Session 2: Assessment and Measurement of the Environmental Efficiency of AI and Emerging Technologies

A stepwise approach to sustainability

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Virtual workshop
AI and environmental efficiency
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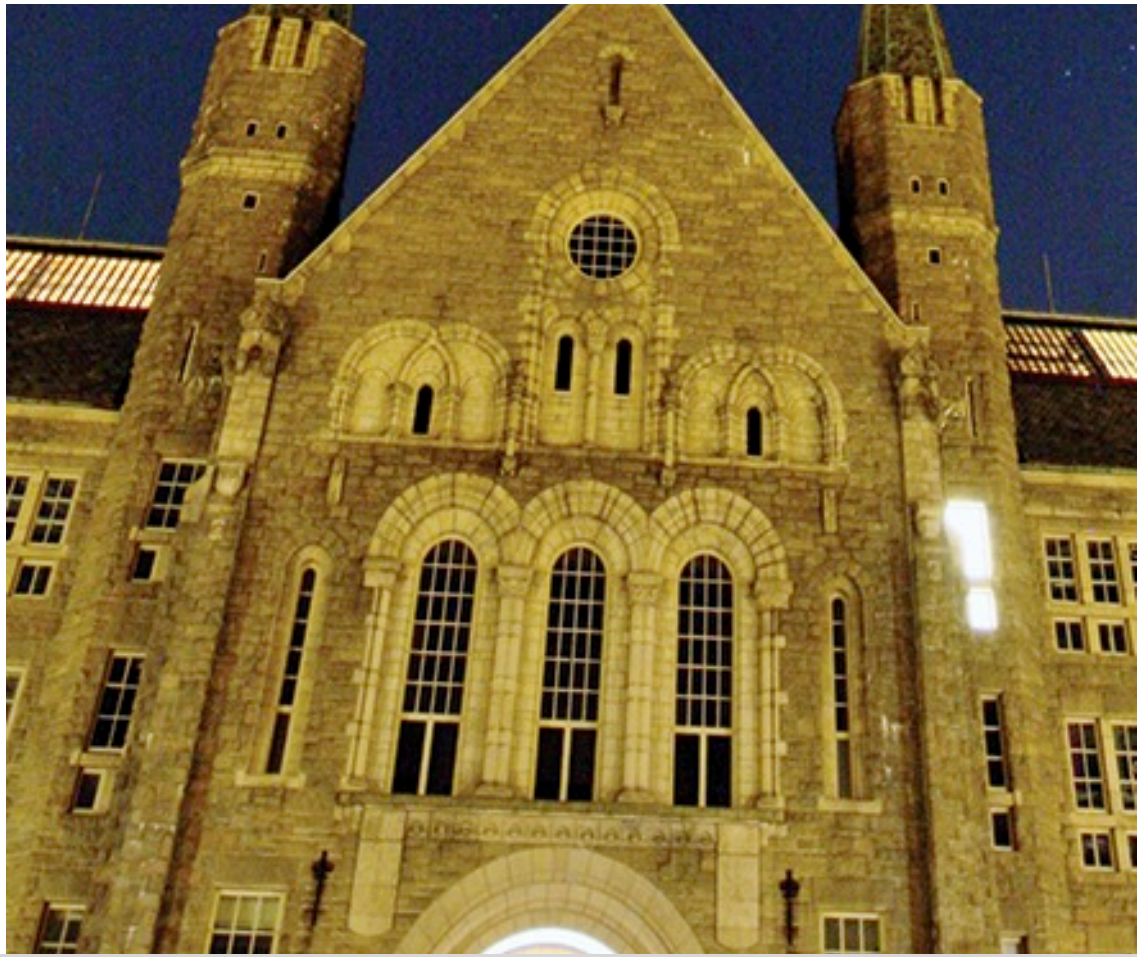

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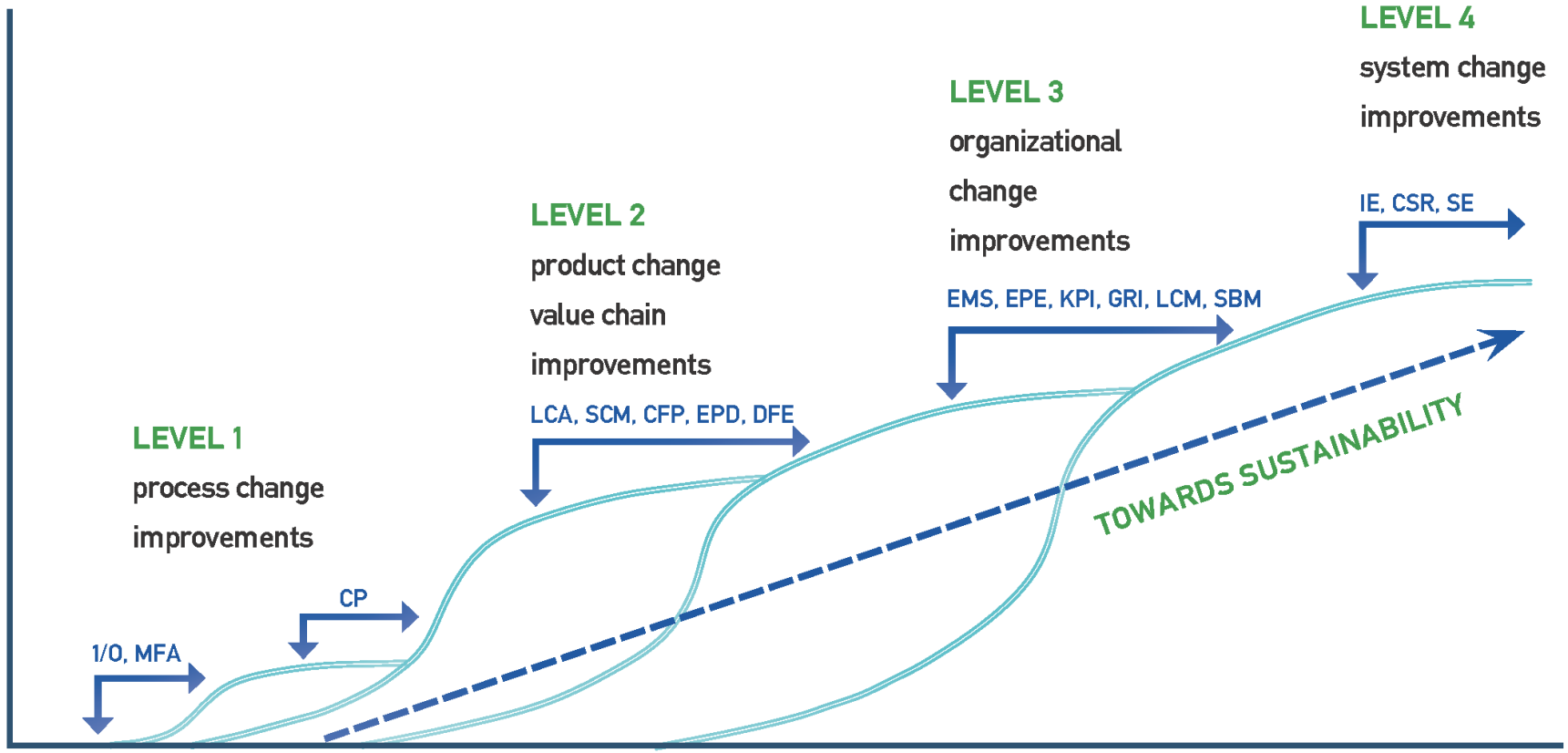
The CapSEM Model

- L1 for process-level improvements
- L2 for product-level and value chain improvements,
- L3 for organizational-level improvements and
- L4 for systems-level change.



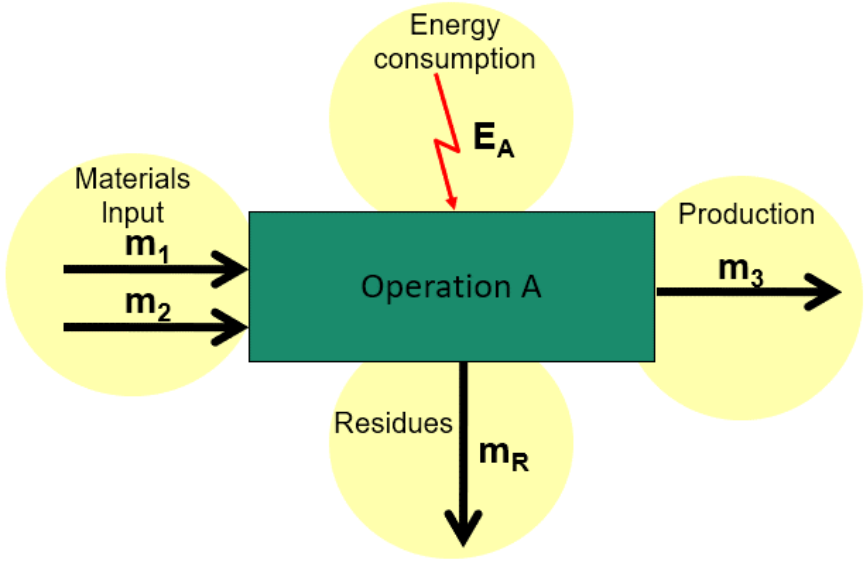
I/O - Input-Output Analysis
MFA - Material Flow Analysis
CP - Cleaner Production
LCA - Life Cycle Assessment
SCM - Supply Chain Management
CFP - Carbon Footprints of he Product
EPD - Environmental Product Declarations
DFE - Design for Environment
EMS - Environmental Management System

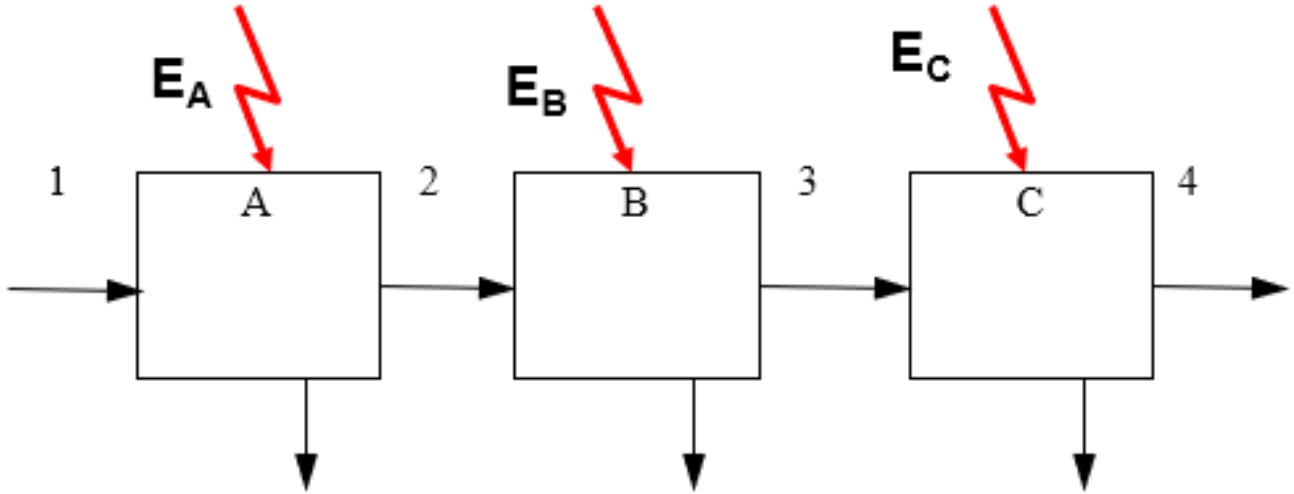
EPE - Environmental Performance Evaluation
KPI - Key Performance Indicator
GRI - Global Reporting Initiative
LCM - Life Cycle Management
SBM - Sustainable Business Models
IE - Industrial Ecology
CSR - Corporate Social Responsibility
SE - Systems Engineering

Input-Outputs (IO) Analysis Basic Operations

Block Diagram

- A block diagram is a simplified representation of the relationship between the input and the output of a physical system.

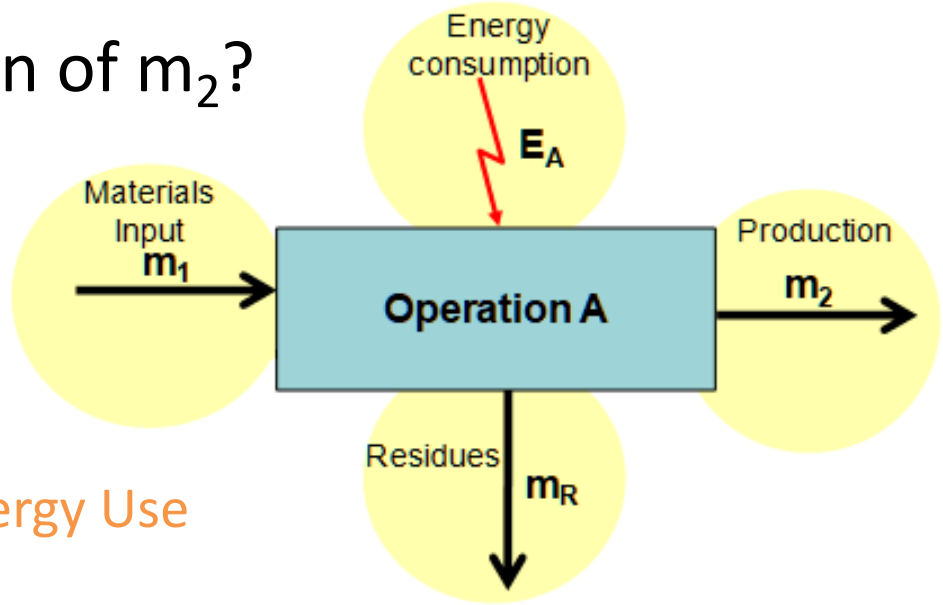




Level 1 - Specific Consumption of Production

- What is the energy specific consumption of m_2?

$$CE_A = \frac{E_A}{m_2}; \qquad CE_1 = \frac{E_1}{m_1};$$



- Write it as

Direct Energy Use

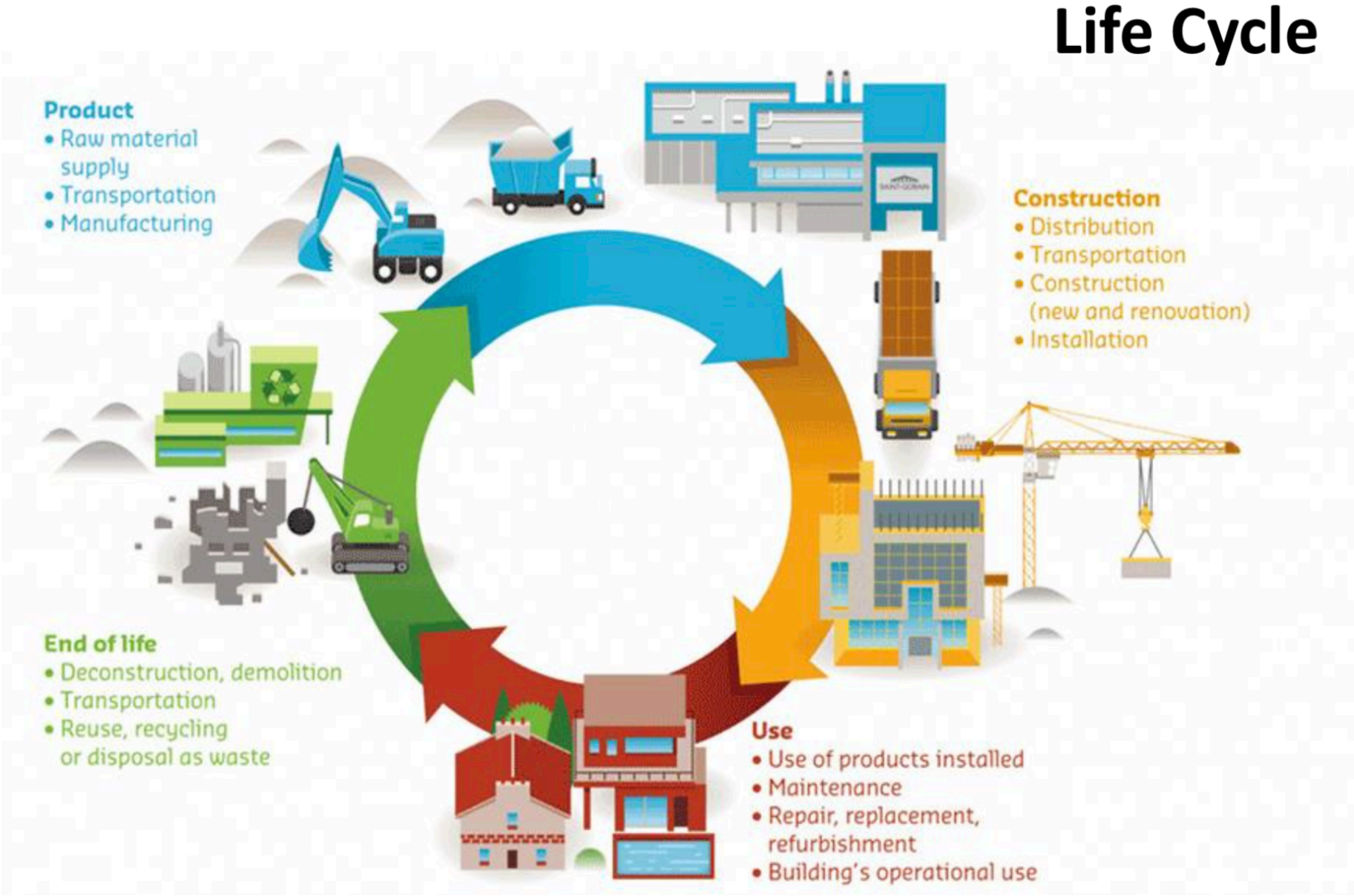
Indirect Energy Use

$$CE_2 = \frac{E_A}{m_2} + \frac{m_1}{m_2}\left(\frac{E_1}{m_1}\right) = CE_A + S_A(CE_1)$$

Block Diagrams (BD)

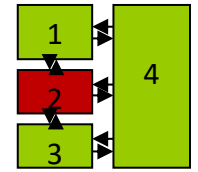
- Mass Factors
- Specific Energy Consumption of Products and Residues
- Residue Treatment and Recycling

Level 2: Product life cycle focus



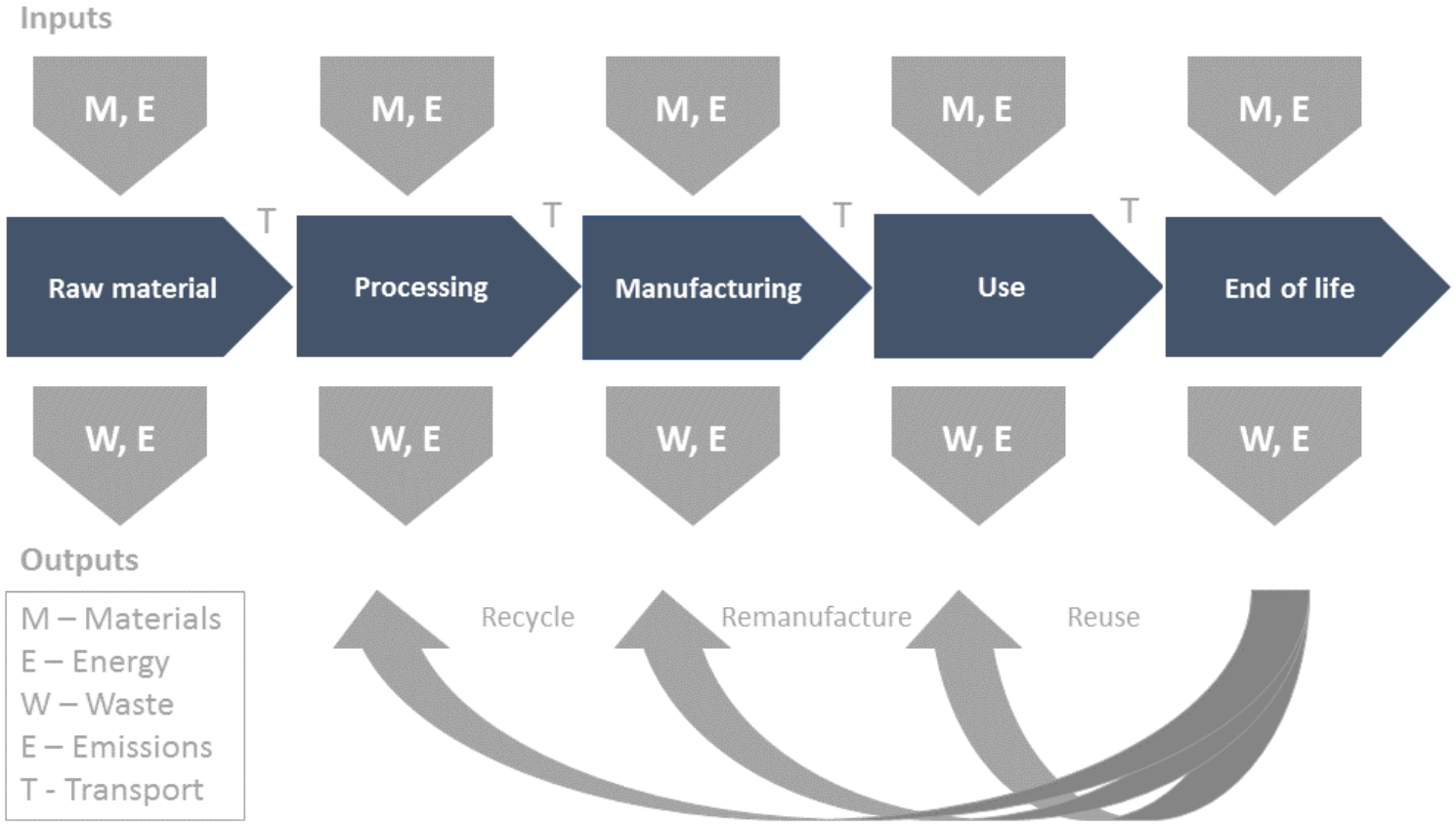
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

What is an LCA – Life Cycle Assessment?



- A methodology for quantifying the total impact of a product or a service

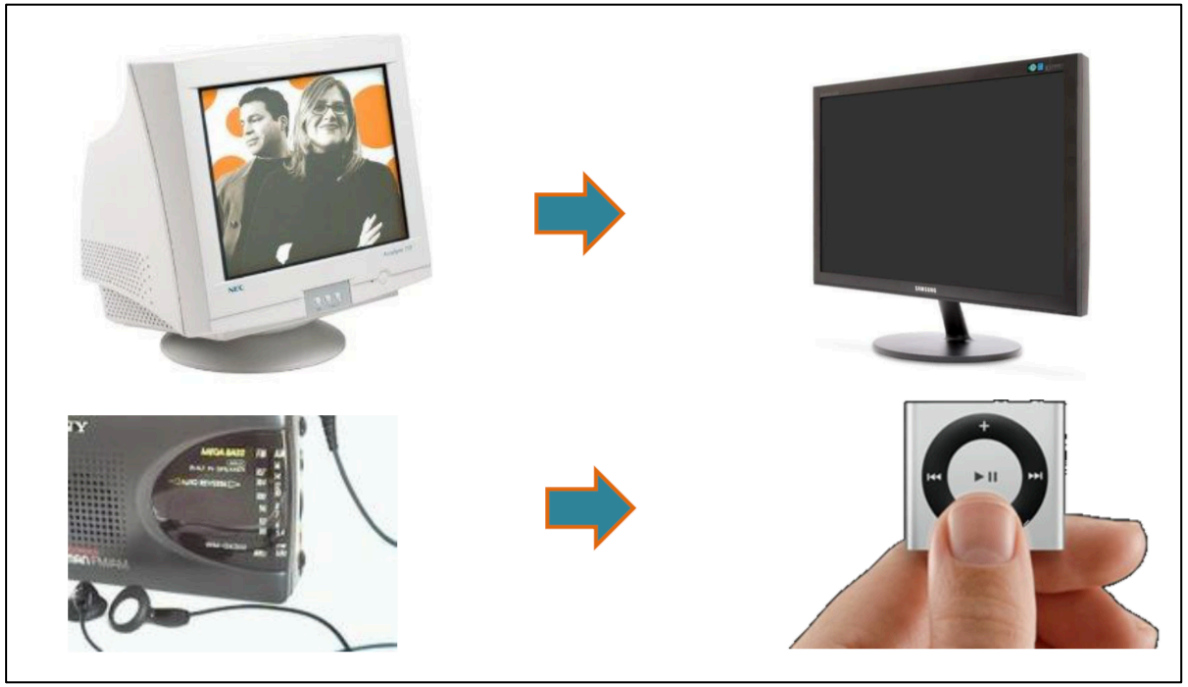
- From cradle to grave/cradle (rawmaterial extraction, production, use, maintenance, waste treatment, recycling inclusive energy use and transport in all parts)



Design for Environment (DFE)

Reduction of energy consumption during the use phase of a product

Reduction of material consumption



Sources for indicators and metrics

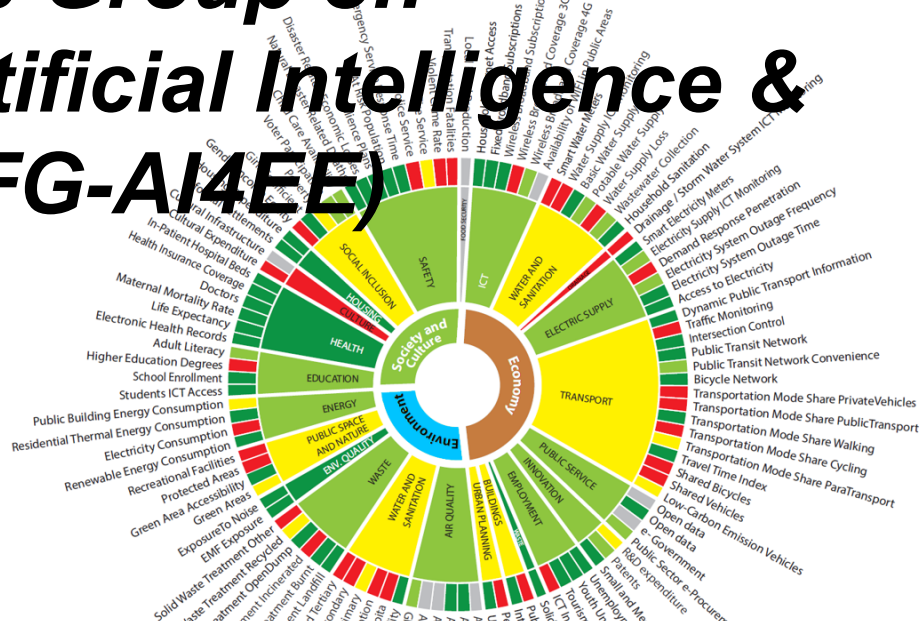
We will need to understand how the use of AI, ML and other emerging technologies are affecting the processes and products

- Circular Economy
  - Sustainable Management and Efficient use of Resources
  - Prevention, Reduction, Recycle, Reuse of Waste
-

This will require a systemic view on the processes – Where do we set the system boundaries for the system we are studying?

- Smart Grids
- Smart Meters
- Smart Distribution system
- Improvement in Rate of Energy Efficiency

Deliverables from the ITU *Focus Group on Environmental Efficiency for Artificial Intelligence & other Emerging Technologies (FG-AI4EE)*

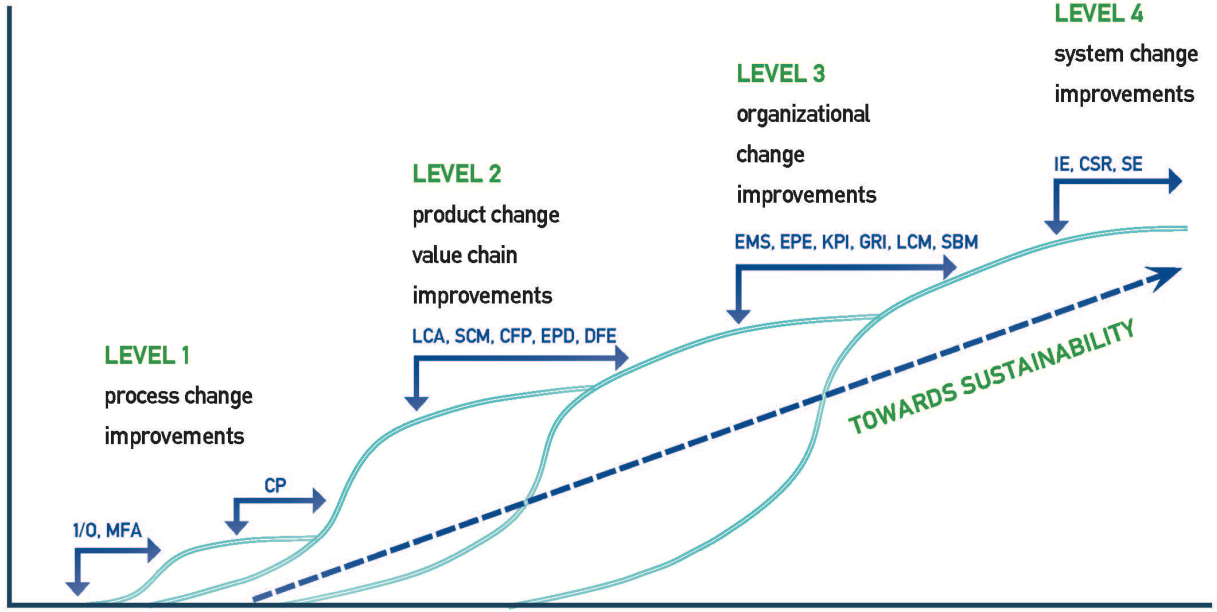


This KPIs system will focus on

- finding indicators which are easy to measure and give a broad range of coverage.

This system will be designed for easy and simple use by

- Small and Medium-Sized Businesses (SMBs) and
- other smaller organizations.



SDGs and Stepwise Change