A new modeling framework for environmental assessment of waste and energy systems

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EASETECH, a new module-based decision support tool has been developed. The model is built on the knowledge and understanding from more than 10 years of development and use of the waste-dedicated LCA model EASEWASTE. EASETECH integrates in a new framework the same concepts from EASEWASTE while giving the user more flexibility and new functionalities. It allows the user to assess the environmental performance of complex systems that involve different materials and energy carriers.

The specificity of EASETECH compared to other LCA software lies in the handling of material flows via a functional matrix characterising flows in terms of numerous chemical and physical properties and as mixtures of several material fractions. These flows are brought to different kinds of modules that can be combined freely to model processes and form complex systems. In this way the software combines LCA and material and substance tracking (inspired from material and substance flow analysis).

Initially the EASEWASTE model originated from the need of bringing LCA into the field of waste management so several modules are particularly adapted to thermal and biological treatments of materials, as well as landfilling and application of sludge or processed waste on agricultural land. EASETECH is built with a more generic framework allowing for any transformation of material and energy flows. The generic modules can then be combined and adapted to specific needs, focusing e.g. on gas emissions over time, energy conversions, wastewater treatment or use on land.

In addition, new functionalities compared to the earlier versions include (1) the possibility of importing datasets in the ecoSpold 2 format (e.g. used in the ecoinvent 3 database), (2) an improved graphical user interface with easy construction of complex systems, (3) the possibility of combining modules in a free manner, (4) the possible parameterisation of processes allowing easy sensitivity analyses and uncertainty propagations with Monte Carlo analysis, (5) the possibility of changing the time horizon for inventory calculation of particular processes (landfilling and use on land) and (6) better presentation of the LCA results and material and substance flows of the modelled system using Sankey diagrams.