

Syngenta's early-stage framework to quantify climate impacts of new active ingredients

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With the world facing the challenge of climate change and its alarming effects, the chemical industry needs to find reasonable approaches to account for the environmental sustainability of its products. This should be initiated during the early stages of process design, when more degrees of freedom are still available to process chemists and engineers. Accordingly, several approaches were designed in the past years to introduce simplification practices when performing a life cycle assessment.^[1]

In Syngenta, a business process and web-based software was created to support early-stage life cycle assessments of our active ingredient portfolio, with the concept of modularity in mind. The core objective designed into the tool is to empower the owners of the technology, *i.e.*, the process chemists and engineers, to model different process design options and then calculate the associated cradle-to-gate climate impact with minimal life cycle assessment expert support. To enable such order-of-magnitude estimates at scale, simplifications were introduced for the impact estimation of raw materials, energy, and waste treatment.

Such a modeling solution enabled Syngenta to obtain the first screening-level estimates of climate impacts for their active ingredients, obtaining insights to hotspots and enabling early-stage decision making for informed chemical process design.

[1] S. Beemsterboer, H. Baumann, H. Wallbaum, *Int J Life Cycle Assess* **2020**, *25*, 2154, DOI: 10.1007/s11367-020-01821-w.