



**PE INTERNATIONAL**  
SUSTAINABILITY PERFORMANCE

# Life Cycle Assessment in India

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A subsidiary of PE International AG, Germany

# Agenda



- Life Cycle Assessment
  - Need and Drivers in India
  - Applications and Case Studies



# Green Claims – the issues



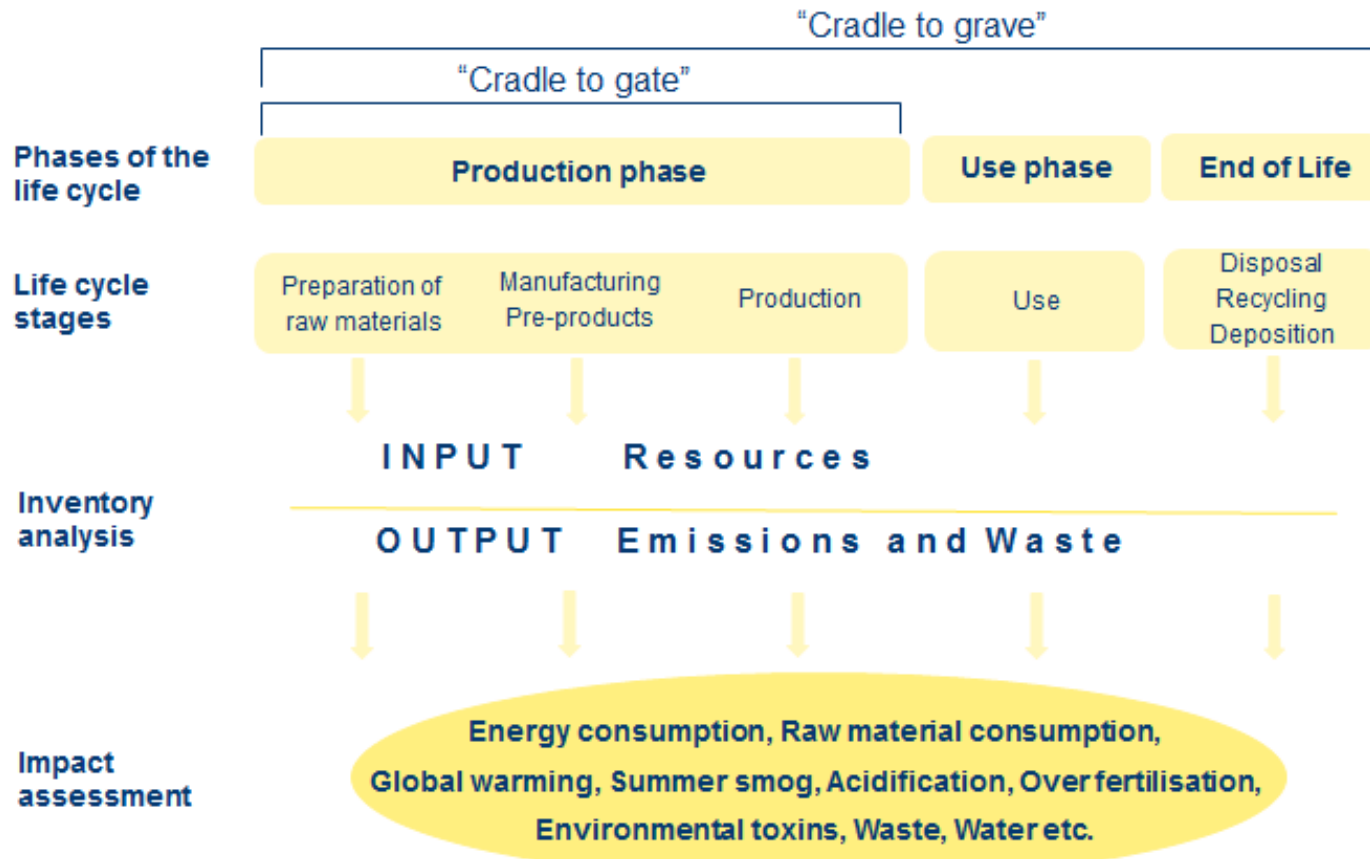
- What is green?
- How do I prove that my product or company is green?
- Do I have to prove I'm green in different ways to different clients?
- Will consumers and business partners understand my claim?



- Confusion
- Mistrust
- Free-riders win
- Costs

▶ **“A holistic approach based on robust methodology to convert science into insights by quantitative assessment of environmental impacts of products, throughout their life-cycle”**

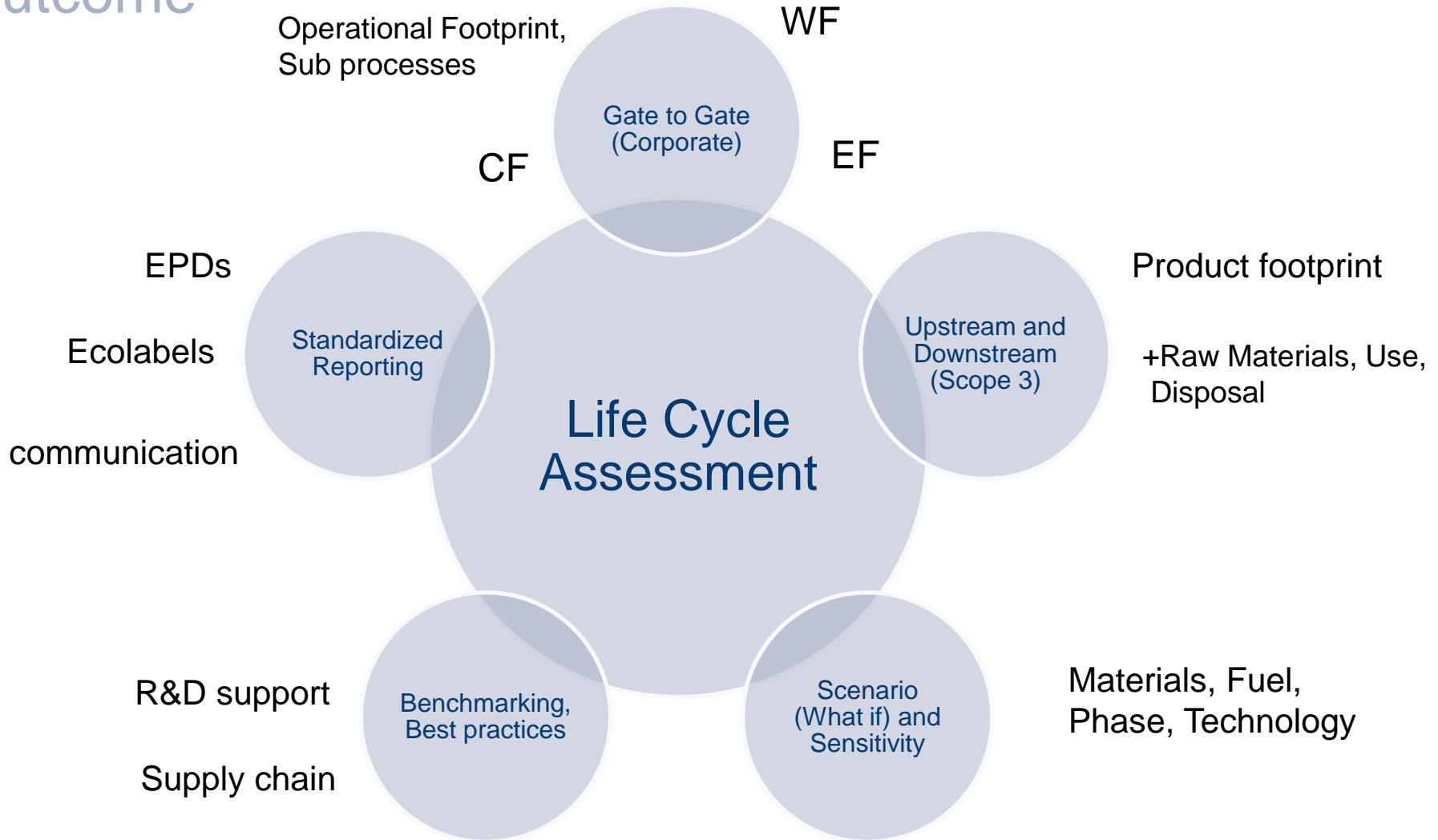
# Life Cycle Assessment



„LCAs provide the best framework for assessing the potential environmental impacts of products currently available.“

EU-Commission - Integrated Product Policy - COM/2003/0302 final

# Life Cycle Assessment Outcome



# LCA Studies in India

## Milestones

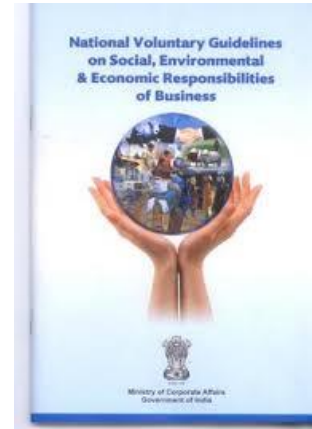
- LCA in Steel Sector sponsored by MoEF and supported by IISI (1999-2002)
- LCA in cement Sector by NCCBM and MoEF (2005)
- LCA for Jute Bags by Jute Manufacturers Development Council, Ministry of Textiles (2005)
- Jatropha LCA study in collaboration with NREL, USA, 2008
- First ISO 14040/44 compliant comparative LCA study for container glass versus PET, beverage carton, Al can and pouch for AIGMF (2012)
- LCA studies in Steel, Automobile, Plastic, Fertilizer, Heavy Engineering, FMCG, Packaging, Paper, Agriculture , Construction, Chemical, textile sector etc – around 45 studies conducted by PE



# Life Cycle Assessment Drivers

## National Voluntary Guidelines-Principle 2

- Provide goods and services that contribute to sustainability throughout their life cycle
- Assure optimal resource use over the life-cycle of the product – from design to disposal
- Ensure that everyone is connected - designers, producers, value chain members, customers and recyclers, and promote sustainable consumption.



## Business Responsibility Reporting – SEBI

- Report on 3 products or services whose design has incorporated social or environmental concerns, risks and/or opportunities
- Provide details on reduction during in sourcing /production/ distribution and usage by consumers in respect of resource use (energy, water, raw material etc.) per unit of product



# GRI – G4, Water Footprint, Awards, Certification and LEED v4

- Materiality Assessment: Significant Impacts in supply chain using established tools such as LCA
- Impacts include energy in supply chain (EN 4), product stewardship (EN 7), Scope 3 GHG emissions in 15 categories (EN 17) and reduction (EN 19), logistics & transportation phase (EN 30)
- The International Standard on water footprint applying life cycle approach (ISO 14046)
- CII-GBC Green Co Scheme and other awards emphasize LCA and Sustainable Product Portfolio
- LEEDv4: New Credit for conducting building LCA and development of Environment Product Declaration for building products





# Agenda



- Life Cycle Assessment
  - Need and Drivers in India
  - Applications and Case Studies



# LCA Practitioners in India

Mahindra  
SANYO

Mahindra  
LIFESPACES



Godrej interio

Godrej | GODREJ & BOYCE

Godrej | LOCKS



L&T Special Steels and Heavy Forgings



BUNGE

TATA  
TATA CHEMICALS LIMITED



Honeywell®



POLYGENTA  
The Way

JSW

ESSAR  
STEEL

JINDAL  
STEEL & POWER

سابک  
sabic



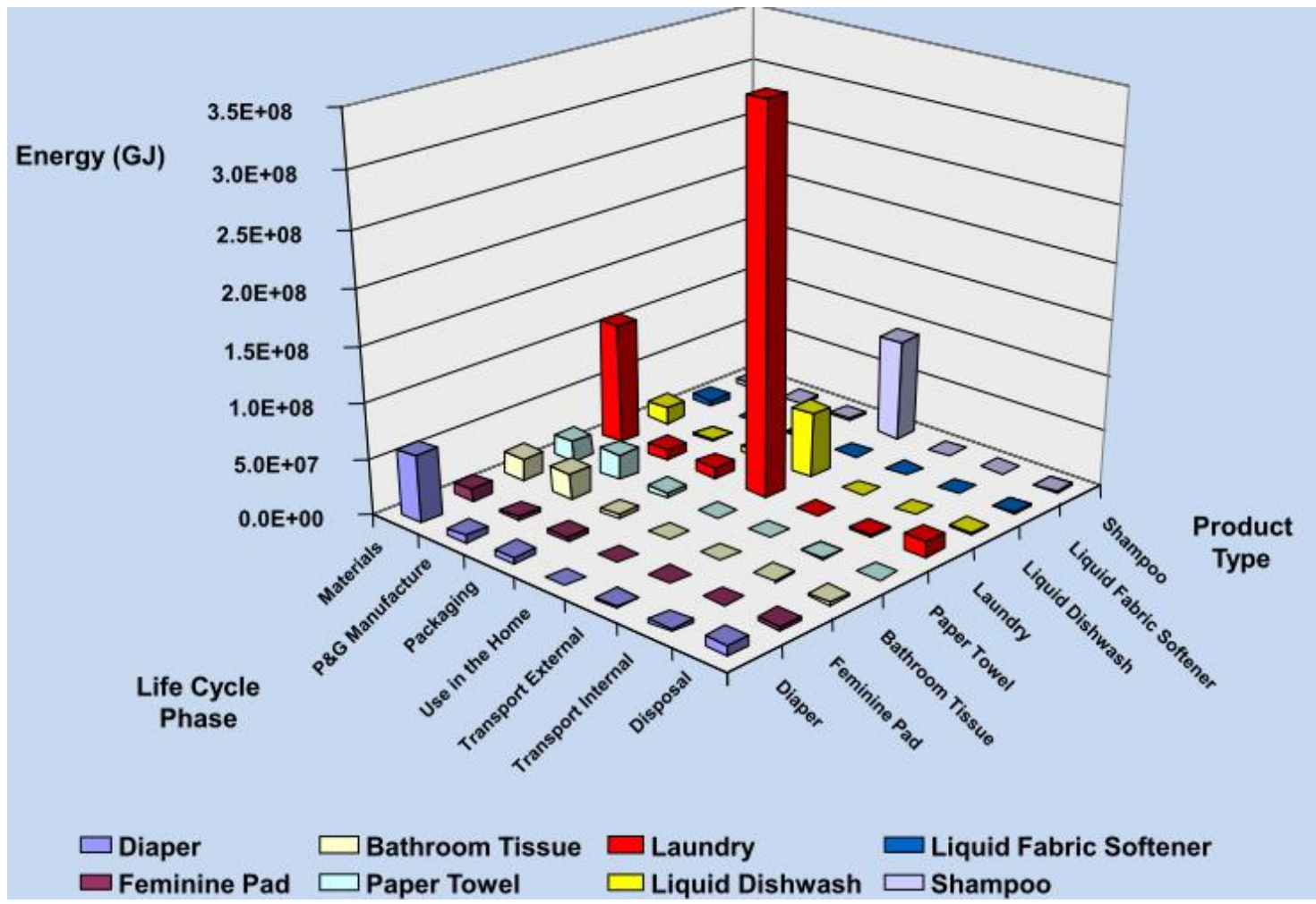
Godrej | APPLIANCES



# Design for Environment



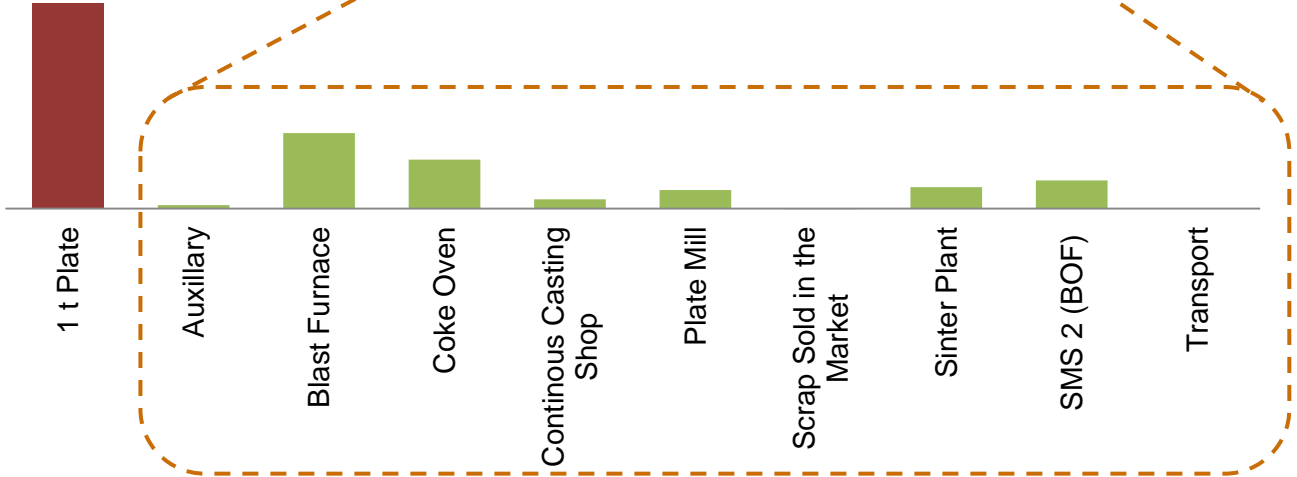
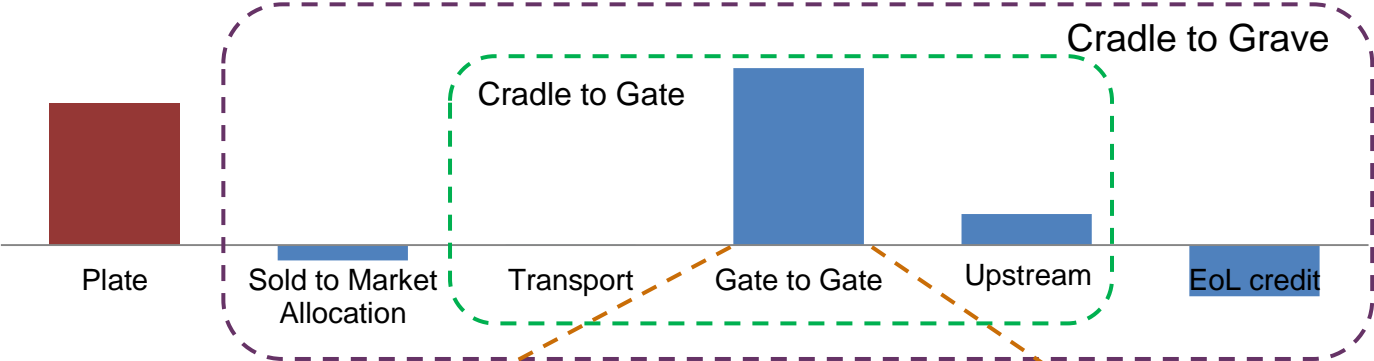
## Product Portfolio Indicator and Lifecycle Phase



# LCA of Steel Product

## Process Evaluation

Global Warming Potential per Tonne of Plate with EoL Recycling (Kg CO<sub>2</sub>e)

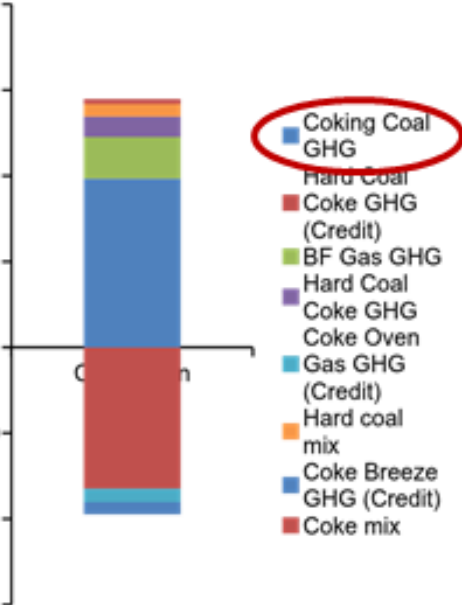


Global Warming Potential per Tonne of Plate (Kg CO<sub>2</sub>e)

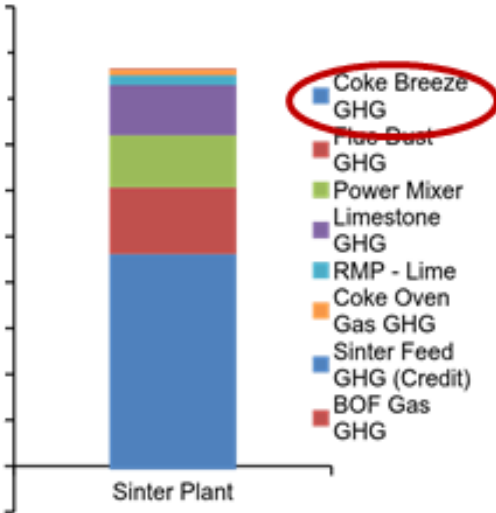


# LCA of Steel Product

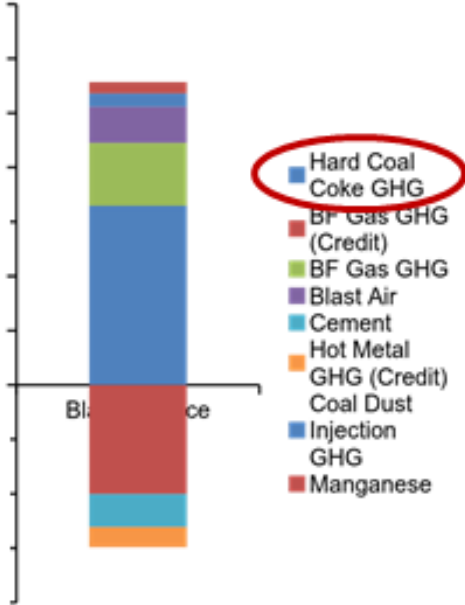
Coke Oven Contribution to GWP for 1t of Plate (Kg CO2e)



Sinter Plant Contribution to GWP for 1t Plate (Kg CO2e)



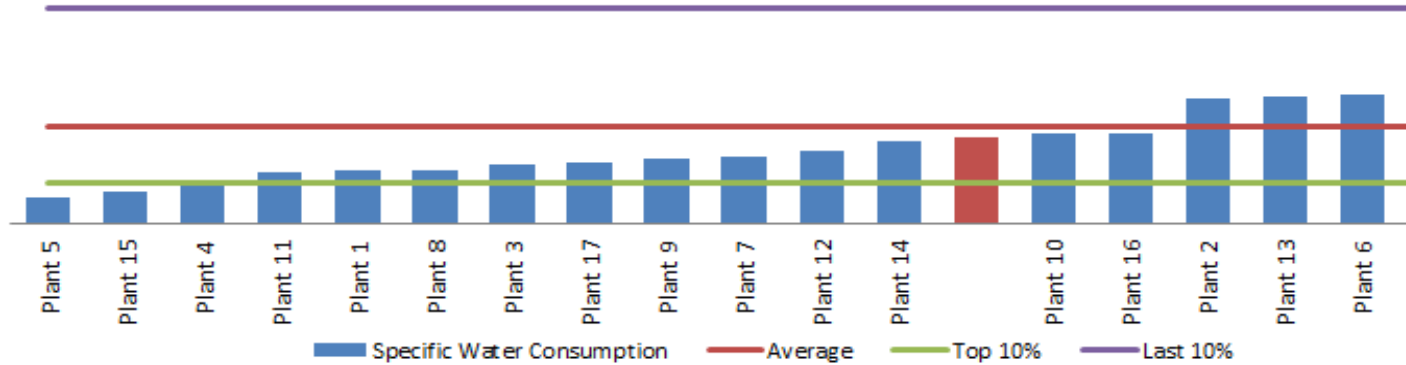
Blast Furnace Contribution to GWP for 1t of Plate (Kg CO2e)



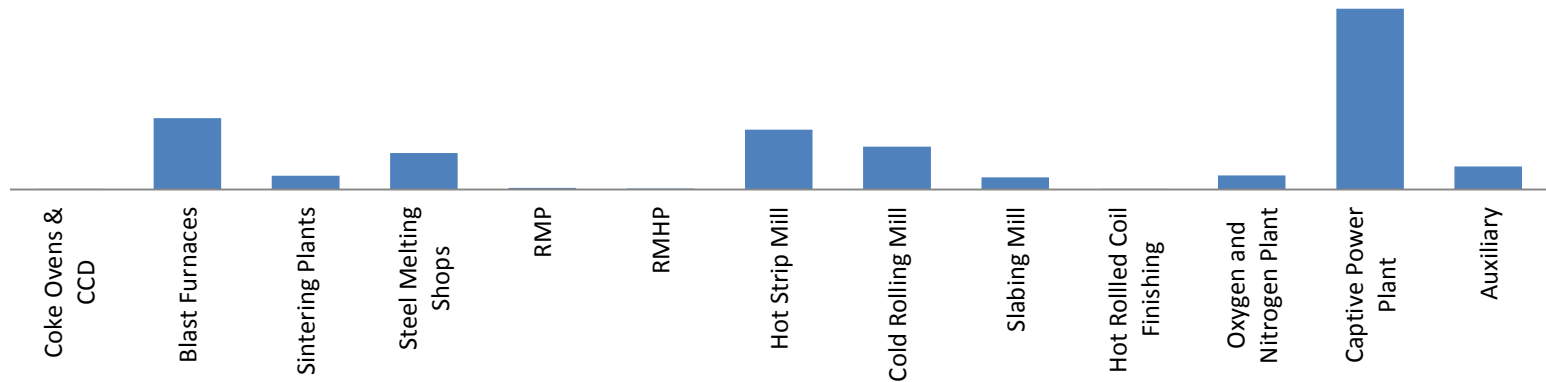
# LCA of Steel Product

## Water Footprint

Specific Water Consumption - Crude Steel (Plant level) (m<sup>3</sup>/t)



Shopwise Water Footprint (m<sup>3</sup>)



# LCA of Steel Product

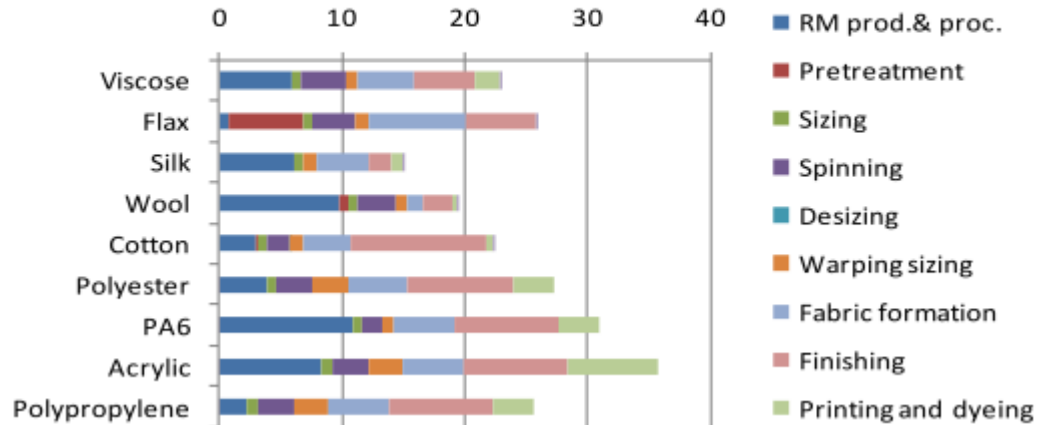
## Gap Analysis

Blast Furnace			
		ABC	BAT
			Weighted Avg. Value
Input Sinter	kg/t HM	1190	1088
Input Iron Ore	kg/t HM	520	180
Input Coke	kg/t HM	480	359
Input Coal	kg/t HM	45	162
Input Oxygen	m3/t HM	60	54.4
Input BF Gas	MJ/t HM	2250	1536
Input COG	MJ/t HM	160	284
Input BOF gas	MJ/t HM	2.45	213
Input Electricity	MJ/t HM	120	268
Input Steam	MJ/t HM	200	48
Output Slag	MJ/t HM	425	280

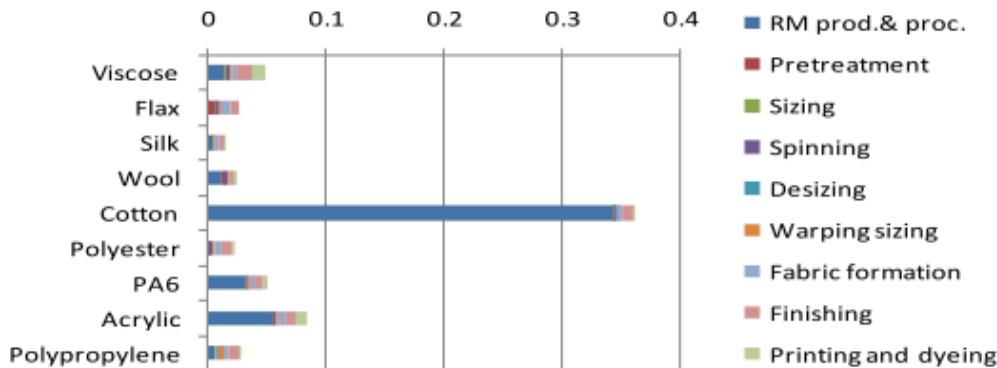


# LCA of Various Textile Raw Materials

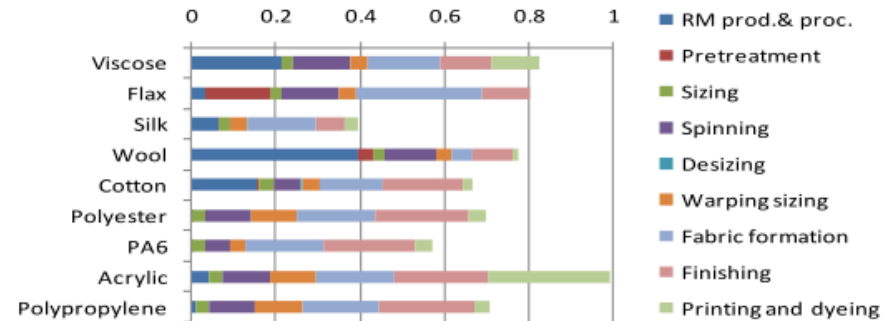
Climate change midpoint



Freshwater ecotoxicity midpoint

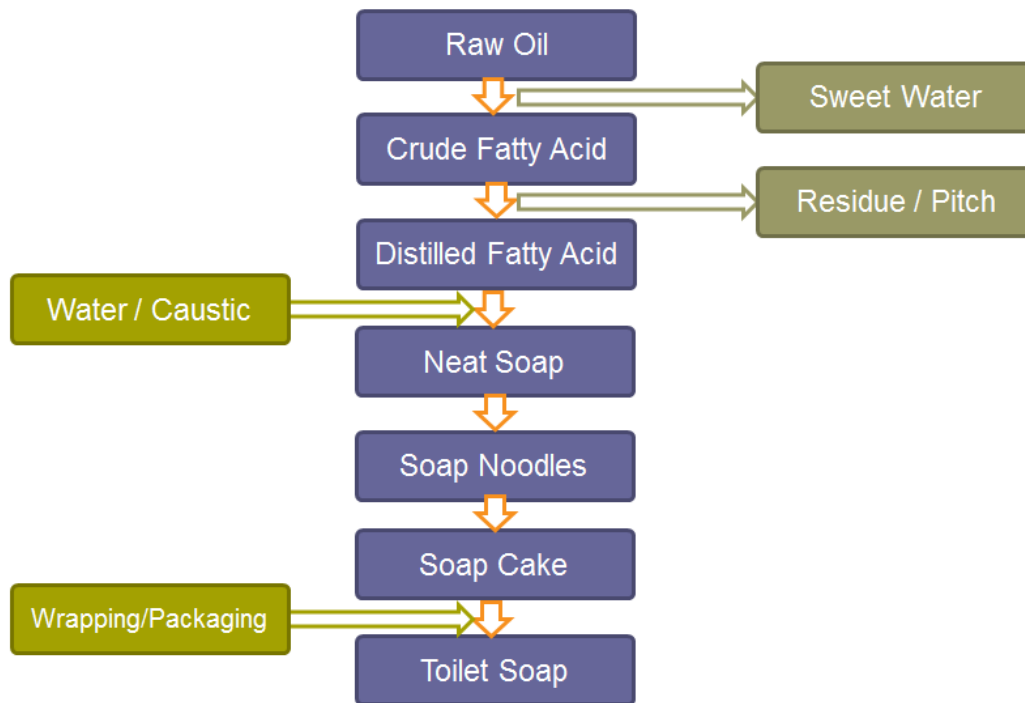


Human toxicity midpoint

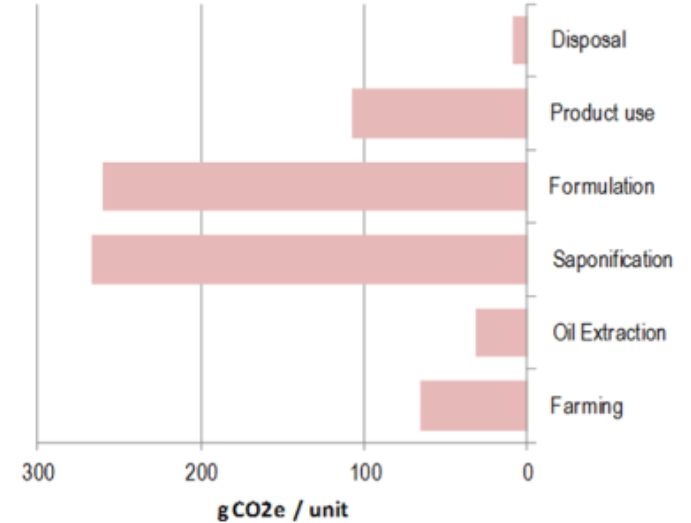




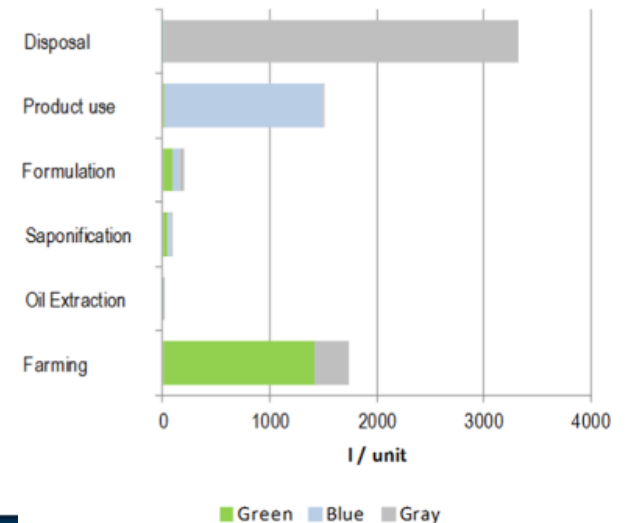
# LCA of Soap



## Carbon footprint

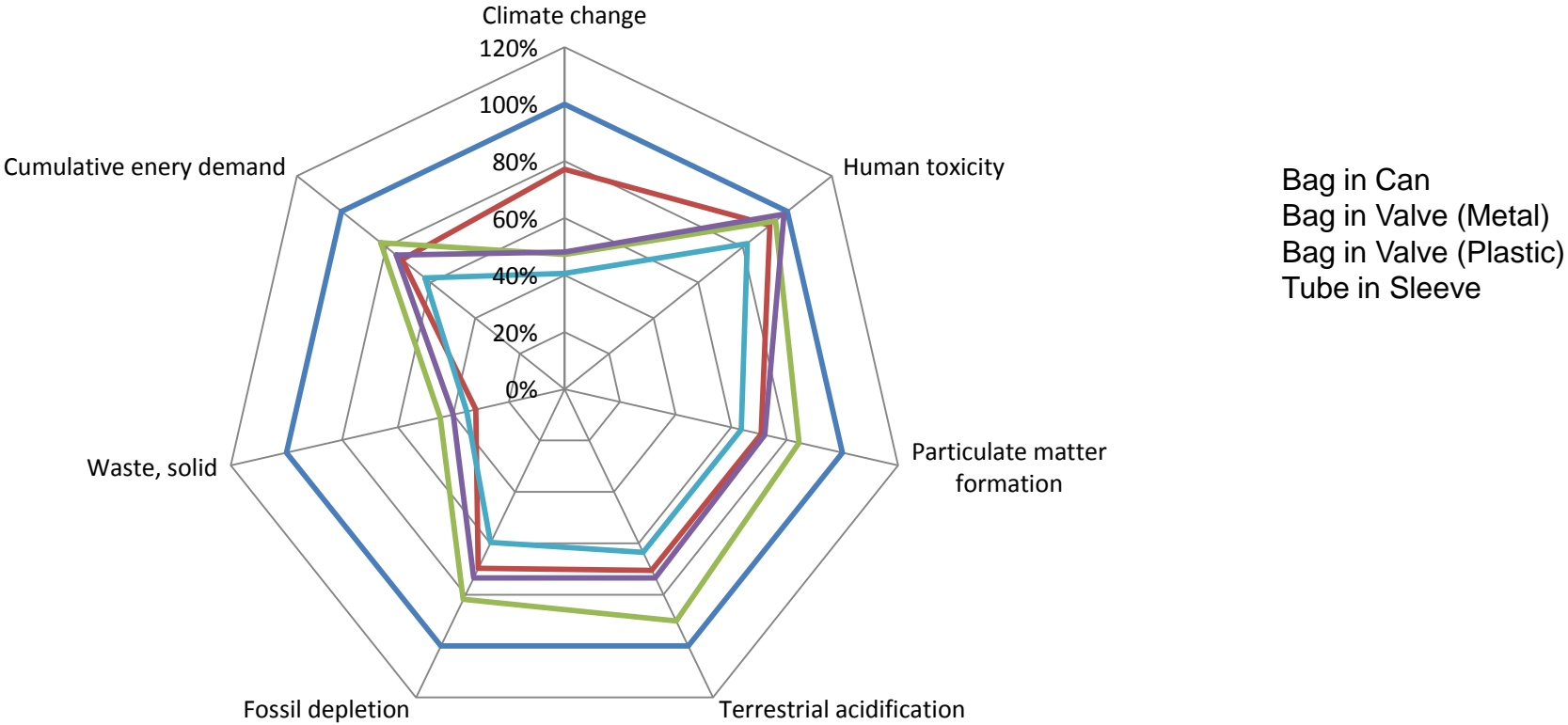


## Water footprint



# LCA of Aerosol Cans

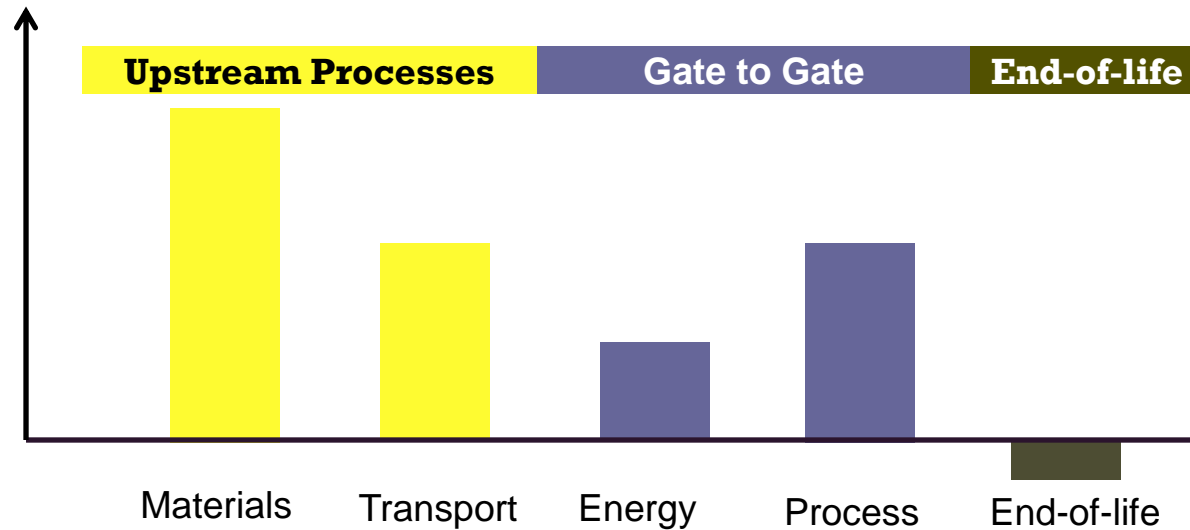
## Various technology Comparisons



Bag in Can  
Bag in Valve (Metal)  
Bag in Valve (Plastic)  
Tube in Sleeve

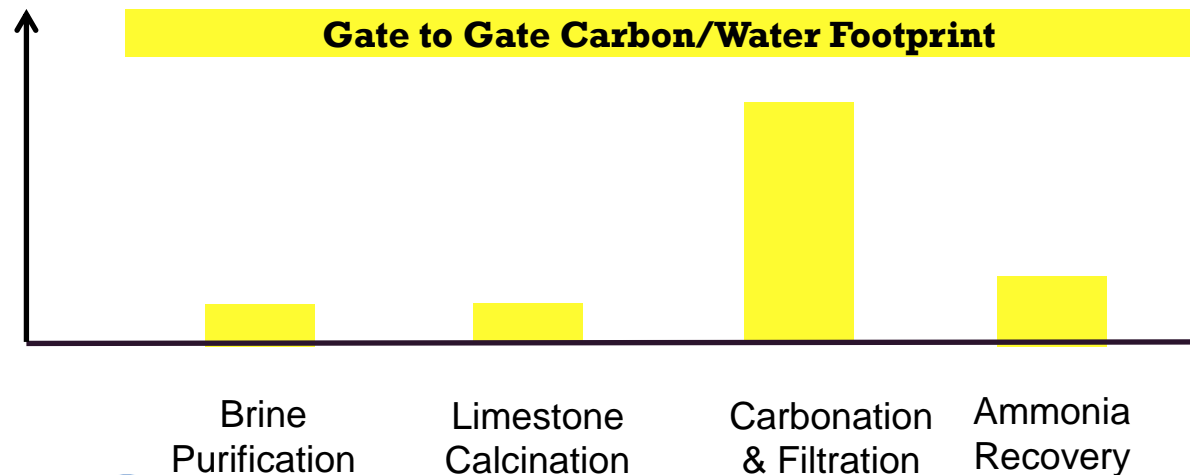
# LCA of Soda Ash

Global Warming Potential (kgCO<sub>2</sub>e)

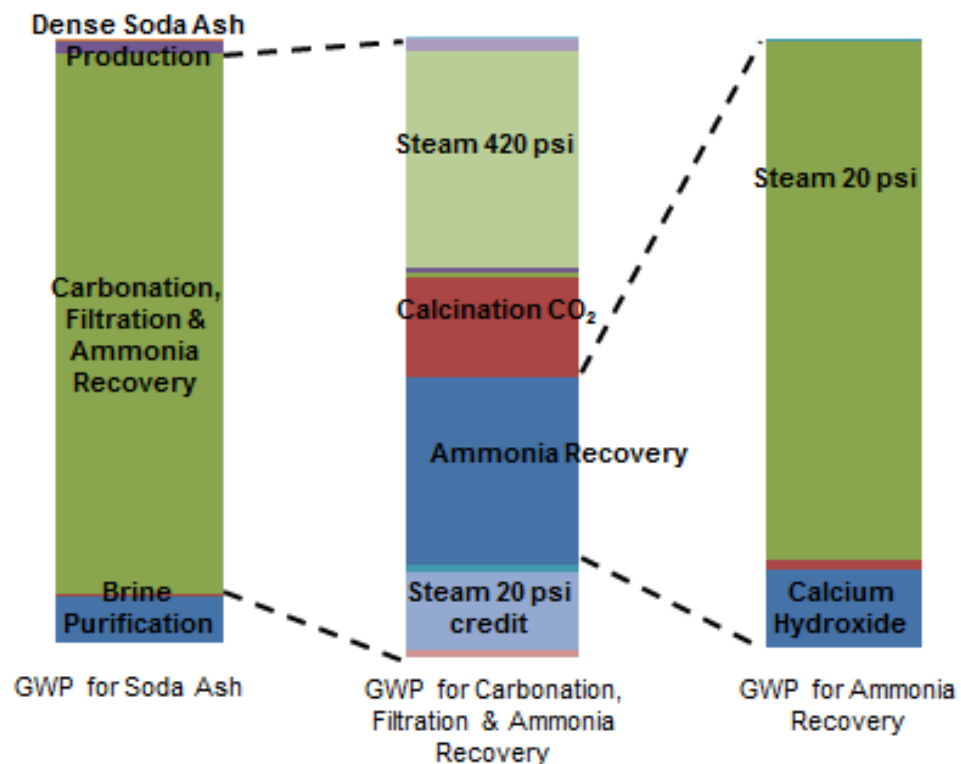
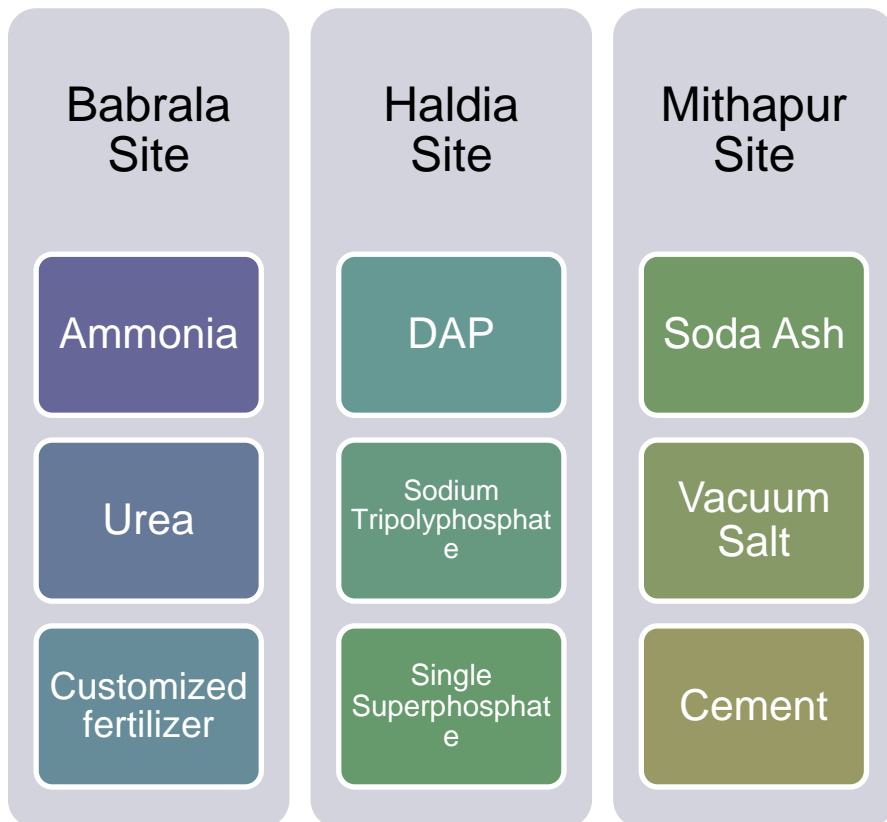


Life Cycle Analysis facilitates

- Product carbon footprint
- Product water footprint
- Operational carbon footprint
- Operational water footprint
- Offers deep insight into various sub processes within manufacturing

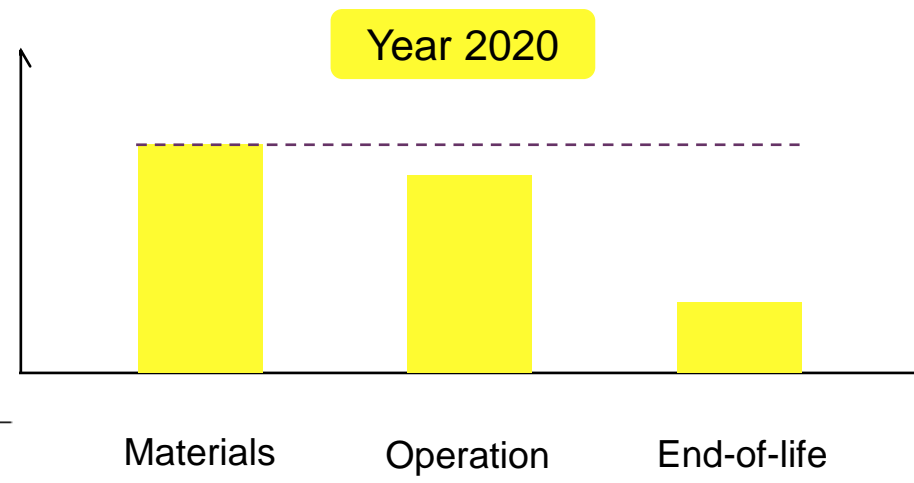
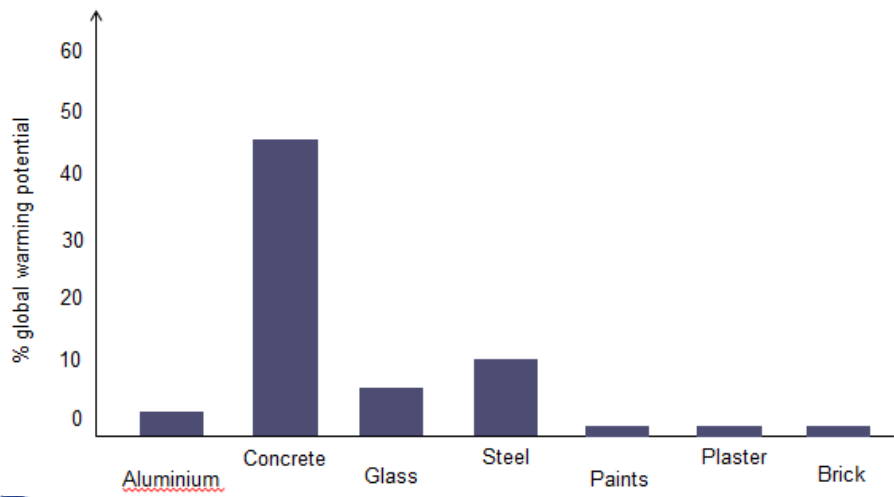
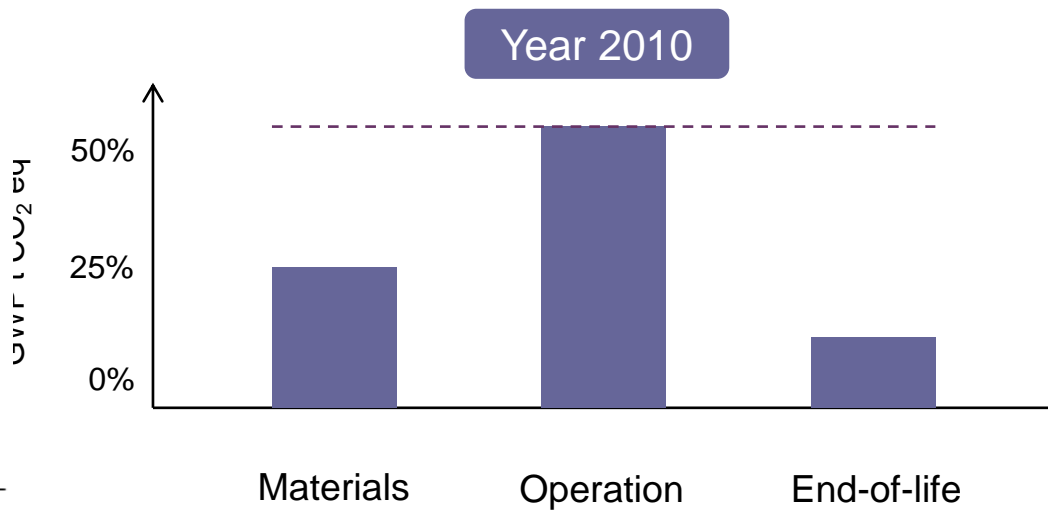
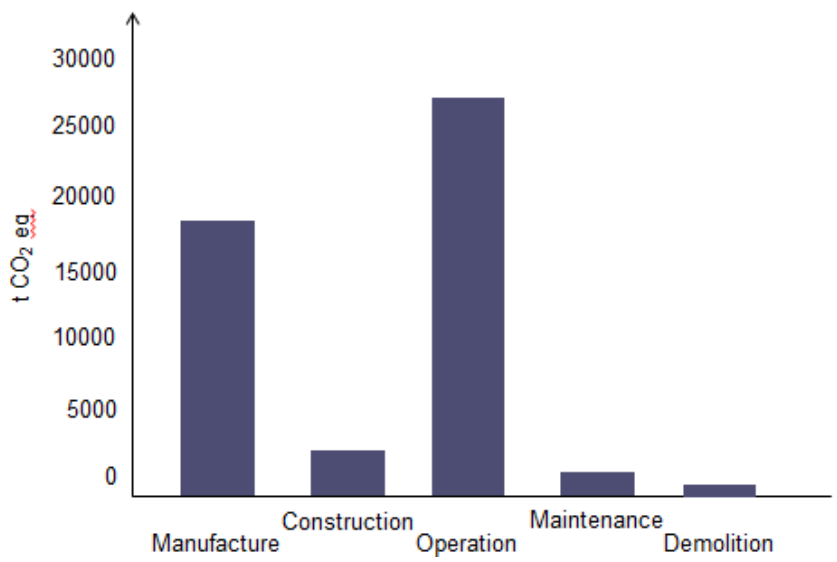


# Life Cycle Assessment Journey at Tata Chemicals



# Environmental Impact of Building

## Present and Future Scenario



# Comparative LCA

## Sustainable Packaging

Impact Category	Credit Energy	Disposal and Recycling	Downstream Transport	Primary Packaging	Secondary Packaging	Upstream Transport
Container Glass	-11%	7%	4%	100%	-2%	2%
PET	0%	19%	2%	82%	-4%	1%
Beverage Carton	-12%	134%	8%	-16%	-15%	1%
Al Can	0%	2%	1%	93%	3%	0%



Source: <http://www.indialca.com/pdfs/ILCM-2012-Session-6-Vinay-Saran.pdf>

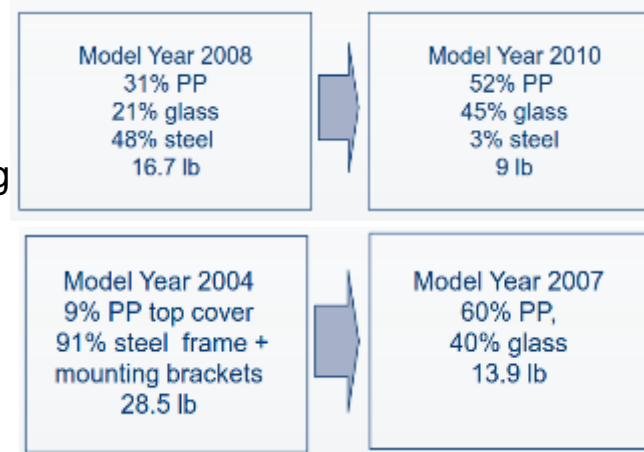


# LCA in Automotive Industry

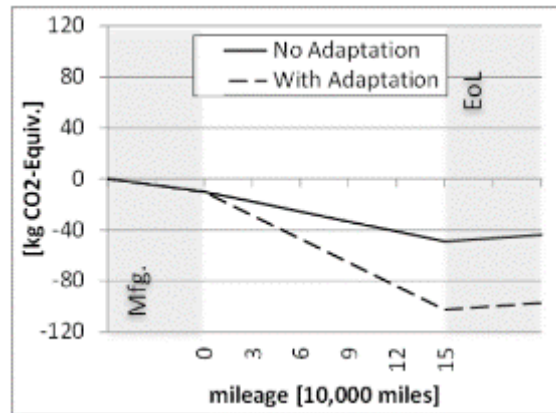
## Light Weighting- Plastics Case

FRV (Without Adaptation): 0.16 l/100km/100kg

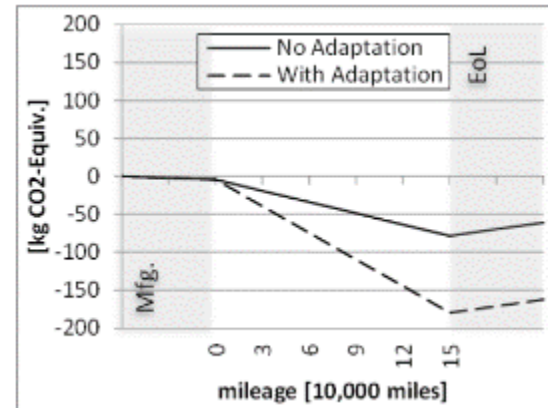
FRV (With Adaptation): 0.38 l/100km/100kg



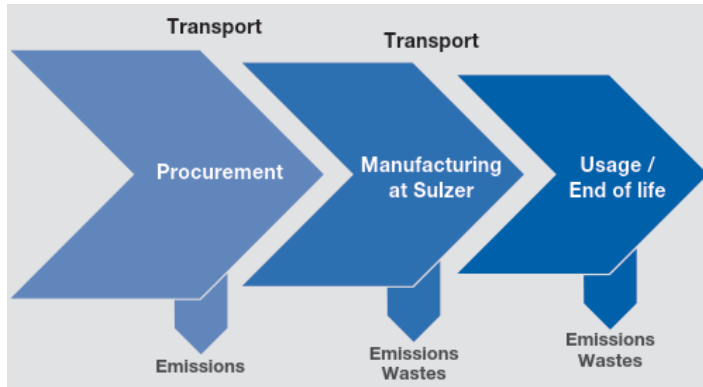
Ford Taurus Bolster



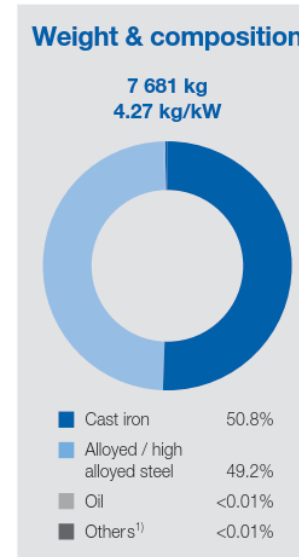
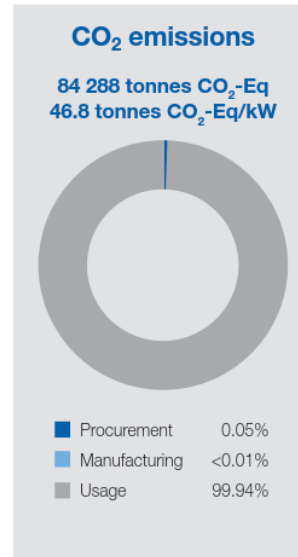
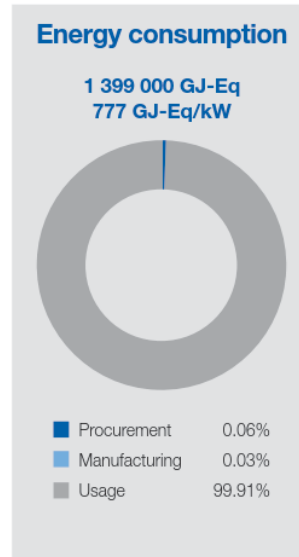
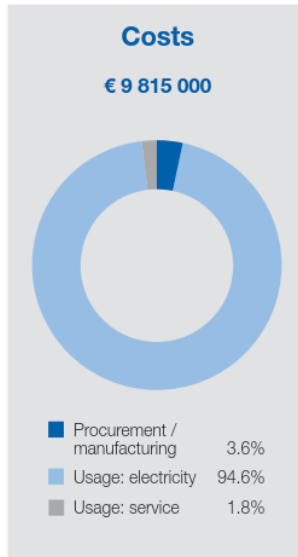
GMC Envoy Running Board



## Environmental Product Declaration HSB Process Pump



- Detailed description of Material and Energy consumption during procurement, manufacturing, use and end of life of the product
- Emissions' assessment over the complete life cycle







# Thank you for your attention!

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