

Collecting GHG Emissions Data Past, Present, and Future

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Life Cycle Assessment (LCA)

Product focus

Multiple environmental impacts

Mass balance

Emission factors typically activity-based, using physical relationships
(e.g. kg CO₂-eq/unit product)

Identify hotspots and improve product

GHG Protocol (Scopes 1, 2, 3)

Organization focus

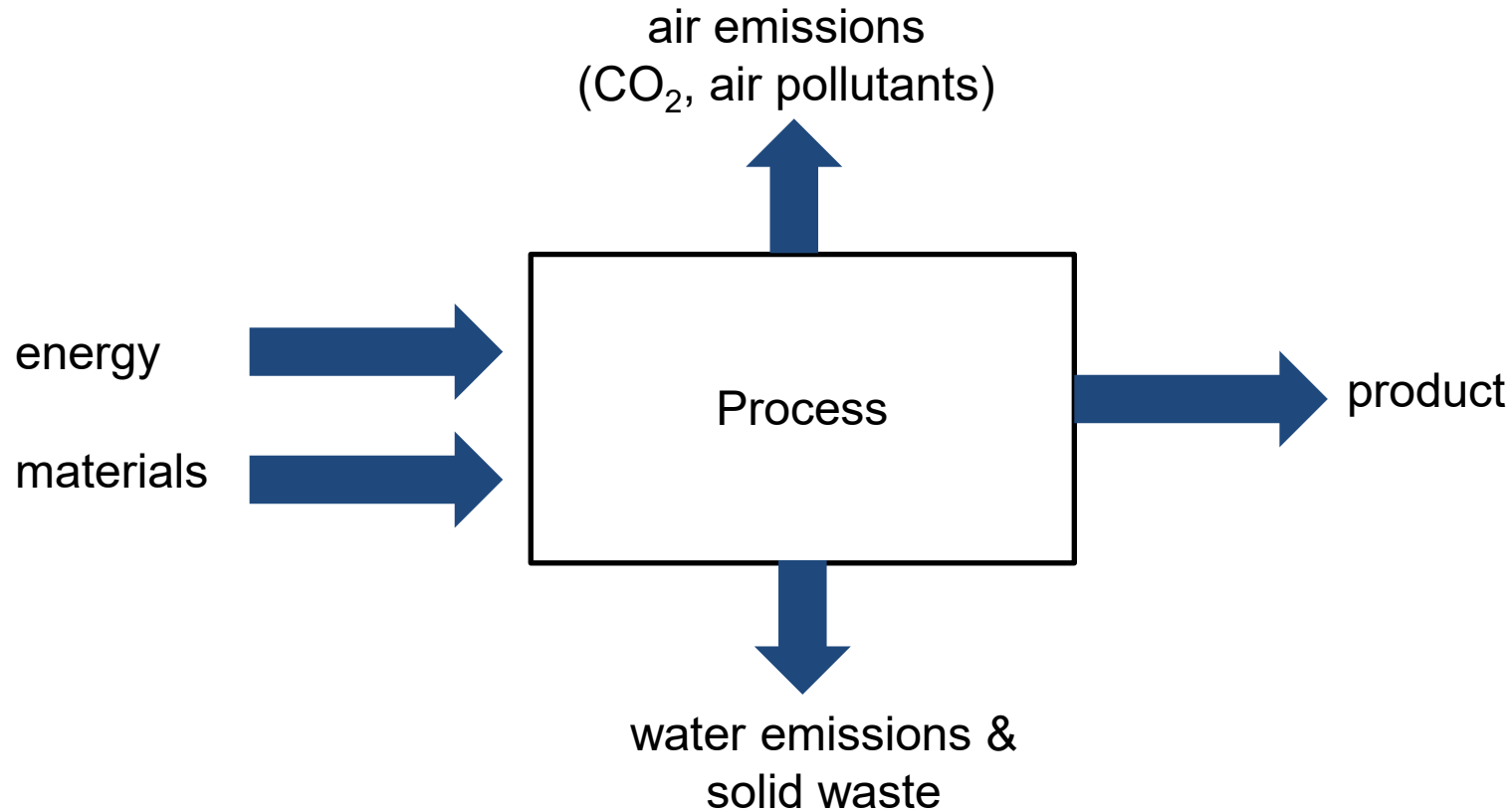
GHG emissions

Follows organizational activities

Emission factors typically mix of activity-based and spend-based
(e.g. kg CO₂-eq/\$ spent)

Standardized reporting & accountability

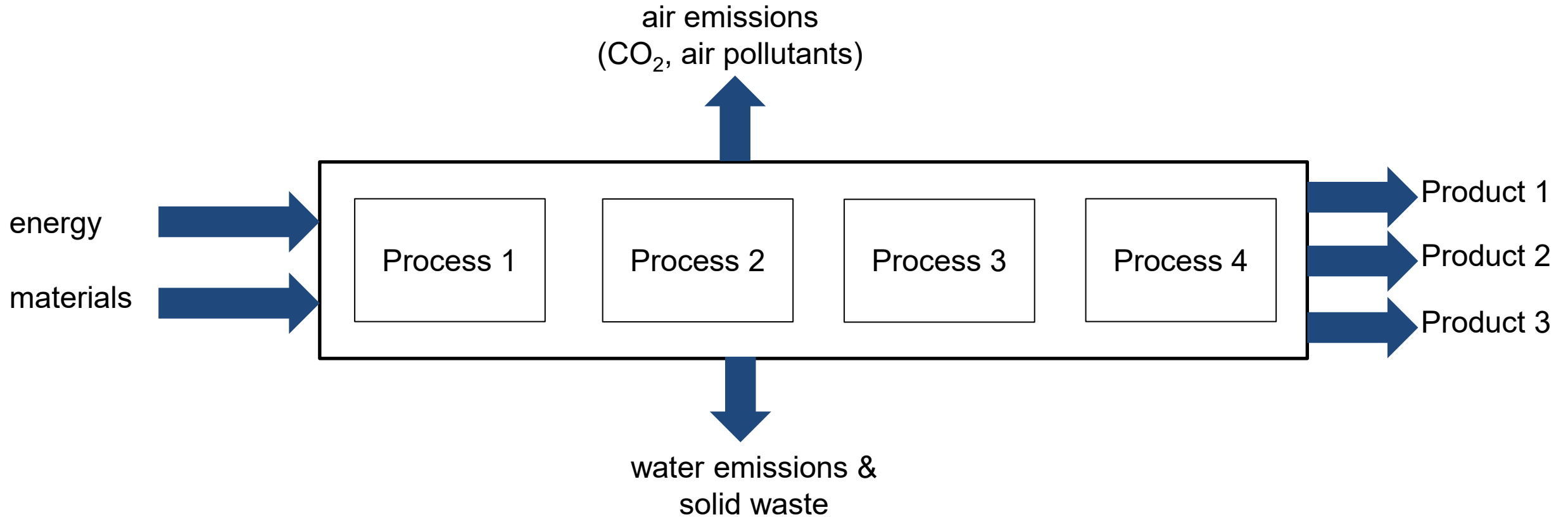
Activity-based emission factors



Emission factor: X kg CO₂/kg product

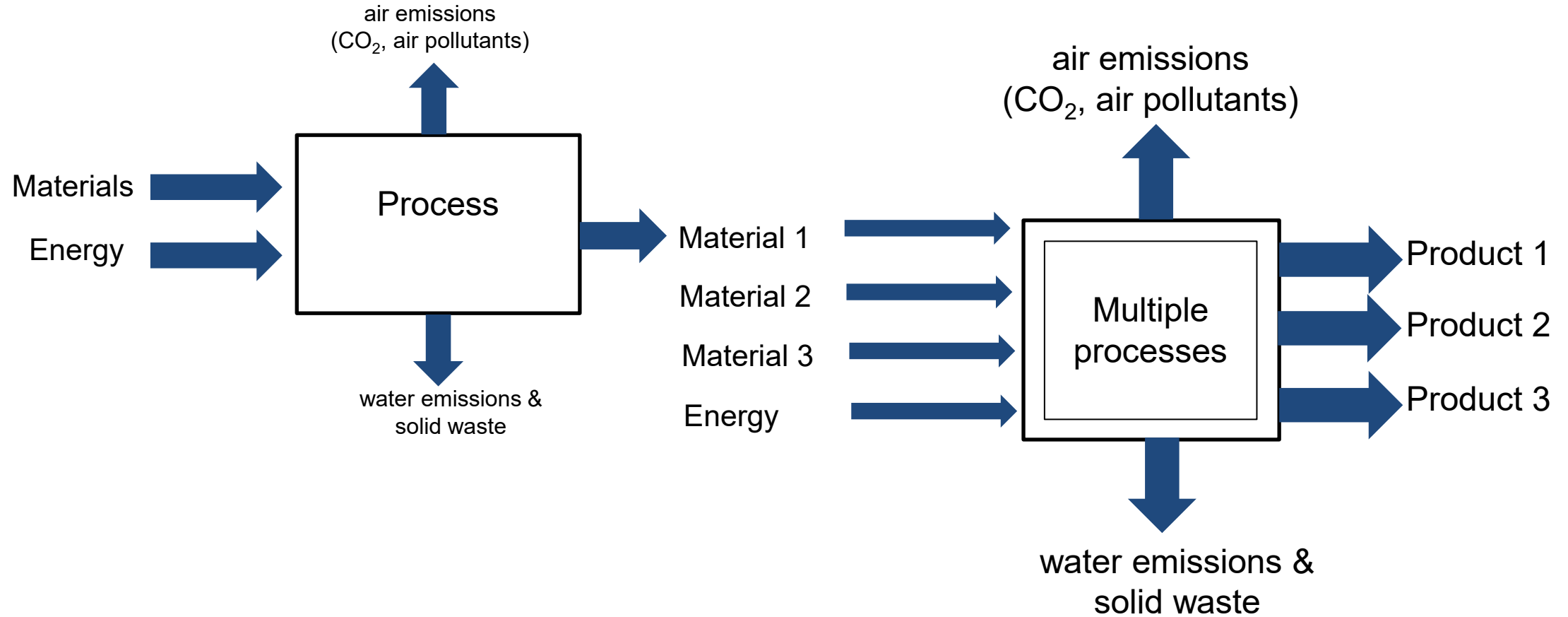
Mass in = Mass out

Activity-based emission factors



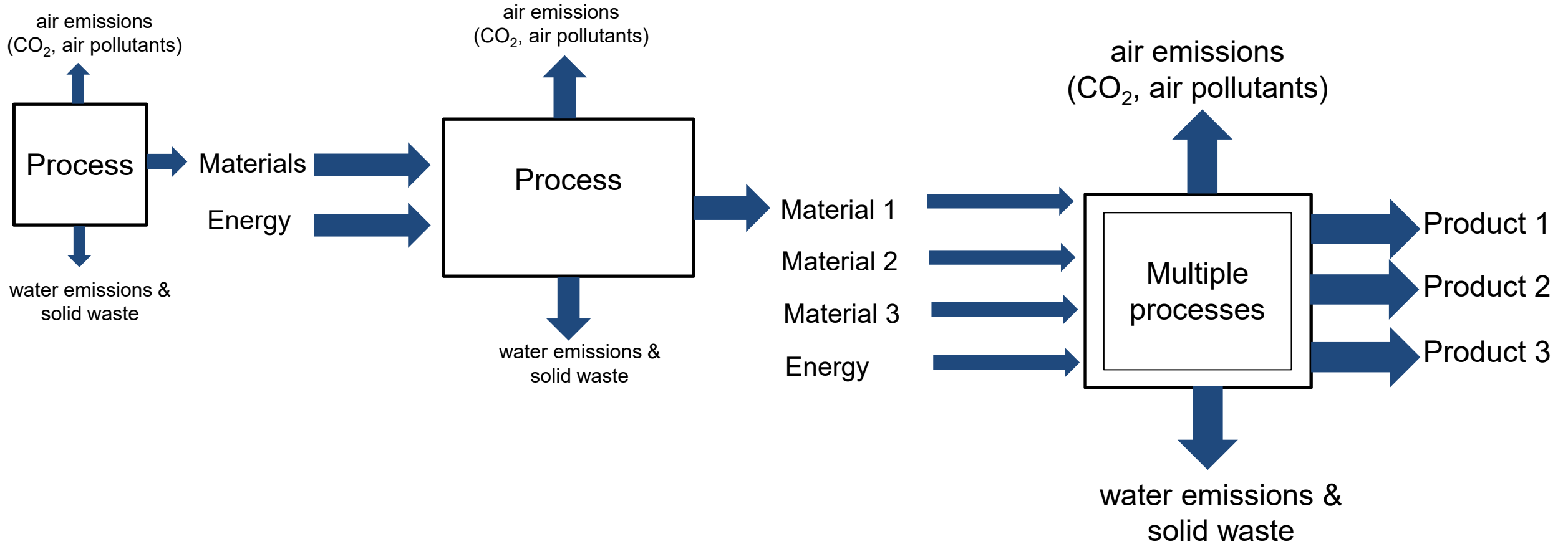
Mass in = Mass out

Activity-based emission factors



Mass in = Mass out

Activity-based emission factors



Mass in = Mass out

Spend-based emission factors

Environmentally Extended Input-Output (EEIO) Models

Combines emissions with economic model of the economy

Emissions data for each major industry sector

Captures economic interactions among industries and associated emissions

Emission factor: $X \text{ kg CO}_2/\$ \text{ spent}$

Activity-based emission factors

Physical relationships

Captures product specific differences

More accurate, higher resolution

More complicated to model

Stable results

Spend-based emission factors

Economic relationships

Generalized to industry sector

More complete, lower resolution

Easy to implement

Results vary with price differences

Data **(**
availability
quality
variability
uncertainty**)** **always an issue**

The future of GHG emissions data

- Emission databases contain data collected:
 - For different purposes
 - In different places, at different times
 - With different levels of rigor and detail
- Can use machine learning and other AI tools to improve & update datasets, but...
- High quality, recent primary data difficult to obtain

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