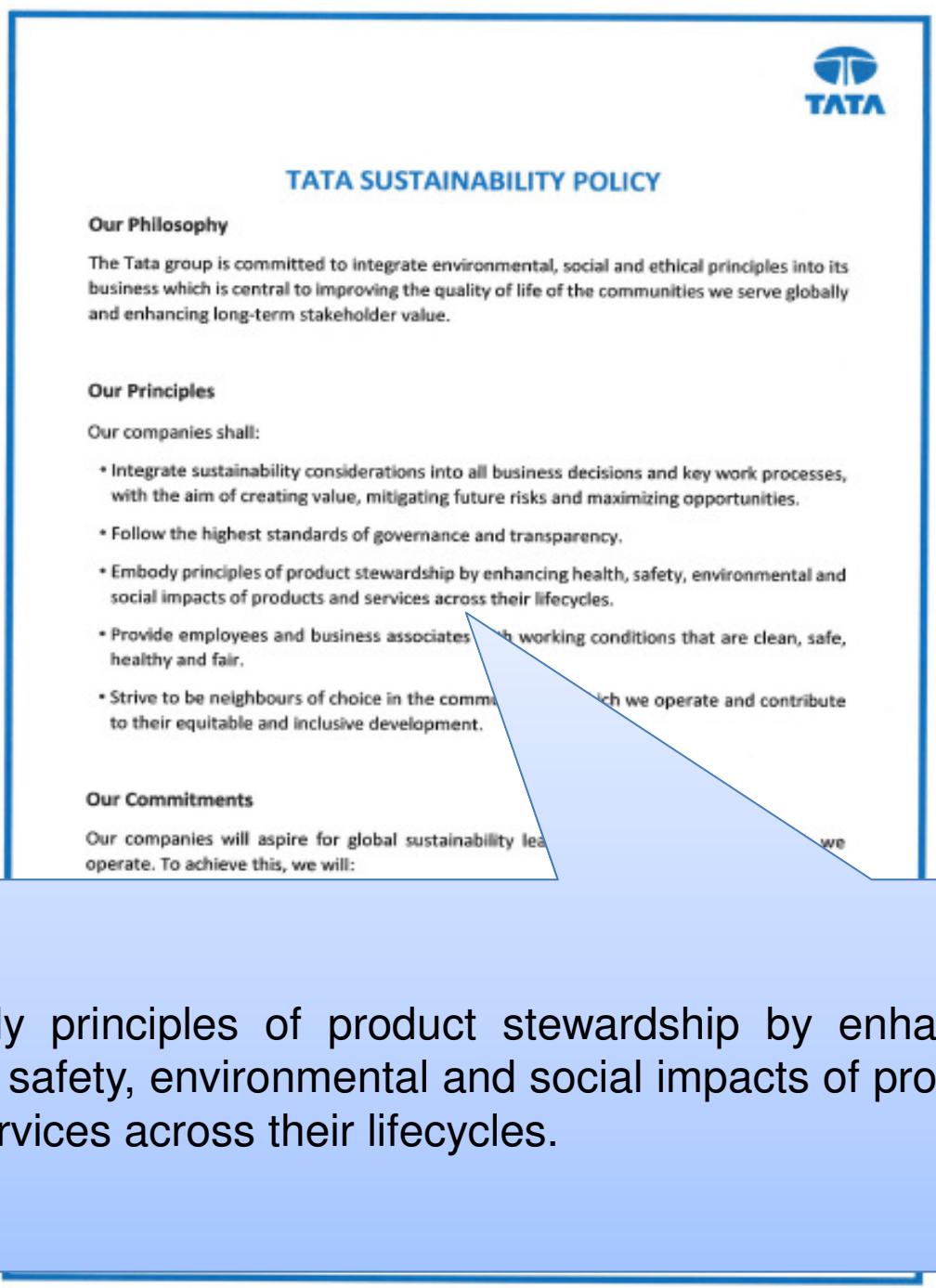


LCA: A Holistic Approach for Driving Sustainability!

Abhay Pathak

FUTUREADY



TATA

TATA SUSTAINABILITY POLICY

Our Philosophy

The Tata group is committed to integrate environmental, social and ethical principles into its business which is central to improving the quality of life of the communities we serve globally and enhancing long-term stakeholder value.

Our Principles

Our companies shall:

- Integrate sustainability considerations into all business decisions and key work processes, with the aim of creating value, mitigating future risks and maximizing opportunities.
- Follow the highest standards of governance and transparency.
- Embody principles of product stewardship by enhancing health, safety, environmental and social impacts of products and services across their lifecycles.
- Provide employees and business associates [illegible] working conditions that are clean, safe, healthy and fair.
- Strive to be neighbours of choice in the comm[illegible]ich we operate and contribute to their equitable and inclusive development.

Our Commitments

Our companies will aspire for global sustainability lea[illegible] we operate. To achieve this, we will:

Embody principles of product stewardship by enhancing health, safety, environmental and social impacts of products and services across their lifecycles.

What is Life Cycle Assessment (LCA)?

- Life-cycle assessment (LCA) is a process of evaluating the effects that a product has on the environment over the entire period of its life i.e. from **sourcing, manufacturing, distribution, use and end-of-life** stage of the product, thereby increasing resource-use efficiency and decreasing damage to environment.

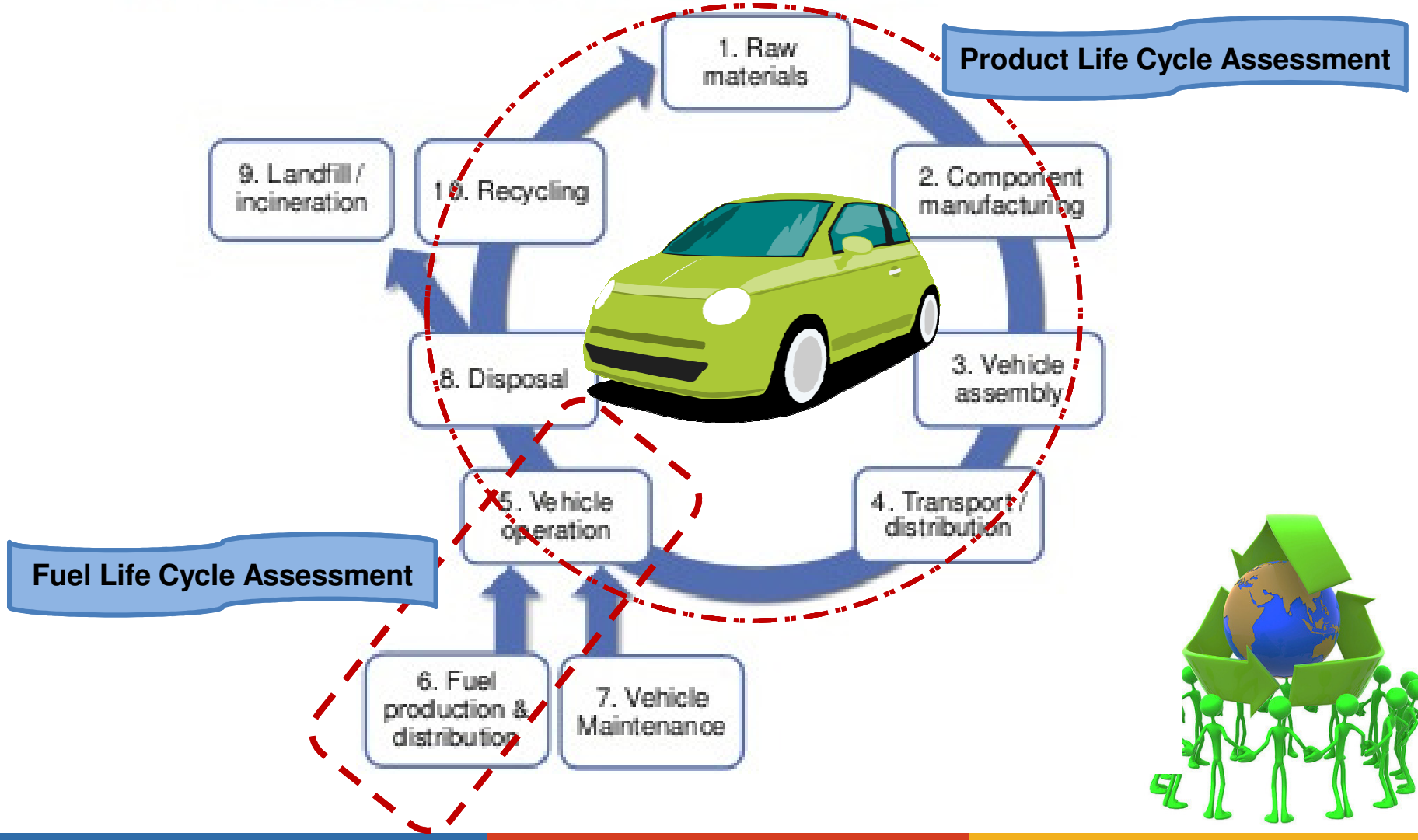
- To develop sustainable products, it is necessary to examine impacts of product through the life cycle assessment and **devise solutions that will effectively respond to it.**

- **Holistic approach towards sustainability!**

Why Life Cycle Assessment (LCA)?

- LCAs enable us to understand resources/energy intensive materials, **hot spots,** pollution load and carbon footprint of the product over the life cycle.
- **Judicious application** can help in identification of **strategic opportunities** to improve environmental performance of the product.
- It also helps in identifying **OFIs in value chain.**
- It can be used as **a marketing tool** to **compare environmental footprint** of similar products
- Improves brand image of organizations – **"environmentally conscious!"**

Life Cycle Assessment at Tata Motors



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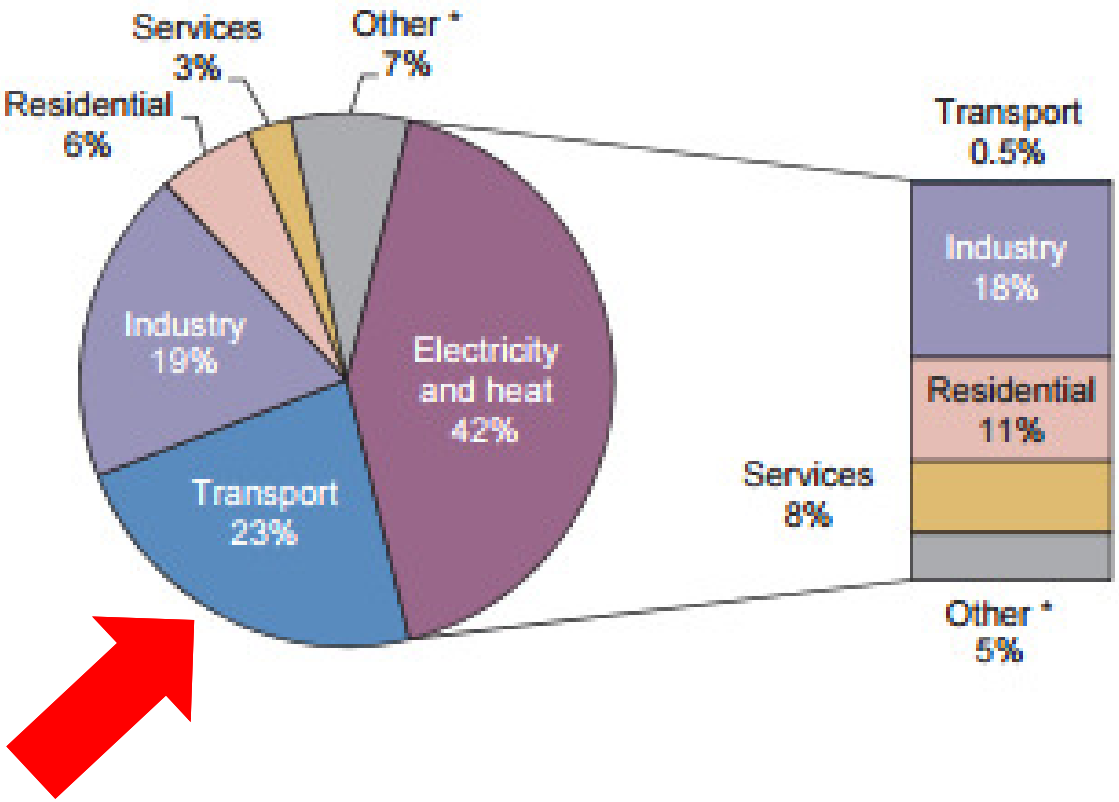
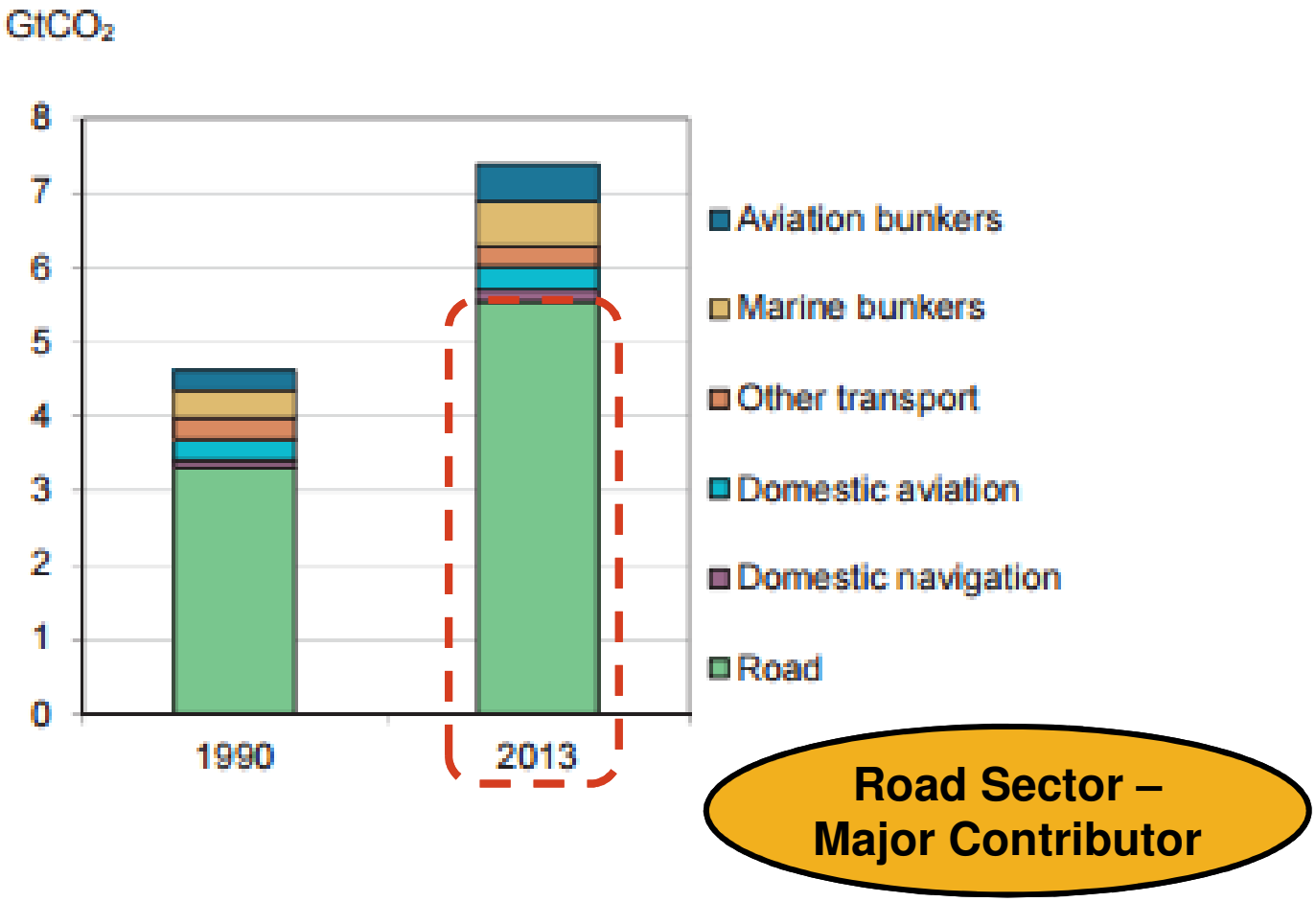
World GHG Emissions by Sector in 2013



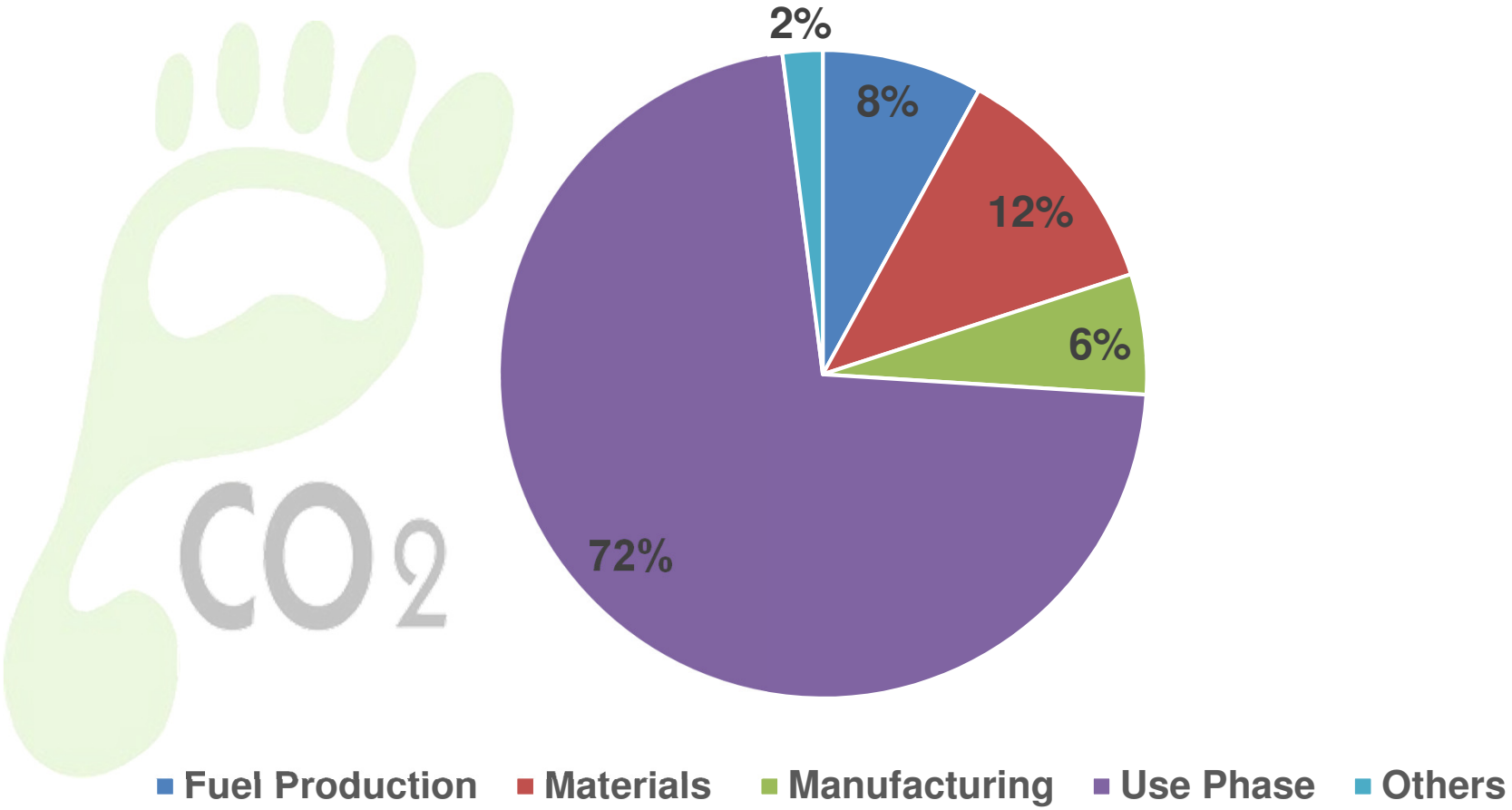
Source: IEA Report

World GHG Emissions by Transport Sector in 2013



Source: IEA Report

Typical Life Cycle CO2 Emissions from an Automobile.



Source:- http://www.einow.org/newsblog/2009/09/04/cash-for-clunkers-was-it-environmentally-successful/

Fuel Life Cycle Assessment

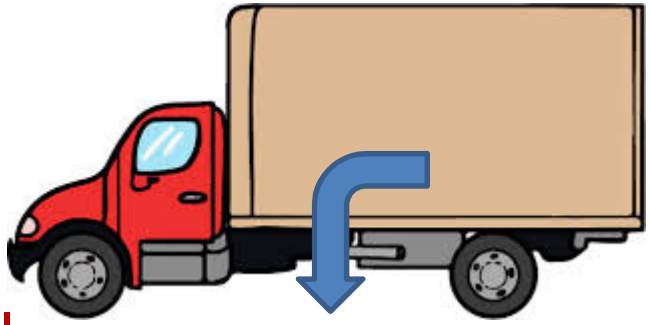
- Fuel Life Cycle Analysis through **Well-to-Wheel** Greenhouse Gas (GHG) Emissions and Energy Efficiency Evaluation of Various Fuel/Energy Pathways in the Indian Context;

  - **Well To Tank (WTT)** analysis of different fuel paths

  - **Tank to Wheel (TTW)** analysis of an automobile

  - **1st time such study has been conducted in Indian context.**

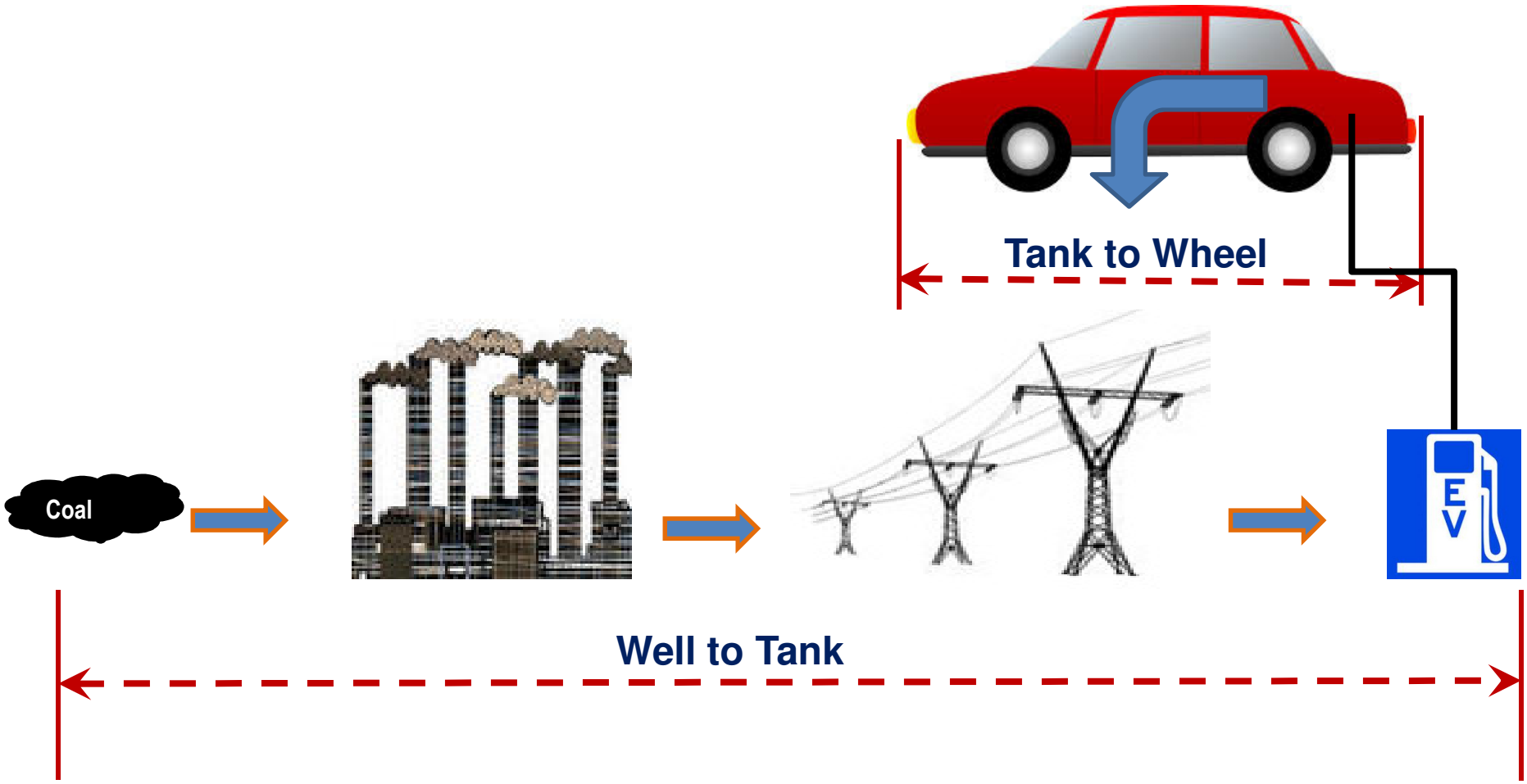
Fuel Life Cycle Analysis



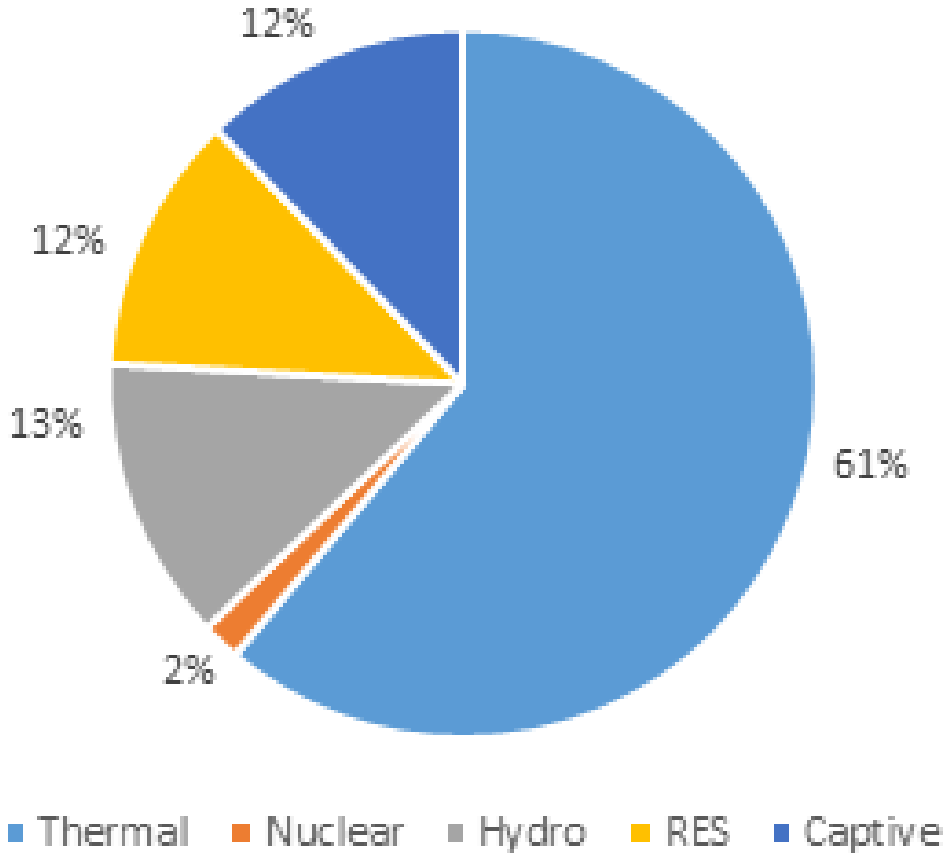
Tank to Wheel

Well to Tank

Fuel (Electric) Life Cycle Assessment

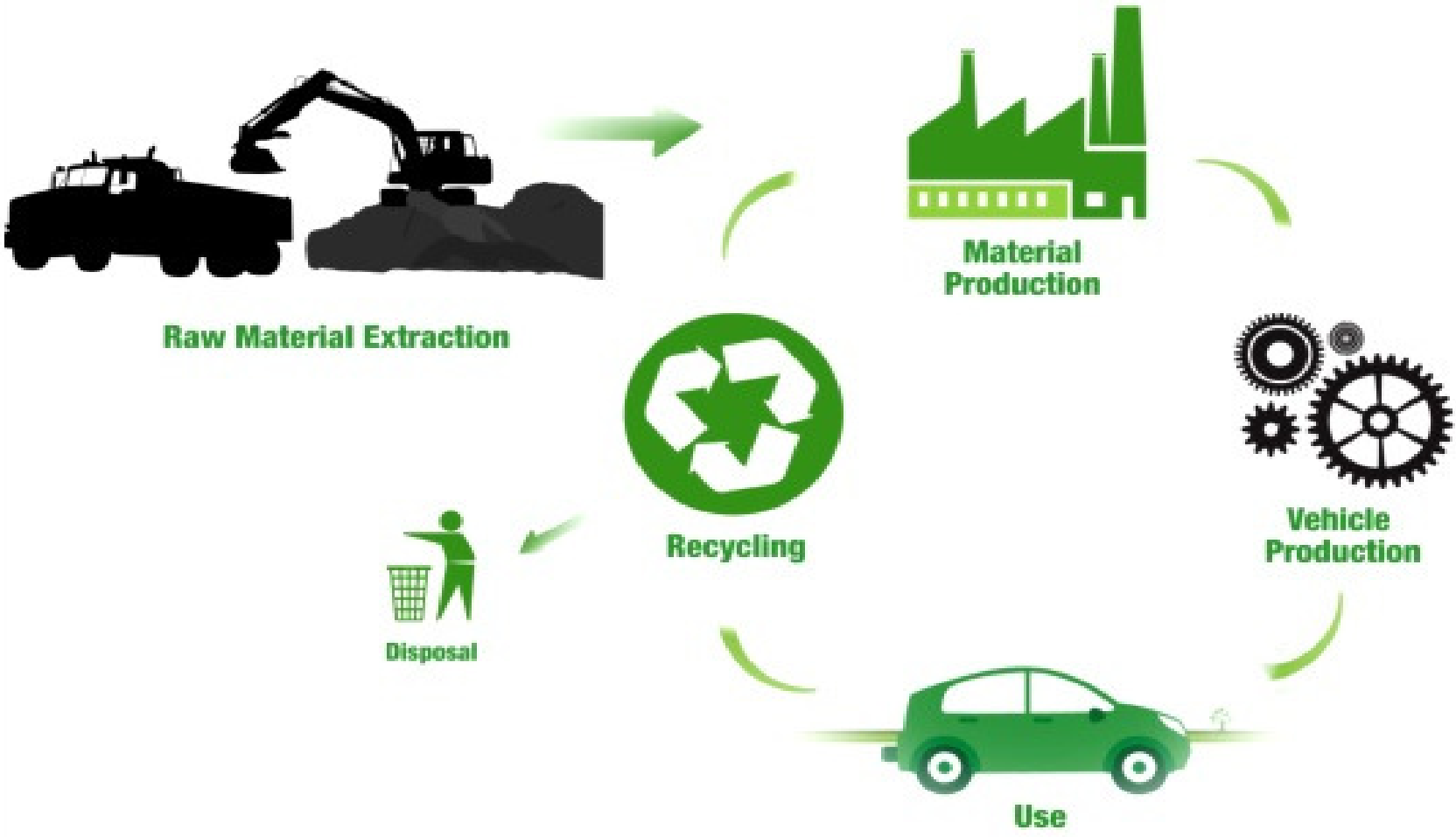


India Electricity Generation Mix



Source: Central Electric Authority Report

Product Life Cycle Assessment (LCA)



Product Life Cycle Assessment (LCA) Approach

- Conducted LCA of auto components initially during 2010-12.
- Conducted LCA of a car during FY 2013-14
- Regularly conducting LCAs of PV and CV products since then.
- ***1st Indian Automobile Company completing LCA of a car, benchmarking with global auto leaders like BMW, Mercedes Benz.***

Benefits of Life Cycle Assessment (LCA)

- Fuel LCA studies provided inputs for product development strategies in terms of **sustainable energy sources** for automobiles in Indian context.
- Increased awareness in manufacturing plants and supply chain about environmental impacts and **life cycle thinking**.
- **Supported design changes** in products wrt to environmental improvements.
- Evaluated **carbon footprint** of products and compared with competitor's products.
- Identified **OFIs in supply chain** wrt to environment, energy, health & safety.
- **Green image** – Best Practices Award by CII-GBC for conducting LCAs

Promoting Life Cycle Assessment (LCA)

The Real Green Cars

Until recently, tailpipe emission was the only measure of a car's impact on the environment. Now, Tata Motors has stepped out of the box with its life-cycle assessment philosophy to sustainability, writes **Naren Karunakaran**

A validation by the board or a buy-in from senior management is what every sustainability professional dreams of as he or she helps craft a sustainability framework for the company.

It was, therefore, with some trepidation that Abhay Pathak set about making a presentation to a Tata Motors' board committee with celebrated scientist Raghunath Mashelkar as chair.

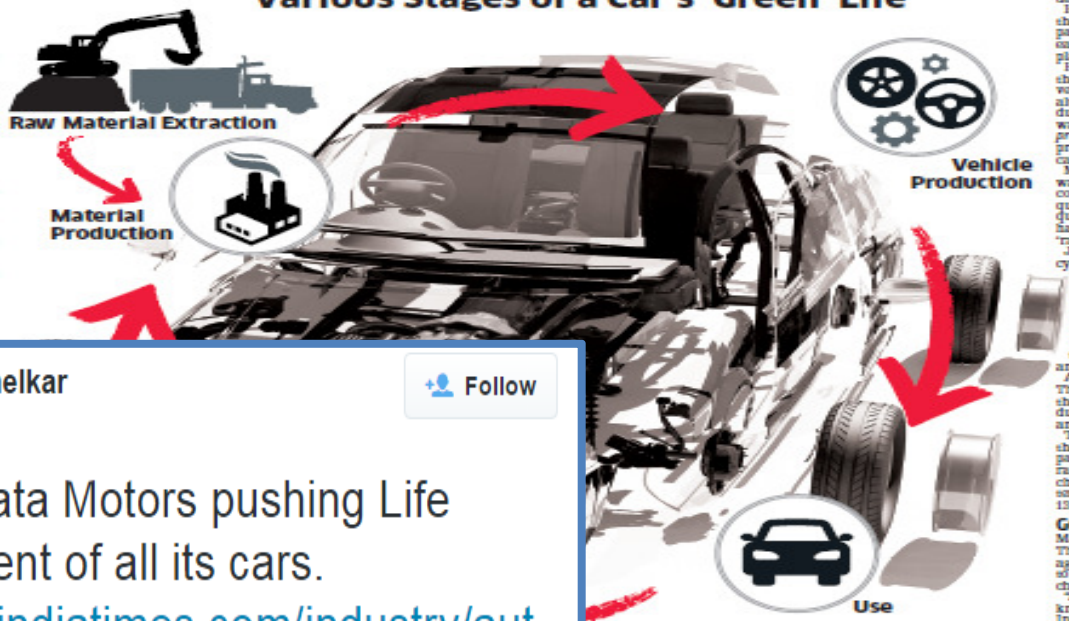
Pathak, the Sustainability Lead at the company's Engineering Research Centre (ERC) in Pune, proposed the bespoke on the life-cycle assessment (LCA) of the Nano car, the first ever 'cradle-to-grave' analysis of an entire vehicle by Tata Motors, nay the Indian automobile industry.

Usually, the environmental impact of a vehicle is measured by its tailpipe emissions. Now, with cradle-to-grave approaches from raw material mining to the end-of-life stage, a true, big-picture impact measurement is possible. An LCA fit this picture' can be huge and time-consuming: a typical car is cobbled together with over 5,000 parts of roughly 50 different materials — steel, plastic, rubber, alloys, glass, even precious metals — sourced from over 200 suppliers.

Mashelkar was impressed with the work done but he wanted to dive deeper. "He wanted to know how the Nano, over its life-cycle, compared with a three-wheeler auto rickshaw," recalls Pathak.

Enthused by the proactive engagement by the board, the crack team of three (high-

Various Stages of a Car's 'Green' Life



she refrain. This onslaught of technical language wasn't taken kindly.

Pathak then charged sick and limited himself to carbon footprints. "Carbon emissions are better understood, and appreciated," says Venkateswaran.

Even as Pathak's team got thro the training regimen, they realised cracking LCA was a huge chal-

and was in use. The LCA was done to support decisions already made.

It emerged that emissions in the 'manufacture' the plastic rail, for instance, was quite high compared with emissions in the manufacture of earlier aluminium alloy rail. Was the move to add plastic a flawed one then?

However, it was also revealed that emission during the mining and processing of aluminium was very high. Here, it was the 'raw material sage' aluminium that played spoiler although emissions during 'manufacture' of the aluminium compone was relatively low (see *Comparison of Carbon Footprint*). On overall comparison, the plastic fuel-r proved to be a better bet with a 30% reduction carbon emissions.

Meanwhile, Pathak had realised data handli was overwhelming his team. He reached out to h counterparts at JLR in the UK. Many of his da queries were cleared and JLR also suggested he u Quite Café, a thinkeasy LCA software tool. JLR al handed him a bouquet of formulae for conducti 'rapid' LCAs.

JLR is working towards a target of lowering li cycle environmental impacts by 30% from a 20 baseline. Simulation of life-cycle impacts for i its 2017 models are on. The new model of Rang Rovers are already 400 kgs lighter and sport smaller fuel-efficient engine which delivers t same performance as the ousgoing model. Its li cycle global warming potential is down by 13.8

Armed with the wherewithal, Pathak thoug they could take on the big challenge of analysi an entire Tata vehicle.

After much deliberation, the Nano was selec The reasons were many; but the two that clinch the decision was that the Nano had a dedicated p duction line unlike the other lines. Data collecti and analysis becomes easier.

The second reason was the fact that almost 70% the car's vendors are located in the Sanand vicin park close to the Nano plant. The LCA team simp rarely moved to Gujarat for the study as the supp chain and cracking components' rights to its raw m serial usage is central to the effort. This was in 20 13. Here again the team hit a wall.

Getting Vendors on Board

Many vendors, expectedly, were clueless about LCA The 'training and convincing had to start all ov again. And when said the company would also li sd speak with their suppliers and go deeper into t chain, many vendors evinced diffidence and suspicion

"Are they going to blacklist us, many wished know," recalls Pramod Bodke, MD of Rakesh Zamb Industries, a Tata Motors vendor of 20 years. He h so answer probing questions from his suppliers a explain why the exercise was being conducted. Ma told him that they were open to any number of qu ity audits, why study their production processes?

During the process, Pathak had to draw out cu sensed data sheets for their key vendors; such w the level of hand-holding. The learnings were hu and numerous hotspots were identified and event

Raghunath Mashelkar
@rameshmashelkar

Follow

Happy to see Tata Motors pushing Life Cycle Assessment of all its cars. economictimes.indiatimes.com/industry/auto/…

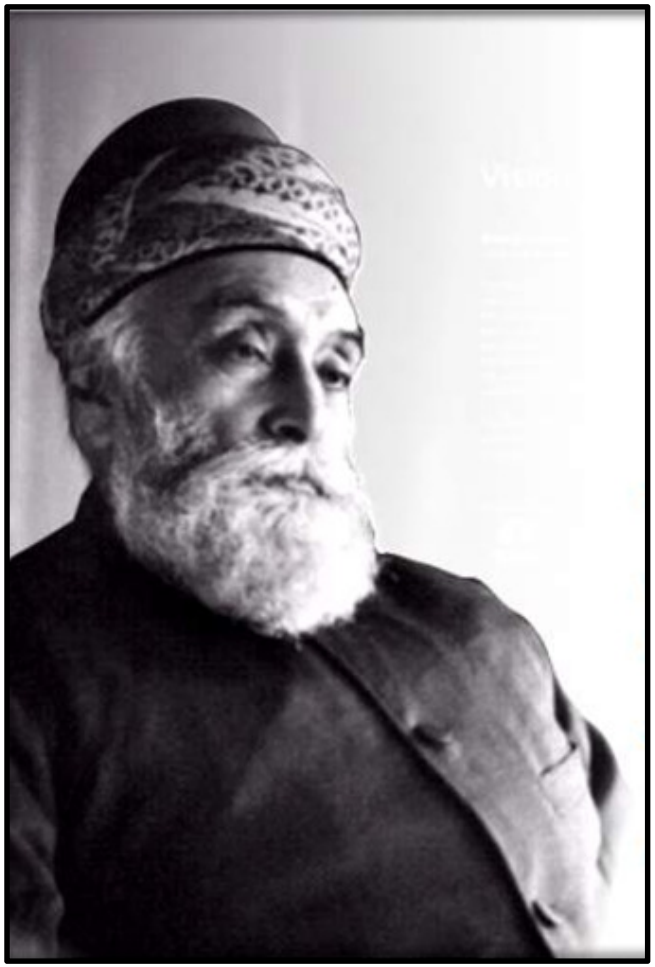
Life Cycle thinking is promoted among stakeholders through various means like showcasing Life Cycle Assessment (LCA) updates in Sustainability Reports, news articles, conferences/workshops.

Challenges in Performing LCA of an Automobile

- To decide goal and scope of LCA
- To collect data from plants, suppliers, logistics, etc.
- To decide assumptions to minimize complexities
- To evaluate, correlate and present environmental impacts

Way Forward…

- Institutionalize LCA process in product design for **sustainable product development!**
- **Environmental Product Declaration** on the basis of LCA studies.
- Identify hot spots and plan improvements in **products, processes and services.**
- Create awareness amongst value chain about **"life cycle thinking"**
- Identify opportunities for improvements in supply chain with respect to social impacts – **Social LCAs!**
- Compare and publish environmental footprint analysis for increasing awareness amongst consumers – **Marketing tool**!



Thank You!!

Jamsetji Tata, Founder
(1839-1904)

"In a free enterprise, the community is not just another stakeholder in the business but in fact the very purpose of its existence."