Monetary valuation of environmental impacts in LCA
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Sébastien Soleille, Augustin Chanoine and Fabio Menten - Deloitte Sustainability
Bo Weidema - 2.0 LCA consultants
Jim Smart – Griffith University
Presentation outline

• **Part 1 – Introduction to monetary valuation**
  ✓ Historic
  ✓ Objectives
  ✓ Methods

• **Part 2 – Monetary valuation for LCA practitioners**
  ✓ Decision tree
    – Monetary valuation with generic monetarisation factors
    – Monetary valuation with specific monetarisation factors

• **Conclusion**
Part 1
Introduction to monetary valuation

• Monetary valuation of environmental damages: **what is it?**
  **Since when** has it been used?
• Monetary valuation, **why** (not)?
• Monetary valuation, **how**?
Monetary valuation of environmental externalities, a long-standing practice

Decades of use in public policy analysis

First applications in public policies

- Flood Control Act (US, 1936): “if the benefits to whomsoever they accrue are in excess of the estimated costs”
- (US, 1960s): Applications in other fields: water quality, preservation of natural parks, use of toxic substances, etc.
- (GB, 1961) Costs-benefits analysis for the construction of the M1 highroad (between London and Leeds)

1990’s: public policies related to atmospheric pollution in Europe and in the US were subject of cost benefit evaluations

- Clean Air Act Amendments (US, 1990)

Few recent examples in France

- Commissariat Général à la stratégie et à la Prospective (2013) « Socio-economic assessment of public investments », Quinet report

From the end of the 1990’s onwards: development of practical implementation on monetary valuation in LCA
What can the monetary valuation of environmental damages be used for?

A few possible applications, depending on different contexts

- **Cost-benefit analysis**: assessing, comparing and justifying public policies (e.g.: policies to reduce greenhouse gas emissions, infrastructure constructions that have an impact on the environment, etc.)

- Assessment study of an ecological disaster to estimate the compensations (e.g.: oil spill caused by BP Deepwater Horizon)

- Assessment of the **environmental externalities** of a behaviour, in order to act rationally on its price (e.g.: to fix an environmental tax)

- Using one single indicator in the context of multi-criteria decisions (e.g.: to initiate an eco-design process)
Much reluctance that are ethical, theoretical or practical

Monetary valuation has always been subject to criticism:

• Regarding its underlying principles: Is it relevant, or even ethical, to express in monetary terms the value of everything?
• Regarding its practical feasibility: Is it even possible to give a monetary value to everything?

2 extreme irreconcilable positions

“It is unacceptable to give a price to things that are not economically measurable”

“Nowadays, most decisions are taken based on economic criteria: what is not measured in economic terms is not taken into account”

Theoretical presupposition of monetary valuation

• Monetary values are relevant as comparative basis to evaluate the value of everything
• The general aim is to maximize global social well-being
• Additive accountancy
• Indifference to rights
• Anthropocentric vision of the world
What are we looking for when we monetarise? On which methods can we rely?

- The value of a product/service is the total amount that individuals are willing to pay to get this product/service (or to receive in order to be dispossessed)
- Value has different components:

- There are different methods of monetary valuation:
  - Market price method
  - Revealed preferences method (hedonistic preferences, travel cost, etc.)
  - Stated preferences method (contingent valuation, choice experiment, etc.)
  - Human capital approach
  - Avoidance method
  - Value transfer
  - Meta-analysis
Part 2
Monetary valuation for LCA practitioners
An iterative approach for monetary valuation in LCA

Development of a decision tree to guide LCA practitioners, with two main steps

1. **Is monetary valuation of impacts appropriate (useful and acceptable)?**
   - **Yes**: 1st iteration – Monetary valuation with generic factors (reference values and ready-to-use approaches / applications)
   - **No**: Stop

2. **Is the development of specific values appropriate (useful and feasible)?**
   - **Yes**: 2nd iteration – Monetary valuation with specific monetarisation factors (and comparison with the results of the 1st iteration)
   - **No**: End
Is monetary valuation of impacts appropriate (useful and acceptable)?

3 key questions

Is there a trade-off?
- Choice between two or more impact categories
- Costs/benefits comparison

Would monetary valuation ease the communication of results?

Example: How to choose between 2 products with more or less good performances depending on different environmental impact indicators?

⇒ Express the impacts in a single unit can be useful!
An iterative approach for monetary valuation in LCA

Is monetary valuation appropriate (useful and acceptable)?

1st iteration – Monetary valuation with generic factors (reference values and ready-to-use approaches / applications)

Is the development of specific values appropriate (useful and feasible)?

2nd iteration – Monetary valuation with specific monetary valuation factors (and comparison with the results of the 1st iteration)

Stop

End
1st iteration: Monetary valuation of impacts with generic factors

- Preselection of generic monetary valuation approaches, which are considered as the most relevant and easy to apply in LCA

<table>
<thead>
<tr>
<th>Monetary valuation of midpoints</th>
<th>Monetary valuation of endpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECOTAX</td>
<td>STEPWISE</td>
</tr>
<tr>
<td>ECOVALUE</td>
<td>LIME</td>
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<tr>
<td>EVR</td>
<td>EPS</td>
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- Recommendations by area of protection:

  **Human health:** application of the 3 endpoint methods

  In some contexts, there are reference values; e.g. VOSL (value of statistical life) used by public authorities. In France:
  - Boiteux II report – 1.5 million EUR\(_{2000}\)/statistical life
  - Quinet report – 3 million EUR\(_{2010}\)/statistical life and 115 000 EUR\(_{2010}\)/year of statistical life

  **Ecosystems:** use of EPS and LIME

  **Ressources:** lack of robustness for abiotic resources depletion indicators

  Most robust methods: LIME and STEPWISE

- In a nutshell: we recommend to use several methods to enhance the robustness of the study conclusions
An iterative approach for monetary valuation in LCA

Is monetary valuation of impacts appropriate (useful and acceptable)?

Yes

1\textsuperscript{st} iteration – Monetary valuation with generic factors (reference values and ready-to-use approaches / applications)

Is the development of specific values appropriate (useful and feasible)?

No

Stop

Yes

\textbf{2\textsuperscript{nd} iteration} – Monetary valuation of impacts with specific monetary valuation factors (and comparison with the results of the 1\textsuperscript{st} iteration)

An impact is specific if:

• It is linked to a specific geographic location
• It is associated with life-cycle steps in the foreground
• The stakeholders who might be interviewed can have a motivated opinion on this impact

\textbf{Examples:} impact of a wind farm on a specific landscape, biodiversity in a specific natural reserve, etc.

\textbf{Recommendation:} Development of specific monetary valuation factors in cases where the existence of specific impacts is confirmed.
An iterative approach for monetary valuation in LCA

Is monetary valuation appropriate (useful and acceptable)?

Yes

1st iteration – Monetary valuation with generic factors (reference values and ready-to-use approaches/applications)

Is the development of specific values appropriate (useful and feasible)?

Yes

2nd iteration – Monetary valuation with specific monetary valuation factors (and comparison with the results of the 1st iteration)

No

Stop

No

End
2nd iteration: Monetary valuation of impacts with specific monetarisation factors

Trade-off between several factors

- Use market prices
  - Is there a market for the impact to be assessed?
    - No
      - Is the impact local and is there a surrogate market?
        - No
          - Are there transferable monetary valuation factors (similar context, reliable and relevant results)?
            - No
              - Perform a stated preferences study (survey)
              - Include specific results in the comprehensive monetary valuation of LCA
              - Compare with the first iteration and conclude
            - Yes
              - Prefer survey-based methods
                - If the dialog with stakeholders(*) is very important in the preparation of the project under study, this criteria in favor of surveys can become overriding
        - Yes
          - Is it relevant/possible to involve stakeholders(*) in the impact assessment of the project?
            - Yes
              - Prefer survey-based methods
            - No
              - Perform a stated preferences study (survey)
              - Include specific results in the comprehensive monetary valuation of LCA
              - Compare with the first iteration and conclude
  - Yes
    - Is the revealed preferences approach
      - Use and adapt values from literature
        - Yes
          - Perform a stated preferences study (survey)
          - Include specific results in the comprehensive monetary valuation of LCA
          - Compare with the first iteration and conclude
        - No
          - Prefer survey-based methods
            - If the dialog with stakeholders(*) is very important in the preparation of the project under study, this criteria in favor of surveys can become overriding
Conclusion
In a nutshell

Monetary valuation in LCA should be used if necessary and depending on the objectives of the study

An approach to solve trade-offs

(Readily-available) generic LCA applications of monetary valuation should be used with substantial caution

An approach with a potentially complex implementation, especially when it is decided to develop specific monetarisation factors, which may request time, cost and expertise investments
Thank you for your attention!

Any questions?

Contacts:

Sébastien Soleille
sssoleille@deloitte.fr

Augustin Chanoine
achanoine@deloitte.fr

Fabio Menten
fmenten@deloitte.fr