

Enhancing the economic dimension of LCA + DEA studies for sustainability assessment



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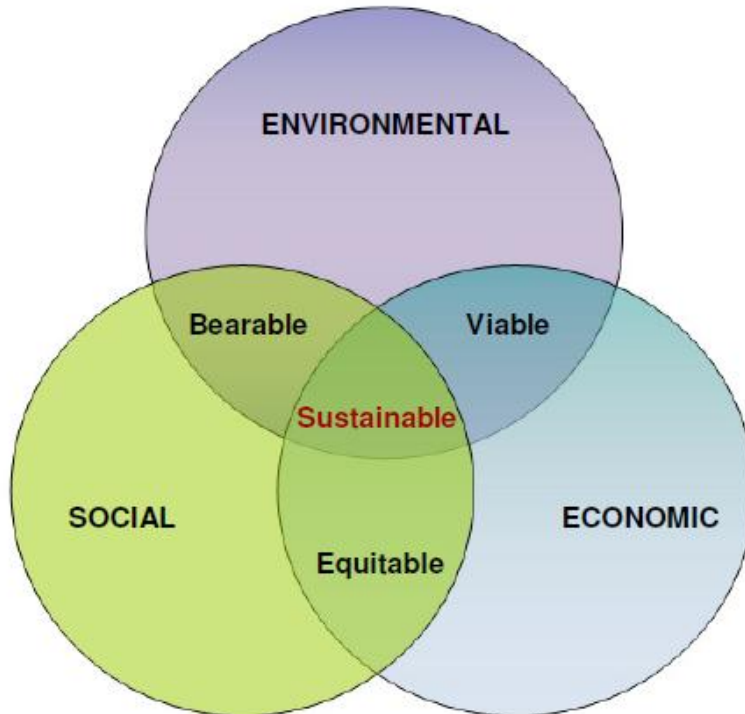
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1. Introduction

General context

- **Sustainable development:** Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- **Eco-efficiency:** Delivery of competitively priced goods that satisfy human needs while progressively reducing environmental impacts of goods and resource intensity throughout the entire life cycle to a level at least in line with the Earth's estimated carrying capacity.

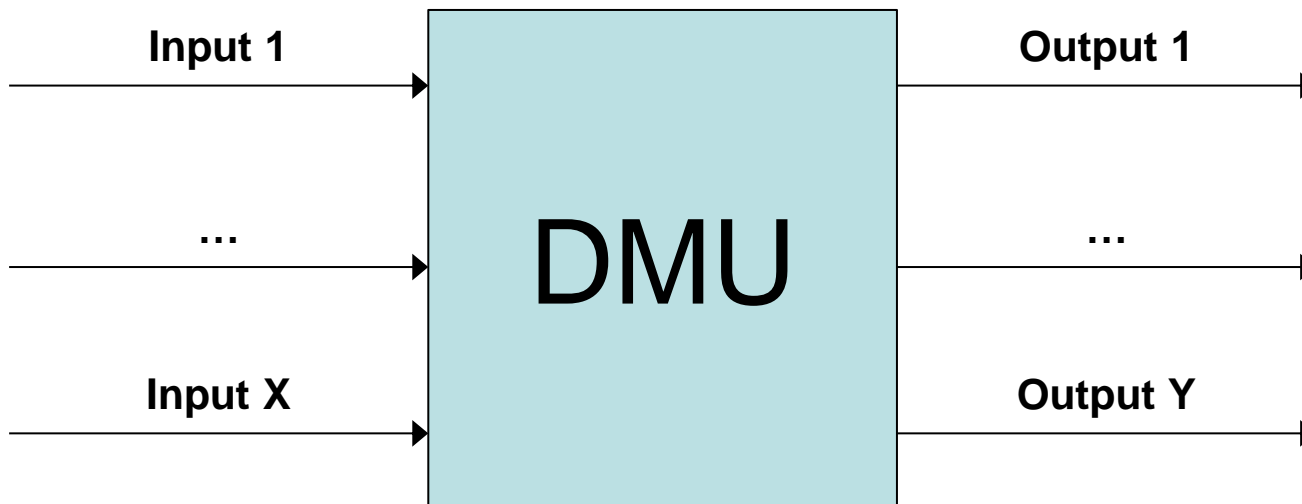


Need for integrative methodological approaches for sustainability assessment and benchmarking



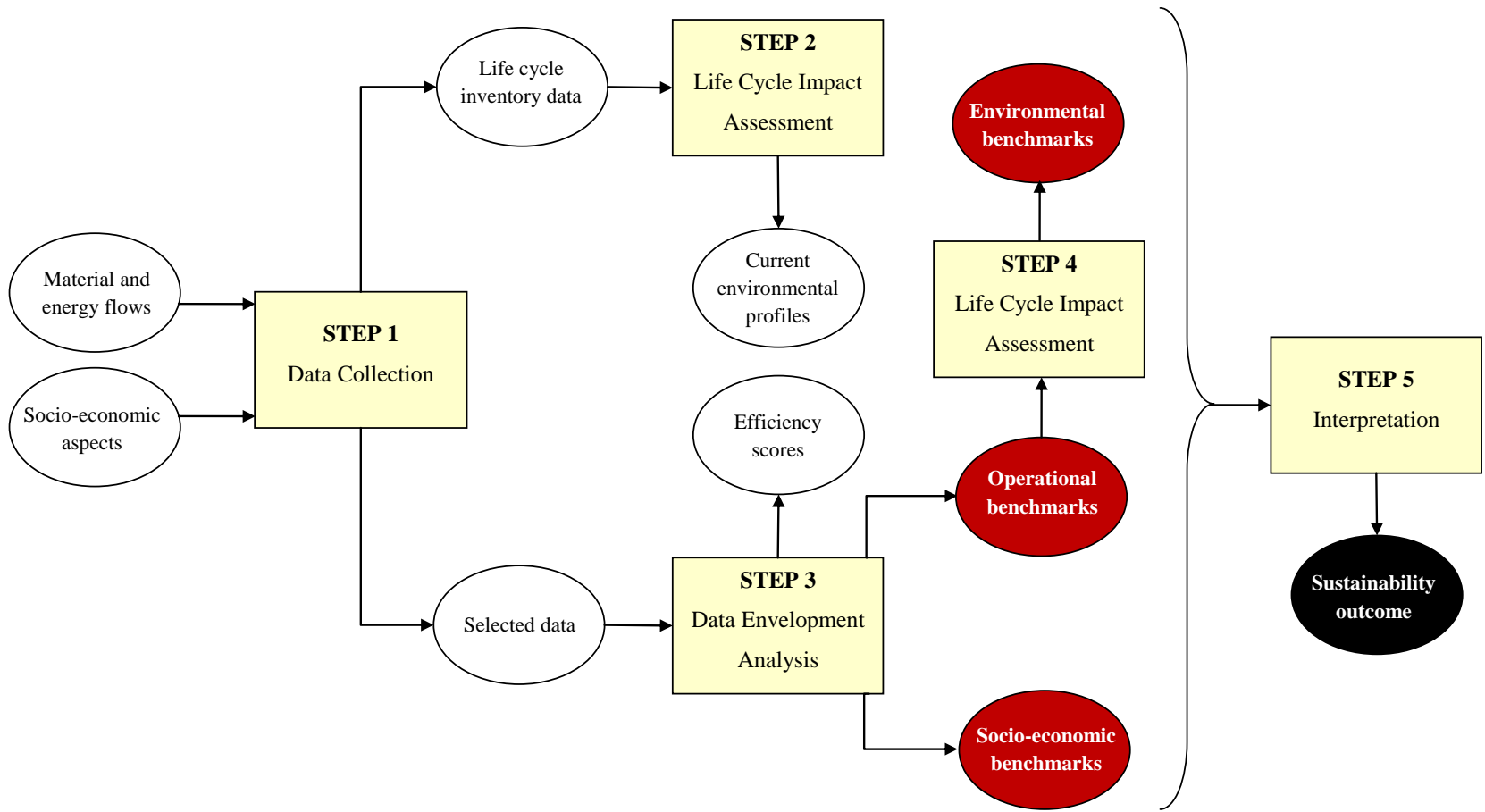
Methodological context

- **Life Cycle Assessment** (LCA): Methodology for assessing the environmental aspects and potential impacts associated with a product by compiling an inventory of relevant inputs and outputs of a product system, evaluating the potential environmental impacts associated with those inputs and outputs and interpreting the results of the inventory analysis and impact assessment phases in relation to the objectives of the study.
- **DEA**: Linear programming methodology to measure the relative efficiency of multiple decision-making units (DMUs) when the productive process shows a structure that is composed of multiple inputs and outputs.





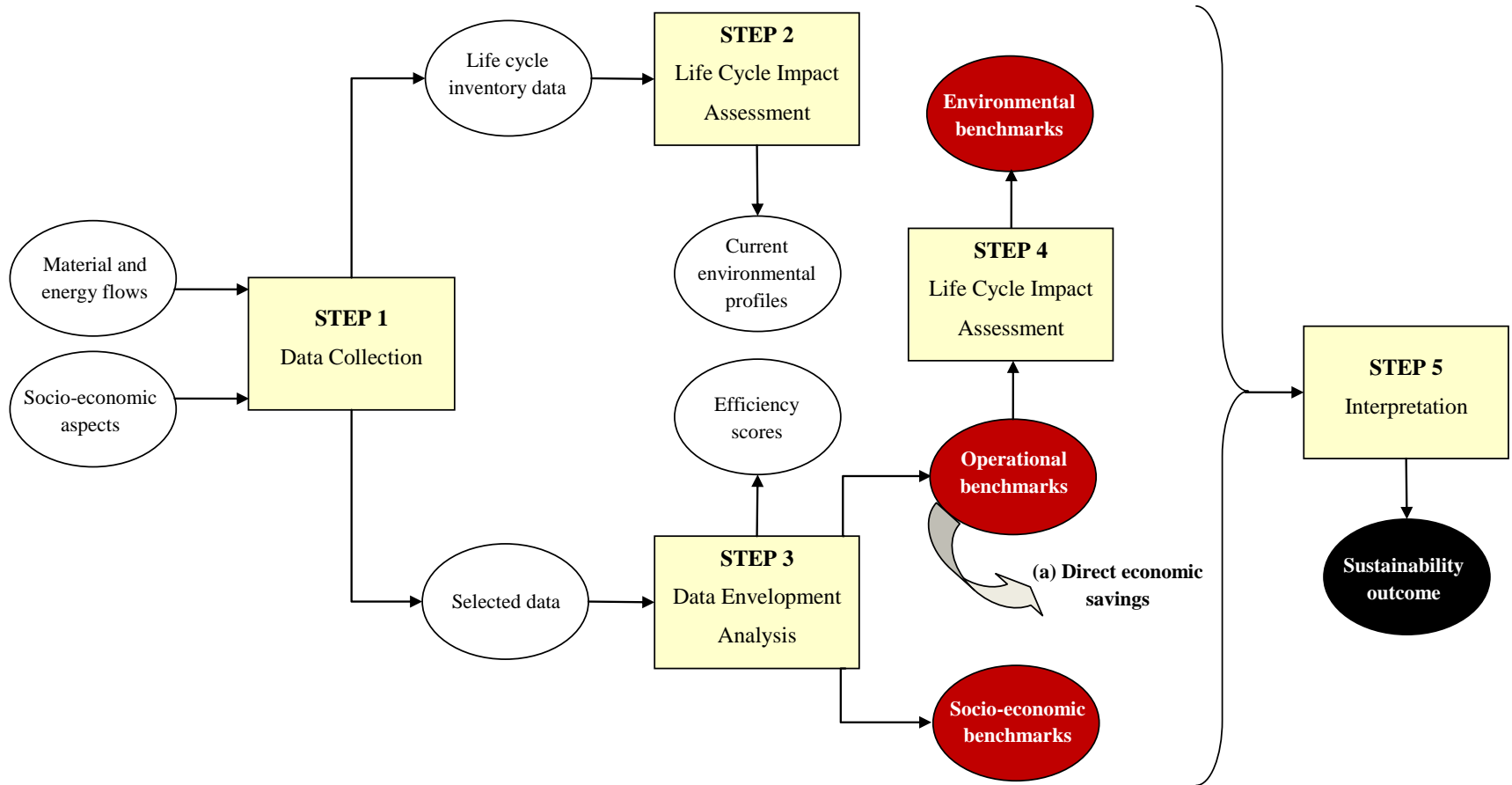
Five-step LCA + DEA method



Acknowledged need for further efforts to improve the economic dimension of the assessment

3. Results and discussion

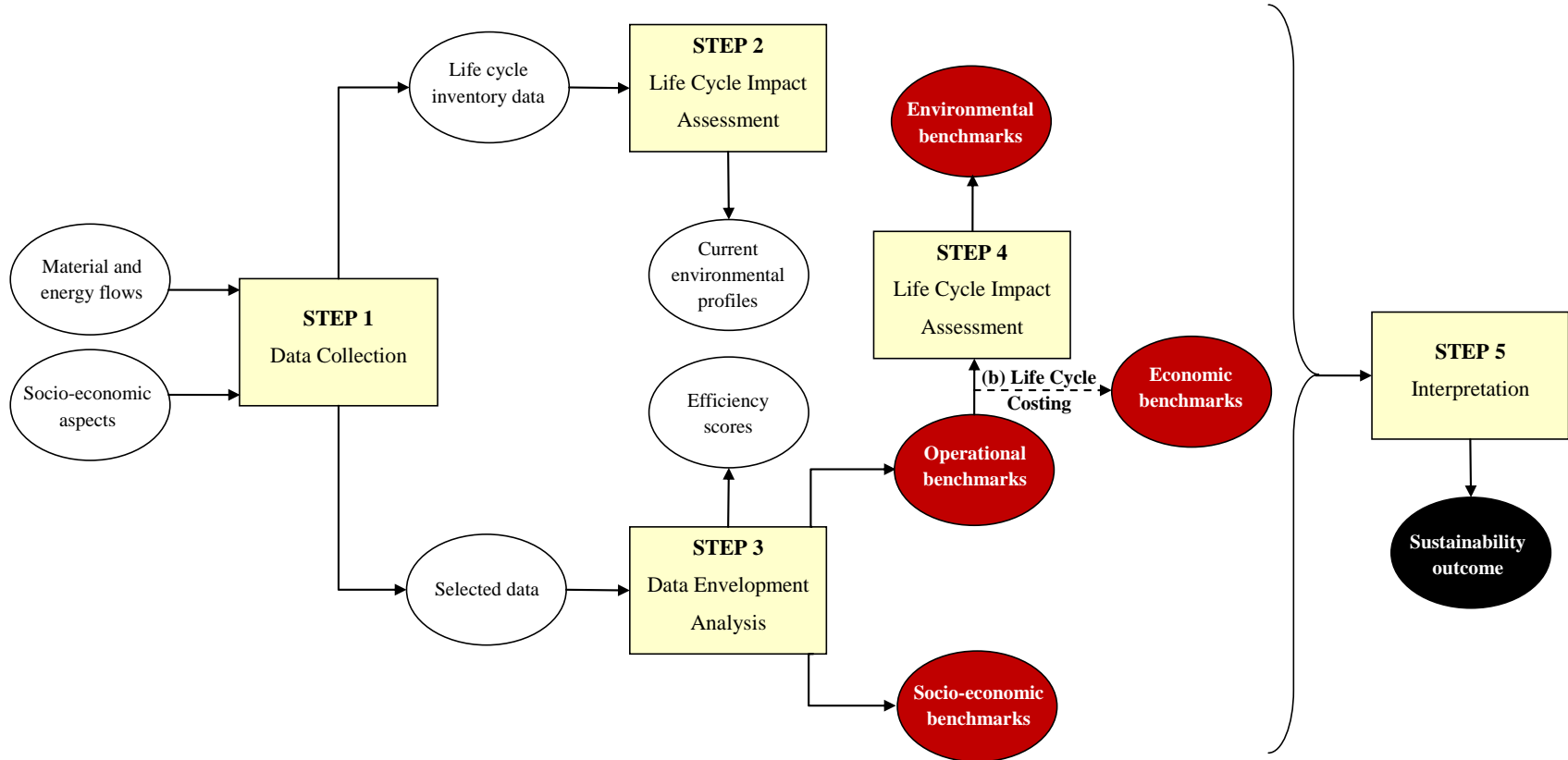
Straightforward strategies (I)





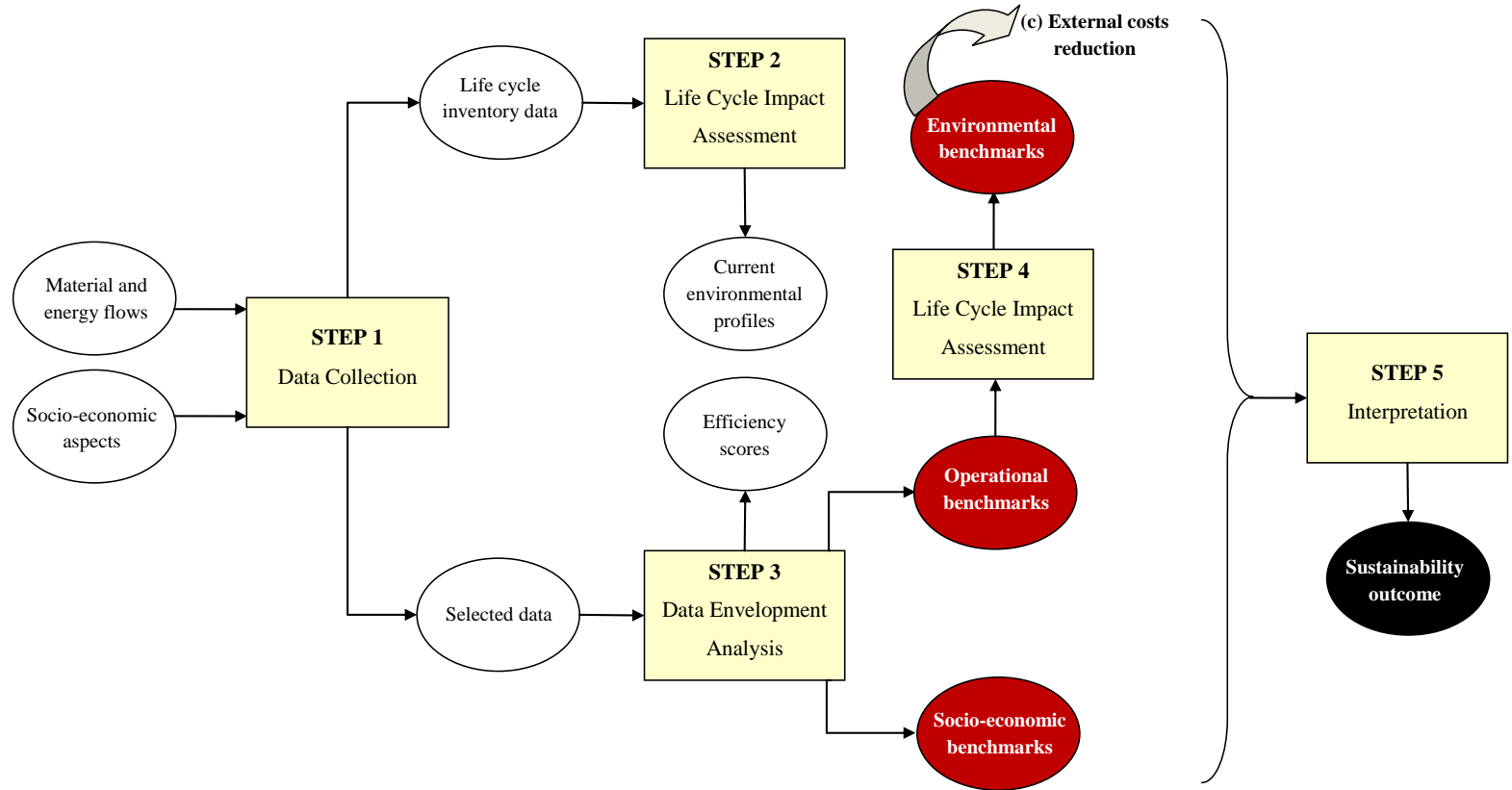
3. Results and discussion

Straightforward strategies (II)



3. Results and discussion

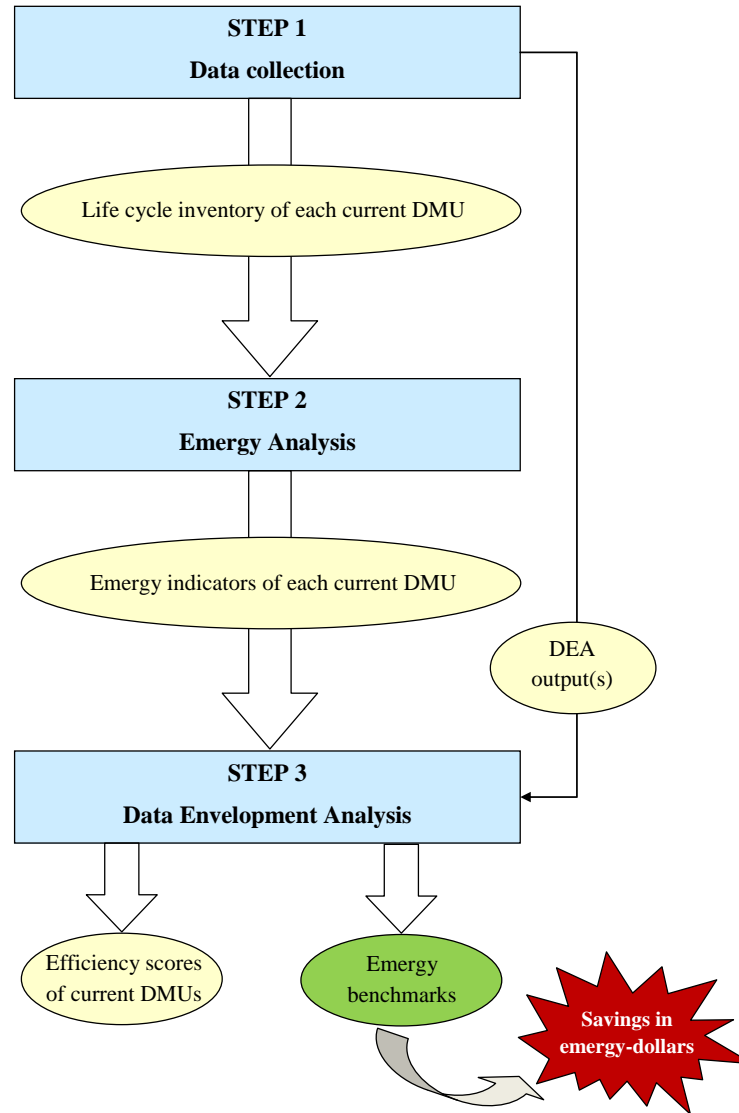
Indirect strategies (I)





3. Results and discussion

Indirect strategies (II)





- The enhancement of the economic dimension of the LCA + DEA methodology for sustainability assessment is **feasible**.
- **Straightforward and indirect strategies** to attain this methodological improvement can be devised.
- The **choice** of the most appropriate strategy or set of strategies depends on the specific case study and on user requirements.
- The implementation of these pathways into the LCA + DEA methodology is expected to **boost its use for sustainability assessment**, dealing with environmental, economic and social aspects in balance.

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