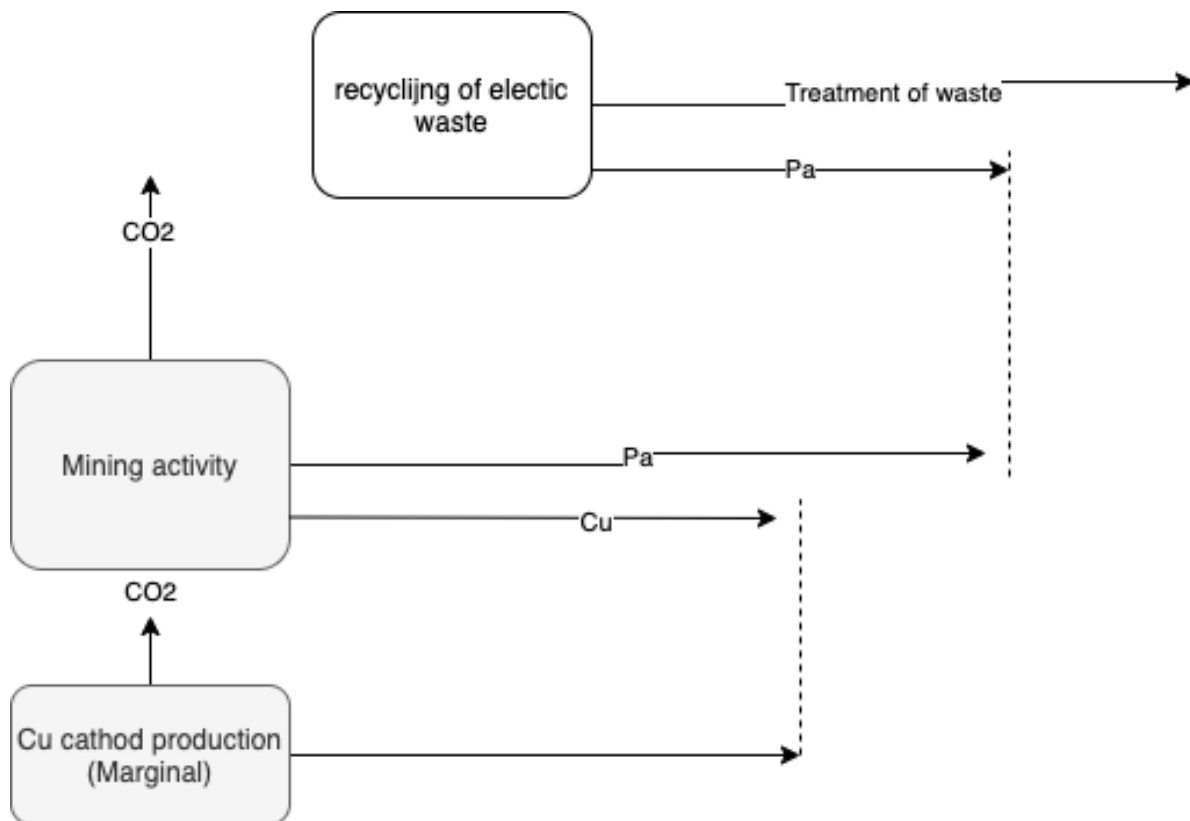


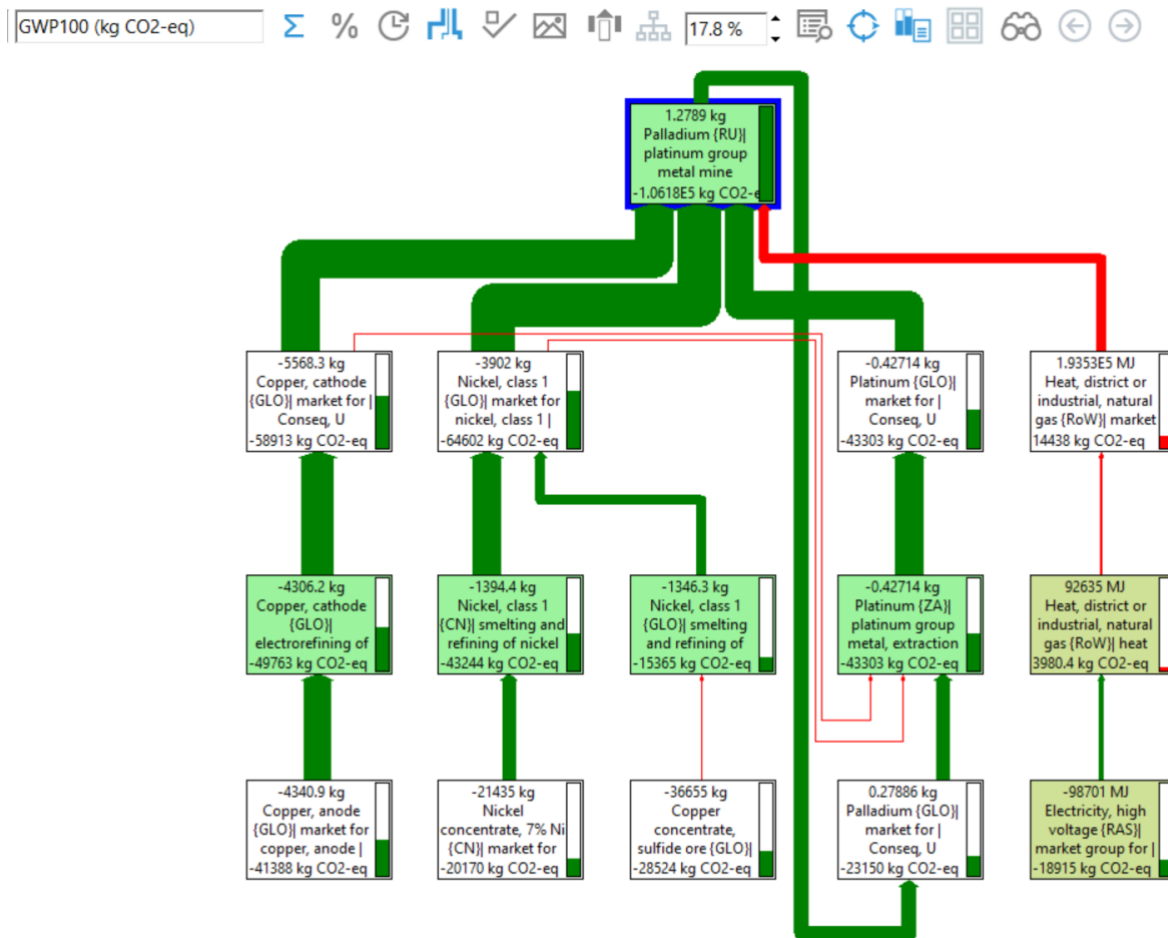
Module 1, part II – Q&A

Georgia: question of mining how is it possible that mining leads to positive impact?

Jannick/Massimo/Døren: this is the system under analysis, there is a double substitution.



However, main issue (disregarding the recycling activity) is that the mining activity producing Palladium and Copper (and other metals) has a negative impact – screenshot below. (answering to Mudit: Negative impact is because the substituted /displaced activities have a larger impact than the mining activity itself so the total system result is negative). Key issue: *Why is Pa the determining product when there is a little quantity of it produced compared to Cu (orders of magnitude lower)?* Because Pa is the only product that can only be produced in this way while Cu has alternative production routes. This is the assumption made by ecoinvent but might be questionable whether it is right. Double check the dataset and try to understand why they made this choice.



Steve: how many activities usually investigated conseq. LCA?

Jannick: it depends. In general less than when you do attributional because many are constrained so no need to model them (and find data etc.)

Steve: So a lot of focus on few processes?

Søren: yes.

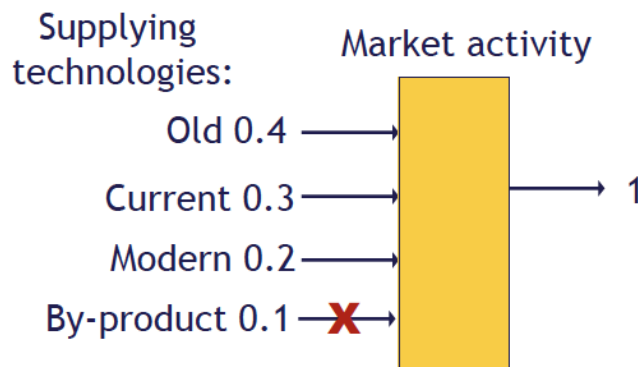
Jannick: most activities are simple. Typically, complex research is on marginal mix. Also complex is multifunctional activities (example of butter) where doing a lot of research on what is the determining product. There collaboration with both engineers and market experts to understand the market mechanisms. But special case.

Haitam: issue of recycling, that using recycling in material in new products leads to increased supply of virgin is counterintuitive and difficult to explain to those in public procurement.

Søren: recycling is a “good” thing in general. The problem (from conseq) perspective is increasing the demand of recycled materials without increasing the recycling, because the availability of these recycled materials is constrained (and thus demanding more of it leads to others using virgin materials).

Referring back to the theory...We are in the situation as in the slide below where by-products are constrained.

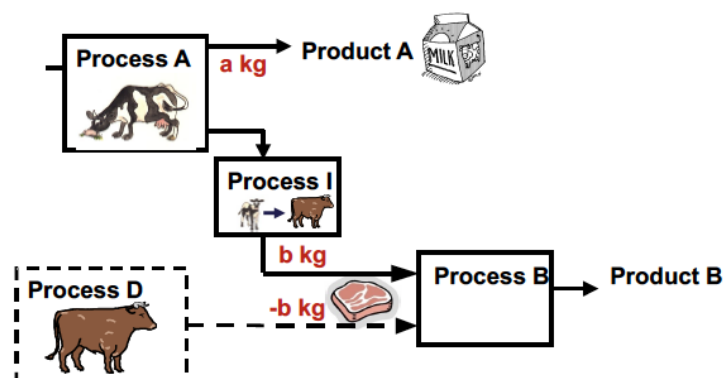
The linking algorithm: By-products are always constrained



This also correspond to the situation here, byproduct fully utilized. E.g. when steel producers “vacuum” all available scrap steel in the market and use it in production of secondary steels because this lowers the costs, so the steel scrap is fully utilized and increasing demand for secondary/recycled steel leads to more virgin production.

See also this paper: Atherton et al (2007) “Declaration by the Metals Industry on Recycling Principles”: <https://www.internationaltin.org/wp-content/uploads/2018/01/DeclarationMetalsIndustryRecyclingPrinciples.pdf>

Substitution when the dependent co-product is fully utilised

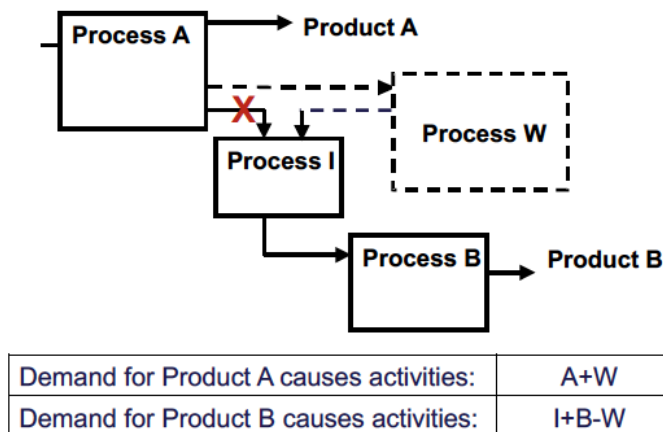


Demand for Product A causes activities:	A+I-D	+ ΔB downstream
Demand for Product B causes activities:	D+B	- ΔB downstream

But you could have a situation like this (e.g., in short term) where the co-product is not fully utilized.

Substitution

when the dependent co-product is **not** fully utilised



So, need to investigate the market (although constrain situation most likely in the long term).

Bogomil: Q1 regionalization of markets, is it always global or are there geographical delimitations?

Jannick: the same as in attributional LCA. We look at a market and at who is supplying to this market. Geography can be a factor constraining some suppliers then the market size should be expanded to global.

Bogomil Q2 we can not “get more” of a constrained co-product, explain again steel example?

Check the paper linked above. Attributional supply mix is average of all possible suppliers. When you look into the conseq. Mix then constrained suppliers are excluded. Steel is a global commodity so global market (can be seen by checking data on trade of steel between countries). To identify the marginal suppliers (after excluding co-products) you look at the historical increment (or forecasted increments) and then suppliers with negative trend are constrained.

Check this link to conseq LCA website example of calculations of increments (deltas) using forecasts, for the case of electricity in DK: <https://consequential-lca.org/clca/marginal-suppliers/the-special-case-of-electricity/example-marginal-electricity-in-denmark/>

Nicolas: does it make sense to make prospective elements in consequential LCA?

Jannick: depends on the scope of the LCA. It is made for decision support and the scope of this decision has a time limit (e.g., 5-10 years). In a prospective LCA context there might be completely new suppliers (e.g., new technologies like e-methanol where current production statistics does not provide informative insights). They can be investigated, and included in a "future" marginal mix, although with large uncertainties, so it is recommended to use different uncertainty analysis techniques.

Check this paper currently under review, preprint here:

<https://chemrxiv.org/engage/chemrxiv/article-details/63ee10cdfcfb27a31fe227df>

Prospective consequential Life Cycle Assessment: Identifying the future marginal suppliers using Integrated Assessment Models