

W o r k s h o p

Learning about quantitative tools or methodologies for evaluating eco-innovation projects

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Conclusions of the workshop and lessons learned

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Discussion on the environmental pillar of eco-innovation criteria

- Most innovation programmes involved in Eco-Innova use **qualitative criteria** for the environmental pillar of eco-innovation criteria, thus comparing the eco-innovation potential of the individual projects is far from easy. Since innovation results in many cases in a claim on the improvement of eco-efficiency, there should be tools to decide on the ability of a project to significantly contribute to a better environmental quality. The possible environmental improvement (with no pollution transfer) has to be demonstrated and for that purpose, LCA tools can be applied.
- There is a huge amount of **Life Cycle (Inventory) Assessment or LC(I)A- like tools** available, and under development. An inventory of measurement methods in the Eco2chem project¹ identified 82 measurement methods. Background information on these methods and a selection tool is also available. Criteria for selection between these methods include the focus on environmental, economical and social sustainability criteria and the focus on micro-level (product/process), company and/or macro level.
- **ReCiPe**² seems to be a widely known and useful LCA method and is now the background of the Ecolizer 2.0 tool³. The ReCiPe methodology provides for a method giving a single score for the impact on 3 environmental damage categories (human health, ecosystem, depletion of resources). Interest in this ecodesign tool comes from all over Europe.
- **Monetary valuation** in LCA or the quantification of external costs is a possible next step after the quantification of the impact of activities/products. There is a lot of scientific information about aggregation (via DALY⁴) and valuation of health impacts, so the LCA ReCiPe + Daly + monetary valuation is a well established and documented approach. But for ecosystems and depletion, there are big uncertainties

¹ www.suschemanswers.be

² <http://www.lcia-recipe.net/>

³ <http://www.ecodesignlink.be/nl/ecolizer>

⁴ Disability-Adjusted Life Year (1 DALY = the loss of one year in good health)

related to concepts, quantification and monetary valuation. About the monetary valuation of environmental impacts, there were different points of view among the participants of the workshop. It is, however, a good tool for weighing potential costs and benefits of eco-innovation projects.

- The general **experience** of applicants and experts with these methods and tools is rather **limited**. The experience of the agencies and programme owners is equally rather limited. In most cases no specific methodology for an ex-ante assessment of the environmental impact of a project is prescribed, a life cycle evaluation approach or a weighing mechanism for the different environmental criteria is generally not foreseen.
- When coming down to practice, an eco-innovation could be assessed through a pilot or specific case and the innovation should provide a significant improvement compared to a **reference scenario**. This base line could be common existing technology on the market or BAT.
- The LCA work to be done in the framework of the evaluation of R&D&I projects will be subject to **time and resources constraints, possible data gaps and uncertainties**. LCA tools in general are rather developed for routine product design, engineering and investment projects and are not always suitable for the assessment of R&D-projects. Specific LC inventory data regarding the innovation are not always fully available. Due to this uncertainties, only significant improvements are relevant to notice. Simplification choices for the modeling adapting the study requirements to the goal and scope (cfr. ISO 14040) will be necessary.
- Asking for an **LCA-like work package** in each project proposal, which is able to steer innovation during the trajectory, would be a strong incentive for environmental beneficial innovations and integrate life cycle thinking.
- The involvement of an **LCA practitioner/expert** as from the conception of the project and during its execution could also be relevant. The use of LCA all along the Eco-Innovation project will assist to define the nature of the main inputs and outputs of the studied system, and thus areas where to improve/optimize the innovation solution. An iterative approach could integrate progressively available results within the LCA modeling providing feed-back to researchers. For this to be effective however, a very close cooperation between the LCA practitioner and the R&D project staff is absolutely essential. There is LCA software available with very useful features, but LCA practice requests significant time and budget, and also training and regular use by a specialist.
- There are some doubts about the applicability of LCA tools for the topic of **paradigm-change** and system-change or step-change innovations. There may be a need for more qualitative criteria with respect to this topic. However, there is probably always a reference situation which can be defined.
- The question was raised if we do not have to look at the innovation system as a whole, define a transformation/transition path and formulate criteria about the level a project can contribute to this defined transition path i.e. incorporating the considerations/criteria of Hekkert (The Netherlands) for a “paradigm-change” oriented project⁵.

⁵Hekkert, M. & Ossebaard, M. (2010) De innovatiemotor. Het versnellen van baanbrekende innovaties. Van Gorkum, 100 p.

- The focus on eco-innovation may indeed require more structural changes in the **design of innovation policy instruments** themselves, because of the practical obstacles or challenges eco-innovations are confronted with: in particular it seems that radical innovations are confronted with high initial R&D costs, lock-in effects of existing technologies with strong vested interests, uncertainties about market demands, infrastructure investments, regulations etc... Hybrid multi-party networks involving public-private collaborations (including companies, government bodies, civil society organizations, universities and research organizations) might be necessary for transition driven challenges.
- However, an interesting case⁶ showed that there is no empirical evidence that radical system innovations can contribute to significant environmental impacts compared to incremental innovations. The success of a technology is not predictable. Technological progress for existing technologies is often underestimated. Environmental impact also depends on the diffusion. High diffusion of incremental innovations might have a bigger impact compared to low diffusion of radical innovations.
- The “**Sustainable technology development**” framework of IWT provides for an example of a method to motivate (and eventually quantify) possible environmental benefits of an innovation project and tries to stimulate life cycle thinking. Applicants should describe a reference situation on the market, assess the environmental performance of the innovation and estimate global environmental benefits taking into account the exploitation potential. There are clear instructions to applicants and evaluators available.
- In the Eco-Innova call, it seems that the environmental criteria do not always seem to be the primary focus of the applicants. Therefore, this topic needs to be developed in the **second call with clearer guidelines to the applicants**.

Hekkert, M.P. & Negro, S.O. (2008) Functions of innovation systems as a framework to understand technological change: empirical evidence for earlier claims. *Technological forecasting and social change* 76, issue 4, 584-594 <http://www.sciencedirect.com/science/article/pii/S0040162508000905>

Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlman, S. | Smits, R.E.H.M. (2006) Functions of innovation systems: a new approach for analysing technological change. *Technological forecasting and social change* 74 413-432
http://www.transitiepraktijk.nl/files/Hekkert_et_al_2007_%20functions_of_%20innovation_systems.pdf

⁶ Renning, K., Markewitz, P. & Vögele, S. (2010) How clean is clean? Incremental versus radical technological change in coal-fired power plants. *Journal of evolutionary economics*.

Discussion on social criteria for Eco-Innovation projects

- **Social LCA (S-LCA)**⁷ processes follow the same steps as an environmental LCA, but instead of looking at the environmental impacts, one looks at social/societal criteria for the chain actors. The main impacts per activity can differ for environmental and social impact criteria. The same uncertainties on project's level exist for both social LCA, as for environmental LCA. You need knowledge on the value chain ... which is not so evident.
- An integrative analysis of different sustainability aspects can be done by a **Life Cycle Sustainability Assessment (LCSA)**⁸. There is certainly a lack of knowledge and experience on this item in the framework of eco-innovation projects.
- **Social criteria** depend on the concerns of the **stakeholders** (workers, local community, society, consumers and other value chain actors). There are two international standards which are incorporating these concerns: ISO 26000⁹, a Guidance on social responsibility, and the Global Reporting Initiative Guidelines¹⁰, the latter used for sustainability reporting. Both are stressing the importance of value **chain responsibility**. The standards provide for a wide range of indicators, including human rights, working conditions, health and safety, cultural heritage, governance and socio-economic repercussions. The key advantage of these indicators is that they have been legitimated by a wide support base of various stakeholders (companies, public sector, environmental and social stakeholder groups...) during the development and voting process.
- Therefore, a way to deal with social responsibility would be to ask for a **sustainability report on organization level** and take this into account in the evaluation for receiving project subsidies. However, there were questions about the feasibility for SME's doing these efforts and there is no clear view on the number of companies who are dealing with sustainability reporting. In most cases, big companies will have a sustainability reporting, whereas only a limited number of SME's are involved, so you would have a bias in the allocation of subsidies.
- In order to incorporate social criteria on the eco-innovation programme level, one could **involve stakeholders in formulating the programme**. On a project level one could involve stakeholders in workshops (such as the regular "**user committee**" meetings and related interaction mechanisms within some existing programs).

⁷ Benoit C. and Mazijn B. (Eds.), *Guidelines for social life cycle assessment of products - A social and socio-economic LCA code of practice complementing environmental LCA and Life Cycle Costing, contributing to the full assessment of goods and services within the context of sustainable development*. ISBN: 978-92-807-3021-0, UNEP-DTIE, Paris, 2009, 104 pp.

⁸ Valdivia S., Ugaya C., Sonnemann G. and Hildenbrand J. (Eds.), *Towards a Life Cycle Sustainability Assessment – Making informed choices on products*. ISBN: 978-92-807-3175-0, UNEP-DTIE, Paris, 2011, 86 pp

⁹ http://www.iso.org/iso/iso_catalogue/management_and_leadership_standards/social_responsibility.htm

¹⁰ <https://www.globalreporting.org/Pages/default.aspx>

- Talking about technology trajectories, the remark was made that also **technology assessment (TA)** has some tools for integrating stakeholders' points of view and for showing involvement with social sustainability.
 - As a conclusion, the concept of “social innovation” has a very broad meaning. One option to include social criteria might be to let a company **build and defend its “social sustainability” case** based upon its selection of relevant issues taken from the wide list of social considerations as reflected in the ISO 26000 standards and GRI-indicators (e.g. indicators for Application level A for maximum completeness). This would be consistent with the “sphere of influence” concepts as described in the standards. It is then to the applicant to decide in which areas the organization could best assume his social responsibility and contribute to making a difference. A risk of this open approach might be the diversity of “creative” motivations making it difficult in practice to choose and select between proposals.
 - The other option would be that programme owners and funding agencies would **“pick and choose” specific social considerations** of priority concern i.e. from a more top-down perspective (such as “consumer aspects” in the first Eco-Innova call). This option would be more value driven or politically sensitive i.e depending on ideological or philosophical preferences. A too narrow approach might also exclude relevant developments.
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