

SCORELCA

Call for Tenders n° 2018-01

Environmental impacts of mining operations for some raw materials

Deadline for email and paper responses:

Monday 13 May 2019

Context :

When conducting an LCA, the data for the modelling of raw material extraction are selected from existing databases such as EcoInvent, ILCD, Gabi... Indeed, the practitioners devote little time and resources to check the robustness of these data.

However, for certain products or applications, the environmental impacts of such activities could be very high on the life cycle and these data should be better analysed to evaluate if they are really appropriate for the study.

For example, LCA practitioners should assess the way these data have been modelled, the different steps considered, the allocation methods, the data sources, their representativeness, etc.

Thus, the goal of this study is to provide an overview of the existing data, their relevance and their limits for a set of selected raw materials and regarding several criteria.

Others data will also be identified, that could be implemented in LCA databases in order to improve LCA studies. Finally, some recommendations will be provided on the use and the improvement of raw material extraction data.

SCORE LCA conducted two studies¹ whose results helped us to identify the main raw materials we will focus on in this study, mainly metals that could be considered as critical in the short or medium term.

After all, the deliverables will help practitioners to gain a better knowledge of the modelled processes for raw materials and to provide recommendations for a better use and improvement of these data when modelling products or services in LCA.

¹ 2017-02 : Scénarios de transitions énergétiques: forces et faiblesses de l'ACV dans une perspective de ressources limitées et
2017-04 : Applications multiples en ACV : aspects méthodologiques et exemple du calcul des impacts environnementaux des batteries bénéficiant d'une seconde vie

Objective

- Assess the relevance of existing data and practices for the mining activities in LCA
- Identify supplementary data that could improve existing data, in particular, improve their representativeness in a perspective of market changes (energy transition)
- Develop recommendations on the use and the future improvement of these data

Study content

I. State of the art on the LCA modelling of mining activities

a) Life Cycle inventories of mining activities in the LCA databases

This first step will present a state of the art of the existing data and the modelling methods of mining activities; that is to say the extraction from the soil of raw materials (mines) including physical separation of ores and tailings ; in the LCA databases (Ecoinvent, Gabi and PEF, as available on the internet) for a short list of raw materials.

It will focus on the study of physical processes, in the site boundaries, excluding the chemical and thermal processes. If some data include this type of techniques, it will be explained and described in the scope.

The data quality will be evaluated with existing criteria in ISO 14044 and PEF.

The raw materials that must be included in priority are: Copper, Aluminium, Nickel, Lithium, Cobalt, Cadmium, Néodymium.

The team will evaluate and clarify the supplementary resources she will be able to include in the scope of the study (in the proposed budgetary framework) and among the following: Zinc, Manganese, Platinum group metals, Lead, Silver, Indium, Gallium, Tellurium, Selenium, Gravels, Coal.

The informations shall include :

- Feature of the raw material : main product or by-product/co-product from another material to be defined
- Features of mining site for the data (geographical location, ...), type of extraction processes, market share, type of mineralization
- Data sources (including the energetic models considered),
- Data date,
- Completeness, differences between sources, data variability (temporal, geographical, processes, etc.),
- Scopes: steps and processes in the modelling (including recycling of process water) : by-products/co-products considered, modes of allocation of coproducts, proxis used...
- Available and missing data,

- Impact of the future evolution (over time) in the evolution of those resources on the previous information,
- Inclusion (or not) of these raw materials in the impact assessment methods on resource depletion

As each SCORE LCA member works with an Ecoinvent licence, the Ecoinvent datasheets could be used clearly in the report in a confidential paragraph if necessary (not published).

b) LCA modelling of mining activities in the literature

Moreover, the team will identify in the literature, the case studies that detail the calculation of the environmental impacts of mining activities. The research will focus on LCA studies and could be spread to non-LCA methods if relevant. These documents will be analysed to highlight the following aspects :

- What are the most used indicators (impacts, others) and why ?
- What are the main impacts? (with impact pathways beyond resource depletion)
- What are the main « upstream » hotspots by raw materials ? (and the way to reduce them)
- What are the main sources of variability ?

The most relevant case studies will be detailed. The team will clarify the number of case studies that will be detailed and a first list with a short description.

c) Supplementary data

Simultaneously, the non-LCA publications concerning the same raw materials will be listed (company, professional federations, academic) and that could bring new data : new or other processes, data update, data for other extraction installations, etc.

In particular, the studies in the mining academic literature that could provide reliable input data for existing LCI and on the evolution of mining techniques will be analysed. The goal is to identify potential sources of data for LCA but also the consistencies, extrapolation needs and inconsistencies with the data used in LCA (the fields of analysis will be explained).

A reflection will be presented to identify how these data could be used in LCA.

Finally, and as far as possible, through contacts with the professional federations of the metals concerned, the team will detail if LCA work is in progress, and the expected dates of publication of the ICV resulting from this work. The respondent will specify the contacts he will have for this task.

d) Synthesis

All the work of this first phase will be illustrated as much as possible by explanatory diagrams and summary tables.

Crossing information between different metals will be conducted.

Sources to consider :

- For Copper : ECI and ICA, see PCR « Copper and ores » by EPD System, see PEF works on pipes and Metals...
- For Nickel : Nickel Institute, Eramet etc.
- ITERAMS project
- ERA MIN projects

The team will identify other sources of data that they consider relevant, and specify how they will use these sources.

II. Analysis

The analysis of the state-of-the-art performed in the first part will identify the different limitations of the data used in LCA, according to the objectives of these LCAs and the contribution of the ICVs in the overall results.

The conclusions of this analysis can be summarized in tabular form.

The types of LCA for which the available data are appropriate will be listed.

Then, the team will analyze, according to several criteria (credibility of the source, completeness of the data, transparency, representativity ...) if the works carried out or in progress can fill the identified limitations and make it possible to use the available data, improved by the works presented above, in other types of LCA.

III. Recommendations

This last part will consist in providing recommendations for the practice of LCA for the mining activities: which data to prefer, how to use them, which sensitivity analyzes have to be lead in the case of prospective or consequential studies, which limitations of use ...

In particular, the following issues will be included:

- Geographical dimension of the models: what needs, what availability? On which geographical scopes / markets can we consider that the use of materials is a convenience, i.e. it is not necessary to obtain specific data (the average on this market is adequate)?
- Implementation of "sustainable mining" sectors: what influence on the LCI of these sectors?
- Consideration of the respective use of co-products in the context of the growth of the demand for a material (while the demand of others would remain stable): How the allocation rules are affected? How the LCI of the material whose demand is increasing is affected?

The respondent will identify in his proposal other issues that he considers essential to include in the recommendations.

Workplan

The expected phases and deliverables of the project are:

- Inception meeting: Detailed presentation of the problem, working mode of the team. This work will consist mainly in deepening the elements presented in the commercial offer and detailing some particular elements. Following this, an inception report will be produced and sent to the monitoring committee, which will validate it.
- Realization of the state of the art, according to the choices made at the launch meeting and the commercial offer..
- Intermediate meeting: presentation of all the results of the state of the art, the learning and an in-depth analysis of this bibliography. These elements will be discussed in the meeting. An interim report, gathering all the work done at this stage will be sent at least two weeks before the intermediate meeting to the monitoring committee, which will produce comments (during and after the meeting).
- Recommendations: the objective of this third phase of the project is to produce a final report answering all the objectives of the project, and this before the final meeting. Practical and concrete recommendations will be proposed in the draft final report and discussed at the final meeting.
- Sending the draft final report three weeks before the final meeting to the monitoring committee, producing comments from the committee.
- Final Meeting: presentation of the work done since the intermediate meeting, recommendations (taking into account comments received) and discussions. Additional comments may be produced after the meeting if necessary. These comments should be incorporated into the final version of the final report.

Meetings

Taking part of three meeting in Paris (eventually in Lyon):

- Launch (including a working plan description and the inception report, two weeks after the beginning of the study),
- Mid-term (including the presentation of the bibliographical results and the first key items)
- Final (including the final temporary report and the interim French scientific overview).

For each meeting, the team will be in charge of the presentation materials (PDF or PPT in French or English).

The meeting will be held **in French language** in preference.

Finally, the team will hold a **feedback meeting** in French during about an hour by web conference (system supported by SCORE LCA if needed). The meeting, carried out after the final meeting, will aim

to present the detailed results of the study to active and partners members and to any person SCORE LCA wish to invite.

Deliverables required

- 1 inception report in French,
- 1 mid-term report in French,
- 1 final report in French,
- 1 set of slides in English presenting summarized overview of the main findings of the study,
- 1 scientific overview in around 5000 words (including: summary + detailed scientific content of the study) in French,
- 1 scientific overview in around 5000 words (including: summary + detailed scientific content of the study) in English,
- Conducting a webinar restitution of the results for members, in French, at the end of the project (duration : 1 hour).

Study duration

About 9-12 months. The launch meeting will take place in Paris in June.

Budgetary framework

About 50 000 Euros duty-free. The offer could add optional propositions to be discussed.

Notes

If the content of the realized work makes it possible, the selected team could be highly encouraged by SCORE LCA to participate in the enhancement of the results (preparation of publications, participation in workshops...): including a detailed option covering this aspect in the offer and a dedicated budget in the financial proposal is strongly recommended.

Moreover, the team could propose to SCORELCA any promoting action that seems appropriate.

The proposed team in the response must be the one that realizes the study. The amendment of the applicant team after filing the reply may question the choice of members of SCORELCA.

Any change in the proposed team during the study should be notified to SCORELCA, the reorganization should be detailed and subject to the acceptance of SCORELCA.

Submission

The projects must be presented with a document based on the English form available on the SCORELCA website: www.scorelca.org

Careful! The responses are limited to 30 pages !

The deadline for the submissions is **Monday 13 May 2019**. (email date and postmarked by the deadline date)

Each response really must be sent *by paper mail* to the following address:

SCORELCA

Bât. CEI 1

66 Boulevard Niels Bohr

CS 52132

69603 VILLEURBANNE cedex

FRANCE

AND *by email* to:

contact@scorelca.org

Responses evaluation

Beyond compliance of the answers to the above instructions, the main evaluation criteria will be the quality and the argument of the response, the skills of the applicant team and particularly his experience in raw material extraction processes and mining activities. In addition, the evaluation will pay attention to the complementarity of the proposed skills. If a partnership is proposed, **any details on the organization and the link between the different entities (to demonstrate the effectiveness of the partnership during the project) will be appreciated.**

Finally, the educational aspect of the project will be a great differentiating element.