



Operational Excellence Services

Decarbonization Life Cycle Assessment/ Management (CO2 Footprint)



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Life Cycle Assessment/Management (CO2 Footprint)

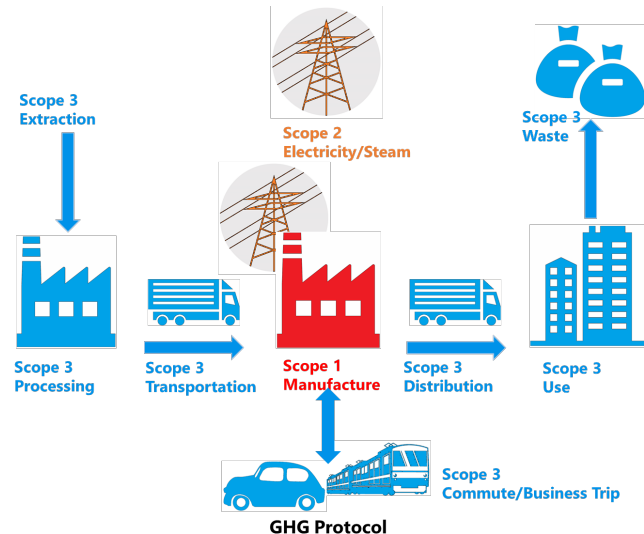
What is the Life Cycle Assessment (LCA)?

- LCA is a method of assessing the environmental impact of your product or service throughout its life cycle (or at a specific stage) :
Resource extraction, raw materials, product production, distribution, consumption, disposal, recycling
- LCA can objectively and quantitatively evaluate whether a product is "good" or "friendly" for the environment, human health, and society

Advanced Application of LCA (LCM) to



Concept of LCA

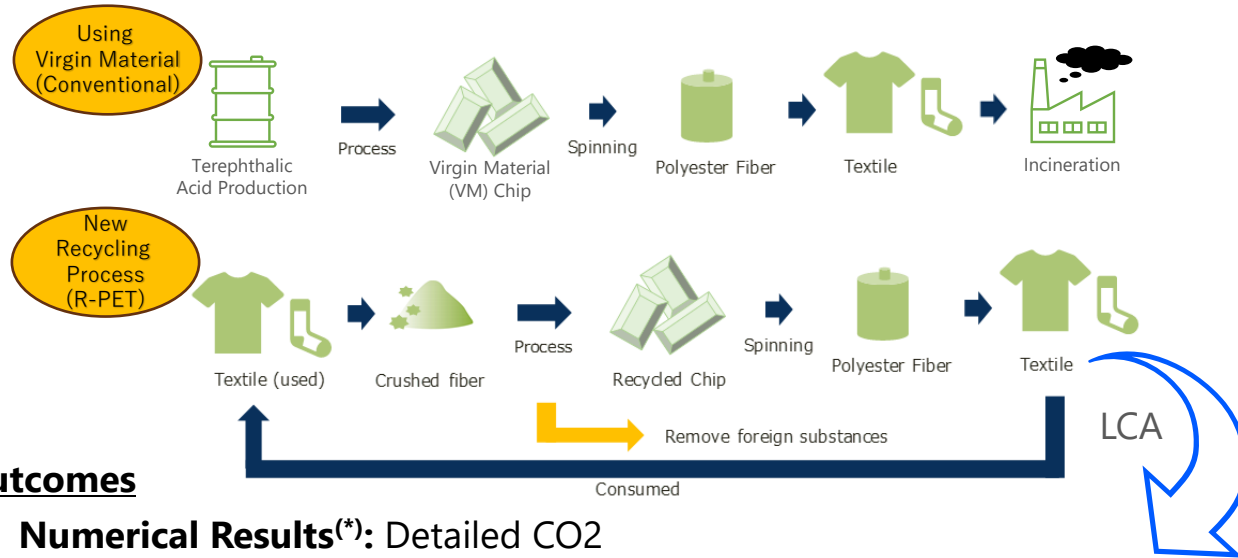


High Client Concern on :

- Environmental Impact
- Optimized Plant Life Cycle
(Engineering, Procurement, Construction, Commissioning, Startup, Maintenance, Manning, Turnaround, Demolition)
- GHG Protocol (Scope 1/2/3)

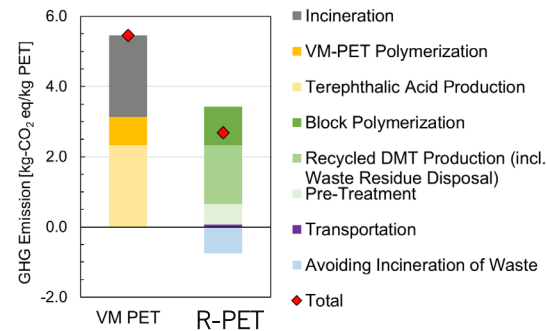
Life Cycle Assessment/Management (CO2 Footprint)

Case Study : LCA for New Recycling Technology



Outcomes

- **Numerical Results^(*):** Detailed CO2 emissions data for each process stage
- **Higher CO2 Reductions:** The new recycling process is expected to achieve significantly higher CO2 reductions compared to the conventional process
- **Visualization of Hot Spots:** Identification and visualization of high CO2 emission hot spots

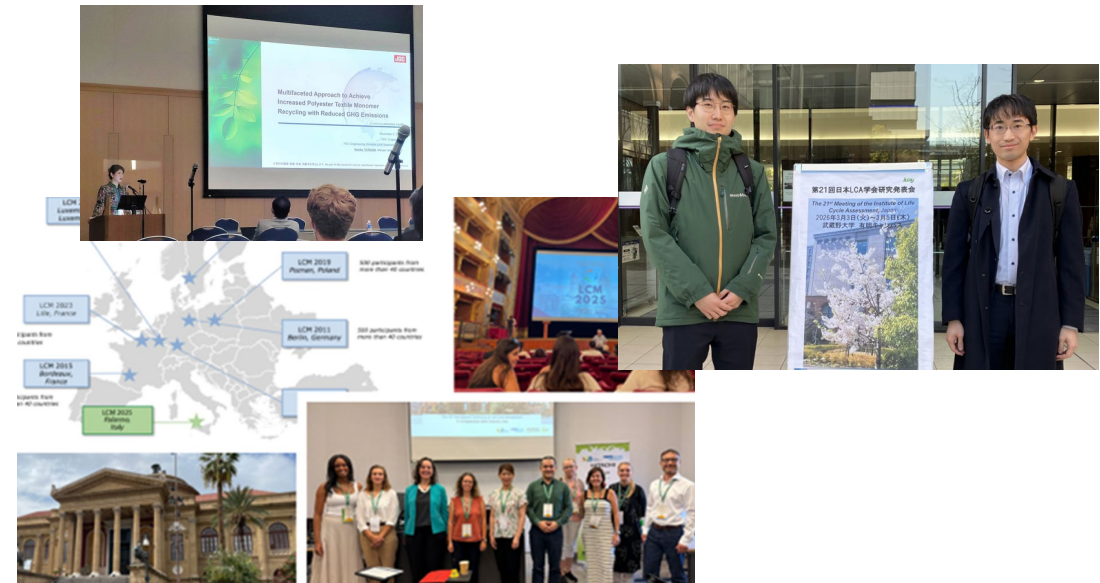


^(*)The scope of evaluation, methods, and assumptions that greatly affect the results, it depends on the implementers and companies

Achievements

Conference Participation:

- Presented at the Conferences (EcoBalance 2022/24, LCM 2023/25, the Society of Chemical Engineers, Japan 2026)
- Attended the 8th S-LCA Conference 2022 – Leave No One Behind –



CO2 Footprint Calculation:

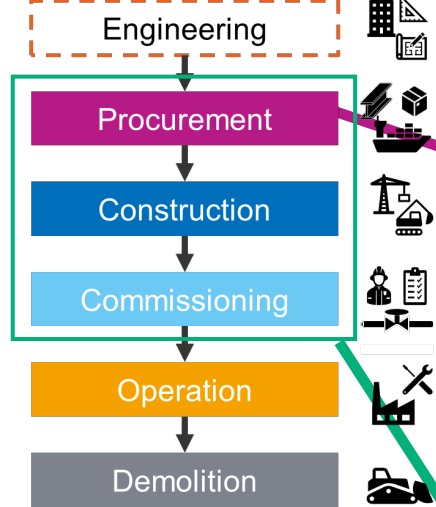
- Calculated CO2 footprint (Scope 1/2/3) for CDP Report from 2021

Life Cycle Assessment/Management (CO2 Footprint)

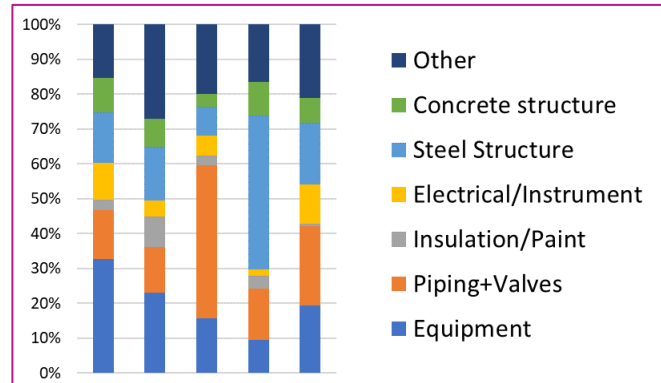
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Case Study : LCA for EPC Business

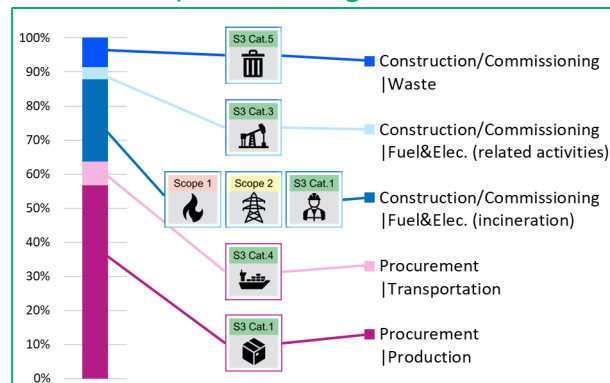
Life Cycle of Plant Facilities



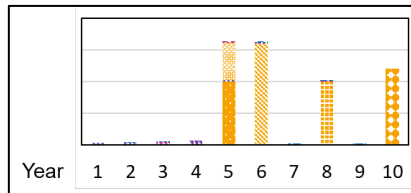
GHG emissions for procured equipment/materials
across multiple projects.



GHG emissions from
Procurement phase through to Commissioning



Report for
annual GHG emissions
of a contractor Scope 3



Outcomes

- **Numerical Approach for Plant Life Cycle:** A comprehensive assessment is applied to focus on for GHG Protocol scopes (1/2/3)
- **Real-Time Monitoring:** With a data-centric (DX) approach, both environmental impact and operational data can be monitored in real time, allowing for the identification of hotspots
- **Visualization of CO2 Emission Hot Spots:** High CO2 emission hot spots are visualized throughout the plant life cycle
- **CAPEX/OPEX and CO2 Emissions Relationship:** Understanding the relationship between CAPEX, OPEX and CO2 emissions

Our Strength

- **Broad LCA Expertise:** Conducting Life Cycle Assessment (LCA) not only for the manufacturing business but also for the construction industry
- **Process Engineering Perspective:** Utilizing a process engineering perspective to optimize material flow and reduce GHG emissions
- **Advanced Visualization:** Capability to visualize emissions using the in-house 3D maintenance viewer **INTEGNANCE VR** [See Details](#)