CHEMISTRY THAT MATTERS™



LIFE CYCLE ASSESSMENT (LCA)

FROM CONCEPTS TO PRACTICE | 101

IGCW 2023 | WESTIN GARDEN CITY, MUMBAI | NOVEMBER 6-8, 2023

TRENDS AROUND CARBON NEUTRALITY AND LINKAGES TO LCA





KEY INFLUENTIAL EXTERNAL DEVELOPMENTS



EU taxonomy CBAM PEF	TfS – industry initiative	WBCSD Pathfinder
Assured and methodology- aligned PCF calculations will be needed. Non-availability will result in material bottom line impact for SABIC.	Chemical industry led initiative for consistent methodology on PCF	PCF methodological guidelines, meta-data on PCF. Data exchanges across value chain partners
Requirements for third party verification on data, approaches	Alignment with WBCSD PACT Guidelines, ISO, EN standards, PCR, others.	Interoperability and data exchange platforms
PCF for key products exported to EU.	Consistent emission factors Scope 1,2,3 considerations	Consistency in framework, DQ and Assurance processes
Needs for India centric background data, supplier- specific data needs.		Blockchain developments also become relevant.



HOW IS LCA BEING USED BY BUSINESS?



WHAT IS THE NEED FOR A LIFE CYCLE FRAMEWORK?



Diesel fuel use emits CO₂, NO_x other emissions Electric car has Zero emissions Electric car has Zero emissions Electric car has DIESEL FUELED CAR

WHICH ONE IS MORE SUSTAINABLE OR ENVIRONMENT FRIENDLY?



WHAT IS THE NEED FOR A LIFE CYCLE FRAMEWORK?



Diesel is sourced from refinery And refineries typically have >95% carbon efficiencies





Electricity is sourced from power plants. Coal power plants generally emit a lot of CO2; hydro or solar has minimal or no emissions



WHICH ONE IS MORE SUSTAINABLE OR ENVIRONMENT FRIENDLY? Would you like to change your answer?



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ELECTRIC CAR

WHICH ONE IS MORE SUSTAINABLE OR ENVIRONMENT FRIENDLY? Would you like to change your answer?



ENVIRONMENTAL IMPACTS ASSOCIATED WITH A PRODUCT LIFE CYCLE?

600 liter capacity consumes 300 - 400 kWh / year Smart Phones: ICT Ecosystem consumes ~300 - 400 kWh/ year



WHICH ONE DO YOU THINK CONSUMES MORE ENERGY?



WHAT IS A PRODUCT LIFE CYCLE?





ENVIRONMENTAL IMPACTS ASSOCIATED WITH A PRODUCT LIFE CYCLE?



سابک عظامع

LCA BASICS – WHAT DOES LCA CAPTURE OR MODEL?



MINING FOSSIL PRODUCT

25

25

PRODUCT

USE

MANUFACTURING

سیابک منطق

WHAT CAN BE MEASURED BY LCA

Impact on resources:

Primary energy demand Cumulative Exergy Demand Fossil resource depletion Metal depletion Water depletion Land occupation



Impact on environment & humans: Carbon footprint Eutrophication Acidification Eco-toxicity Particulate matter Photochemical Oxidant Formation Natural land transformation Human toxicity Life cycle cost # Social impacts # Standards & methodologies

ISO 14044, PAS 2050, GHG Protocol, several others

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LCA AS A DECISION MAKING TOOL



OVERVIEW OF SABIC LCA CAPABILITY

LCA helps assess environmental impacts of SABIC products and technologies from a life cycle perspective. Mature and advanced capability in life cycle assessment: Program well embedded into Core sustainability program

LCA program is well-positioned to support various SABIC business functions in delivering business impact and value.

Contributions to Industry guidance documents and standards development

Tools: SimaPro, GaBi

Well-networked with key consortiums and global efforts in LCA

SABIC LCA program - evolution and maturity

	2009	2014	2019	2023+
Drivers	Early sustainability specifications: Light-weighting Down-gauging Reporting	Differentiators: advancing competencies: Circularity Renewables Disclosures		Advanced sustainability analytics: SBT ESG Monetizing externalities

300+ LCAsRegulations & Product StewardshipBranding & ReportingInvestment and Mega projectsSupply chainCorporate Finance (C-pricing)Corporate Strategy		Technology development	Feedstock strategy	Marketing and Sales
Supply chainCorporate Finance (C-pricing)Corporate Strategy	300+ LCAs	Regulations & Product Stewardship	Branding & Reporting	Investment and Mega projects
		Supply chain	Corporate Finance (C-pricing)	Corporate Strategy





14

~15 ISO PEER REVIEWED LCAS

STEPPING UP LCA PRACTICE

Problem:

- Significant expansion scope & # of LCAs over 10+ years
- Evolving external world

<u>Goal:</u> Re-organizing our LCA Practice to be Best in Class and meet evolving needs of the business

- Appropriate depth, rigor, documentation & review
- Faster ISO compliant LCA
- Cross-use of datasets, models & modules
- LCA communications effective, compliant
- Consistent approach, methodology & documentation





LCA CAPABILITY AT SABIC





بیابک مادا*دی*

DATA QUALITY AND DATABASE MANAGEMENT PROCESSES



Database management – the foundation for long term success

Building on UNEP Global Guidance Principles for Life Cycle Assessment Databases 2011 & USEPA Guidance on Data Quality Assessment for Life Cycle Inventory Data 2016

LCA COMMUNICATIONS PROTOCOL

WHERE TO START? WHAT ARE SOME PRESCRIPTIONS FOR BUILDING LCA PRACTICE?

Building a capability in LCA

- Key to have a centralized expertise for LCA capability
- Resources with background in environmental and chemical engineering
- Protocols for practice, QA-QC, external communication
- New developments around LCA automation tools also become relevant for advanced teams.

Data

- Databases and tools and having ST and LT strategies on data
- Access to high quality, assured internal measurement systems for Scope 1,2
- Access to supplier data on Product Carbon Footprint and LCA data

Leveraging external collaborations

- Internal capacity building with marketing and key functions
- Establish mechanisms for external collaborations for learnings & access to information
- Alignment with standards and methodologies is key
- LCA is a highly specialized expertise that can drive long term value to:
 - business profitability
 - sustainability & ESG communications
 - strategy and decision making
 - steering informed technology development

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STRATEGIC EXTERNAL PARTNERSHIPS AND EXPERTISE

GAP ANALYSIS AND STANDARDIZATION OF SABIC LCA PRACTICE

as well as robust LCA practice that effectively caters to the various business imperatives linked to LCA.