More fairness required

Towards an accurate accounting for carbon from biomass in the Product Environmental Footprint (PEF)

We need a fairer method to account for the footprint of biogenic carbon and allocate it to the actors along the bioeconomy value chains.

Biogenic carbon in the current Product Environmental Footprint (PEF) rules

In the currently proposed methodology of the Product Environmental Footprint rules addressing biogenic carbon, there is no recognized benefit granted to the producers of biobased products, compared to fossil ones.

In a cradle-to-grave approach, the biogenic uptake and emissions of CO_2 from disposal are balanced. Therefore, in such an approach, biobased products will not receive any CO_2 burden when they are disposed of, while fossil products will. This is not a problem for 100 % biobased or 100 % fossil-based products when assessed by cradle-to-grave LCA with final the disposal of the products.

However, in a cradle-to-gate life-cycle analysis using the PEF methodology, biobased products will not receive any credit for the fact that CO_2 was removed from the atmosphere during photosynthesis and plant growth. Whereas in LCA (according to standard EN 15804 and other LCA standards), biobased products do receive such credits.

When the use of the product cannot be singled out – like platform chemicals which are used for a range of different other products, such as bioplastics or intermediates –, the manufacturers need to supply a cradle-to-gate LCA. Accordingly, there will be no CO_2 credit for biobased raw materials calculated at the gate of the product. It will look like there is hardly any benefit from producing biobased products if any at all, compared to fossil-based.

The same *accounting* problem appears in PEF when biomass feedstock is blended with fossil feedstock, like in mass balance scenarios. There will hardly be any difference in greenhouse gas footprints as long as a cradle-to-gate assessment is used for life-cycle inventories and for full LCA where other forms of end-of life approaches than incineration are applied.

The graphs (Fig. 1 and 2) below illustrate this method used for an imaginary product made of both fossil (grey) and biobased (green) feedstock. For simplicity, we assume exactly the same CO_2 footprint in production and logistics for these two feedstocks, as well as the same manufacturing processes and the same final uses. The only difference is in the CO_2 emission at end of life, where biobased feedstock emissions are zero and fossil-based ones are substantial (= 100 in this scale). We easily see that there is no difference in cradle-to-gate LCA or for everlasting products that never will release CO_2. This is counterintuitive since we all know that CO_2 was fixed during the growth of the biomass and has not yet been released again until end-of-life.

Biogenic carbon in *fairer* PEF rules

Another way of assessing environmental footprint which is not in use in PEF today would be based on giving CO_2 removals credits to biomass when produced AND giving CO_2 penalty to all CO_2 (biobased and fossil) when it is actually released back to the atmosphere. In this case, the emissions and removals are shown alongside the time periods that are in the scope of the calculations. With this approach, the data can be shown in a transparent and meaningful way. In addition, this procedure follows the ISO standard 14067 which is the commonly applied standard. Furthermore, this will be much more in line with people's perception and much easier to communicate. It should also allow for informed discussions on the different levels of the life cycle.

Figures 3 and 4 illustrate such an alternative and more meaningful accounting method, based on the same imaginary product produced from fossil- (grey) and biobased (green) feedstock. Again, for simplicity, we anticipate exactly the same CO_2 footprint in production and logistics of these two feedstocks, as well as the exact same manufacturing processes and the same final uses. The only difference is in the CO_2 emission at the cradle, where biobased is negative (due to adsorption of CO_2) and fossil-based is zero. With this method, there is the same total carbon footprint at end-of- life as with the first method, but the difference also shows up at any stage during processing and use.

Recommendation from the biomass-derived chemicals sector

BioChem Europe and its members, as well as Cefic, are convinced that the use of the proposed alternative methodology to account for the carbon impact of biobased products within the Product Environmental Footprint will be more intuitive and transparent, is ISO compliant, and will show the actual difference in CO_2 footprint between biobased (such as bioplastics) and fossil products at any stage of the life cycle, irrespective of the selected system boundaries linked to the functional unit of an LCA. The latter will enable customers and consumers to make an informed purchasing decision, based on the demonstrated climate benefits of biobased solutions.

The biomass-derived chemicals producers recommend adapting the current Product Environmental Footprint accordingly, especially in the context of the forthcoming Sustainable Products and the Green Claims and Consumer Empowerment initiatives of the European Union.

https://cefic.org/

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About BioChem Europe

- Biomass-derived chemicals, such as biopolymers for plastics, are chemicals wholly or partly derived from renewable materials of biological origin (i.e. from plants, crops, trees, algae, and biological waste). These chemicals are used in a wide range of applications, such as energy, textile, plastics, pharmaceuticals, hygiene, food, and many more.
- Ideally, biomass-derived chemicals are circular by nature, since they are made of renewable resources, are designed to be re-used, re- and up-cycled several times, and at the end, returned to nature through biodegradation or composting if technically possible.
- BioChem Europe is a Sector Group of CEFIC, the European Chemical Industry Council, that gathers 13 European leading and pioneering companies in the field of biomass-derived chemistry. It aims at promoting responsibly produced chemicals derived from sustainably sourced biomass to respond to society's growing appetite for circular products that have limited or even positive impacts on the environment and climate.

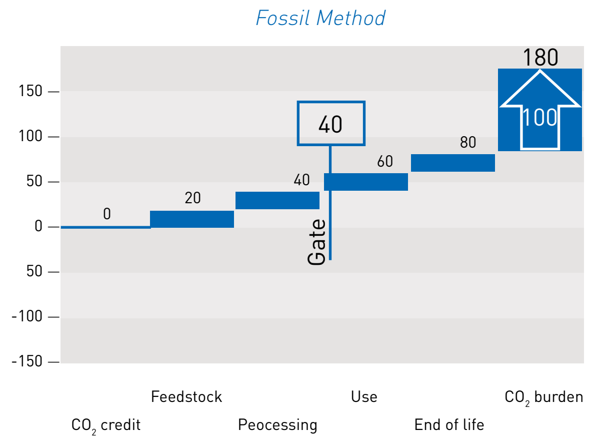

Fig 1. Cradle-to-gate carbon footprint – fossil feedstock

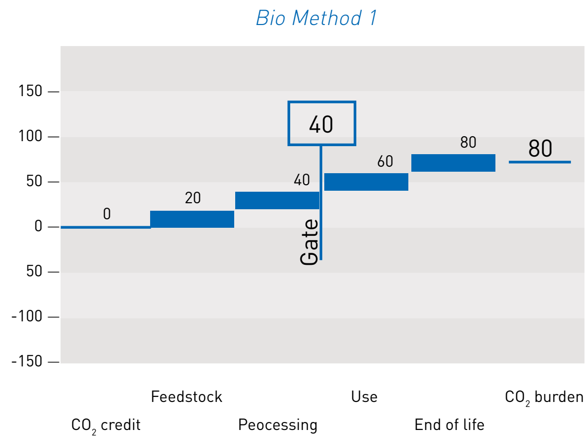

Fig 2. Cradle-to-gate carbon footprint – biobased feedstock

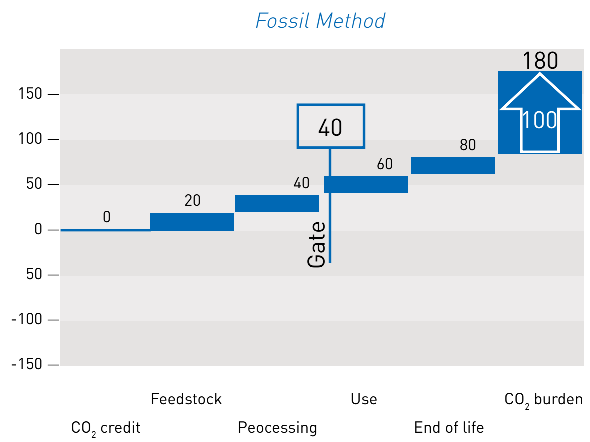

Fig 3. Cradle-to-gate carbon footprint – fossil feedstock

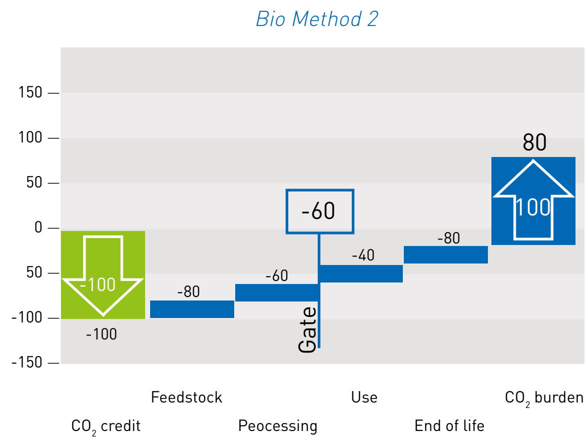

Fig 4. Cradle-to-gate carbon footprint – biobased feedstock