Editorials

How to Account for CO_2 Emissions from Biomass in an LCA

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In a part of the LCA community, a special convention has been established according to which CO_2 emissions need not be counted if emitted by biomass. For example, many studies on waste incineration do not take into account CO_2 from biomass within the incinerated waste, arguing that the creation of biomass has removed as much CO_2 as is emitted during its combustion. The logic of such a practice would imply absurd conclusions, e.g. that the CO_2 emitted by burning a tropical forest, if not counted, would equalize the climate impact of burning a forest and preserving it, which is obviously wrong. Likewise, the benefit of adding carbon capture and sequestration (CCS) to a biomass fueled power plant would not be evaluated because that CO_2 is totally omitted from the analysis.

To avoid such conclusions, we recommend that emission and removal of CO_2 be counted explicitly at each stage of the life cycle. For example, in a study of a biomass fuel chain (where biomass is grown as fuel to be burned in a power plant), the removal of CO_2 should be counted explicitly for the biomass plantation, and the emission of CO_2 explicitly for the power plant. The net effect is of course zero or almost zero in this case: the biomass has been produced only to provide fuel for the power plant. But for an LCA of waste treatment, the appropriate system boundary is at the point where the waste has been produced, since it has been produced regardless of the chosen treatment method. Thus the CO_2 emitted during incineration has to be counted fully. If CCS is included in these examples, such explicit accounting automatically yields the appropriate results, whereas the above-mentioned convention would wrongly assume that removal and emission are balanced.

Explicit accounting for CO_2 at each stage offers a further advantage, namely it allows the dynamic modeling of emission and removal. The time dimension is crucial for systems with a long delay between removal and emission of CO_2, for example, the use of wood for buildings, furniture and wood-based materials. Such CO_2 is sequestered for decades or centuries, but eventually much or all of it will be re-emitted to the atmosphere. Different processes for the re-emission may have very different time scales. It is not appropriate to neglect such delays, even if one does not use monetary valuation and discounting in quantifying the damage costs associated with climate change.

By explicitly counting CO_2 at each stage, the analysis is consistent with the 'polluter pays' principle and the Kyoto rules which imply that each greenhouse gas contribution (positive or negative) should be allocated to the causing agent. For example, under a system of greenhouse gas taxation, the CO_2 from using wood for space heating should be taxed the same way as CO_2 from oil heating, and a credit for CO_2 removal should be paid only when and where the wood is replaced by new growth.

A selection of interesting aspects on CO_2 in general, published in Int J LCA in the period of 1996 through 2007 (see also this issue, pp. 282–307), is cited below [1,3–10,13–15]. The conference report [12] deals with the topic of this editorial (see also [2,11]).

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