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Systems analysis of stock buffering: development of a dynamic substance flow-stock model for the identification and estimation of future resource, waste streams and emissions

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Propositions

1. Information about stocks of substances within society plays an important role in determining future waste and emission of hazardous substances, and particularly enables to take into account the impact of delay for applications with a long life span.
Chapter 5 of this thesis.
2. Inclusion of both economic and physical/chemical elements in one model enables explaining substance flows into, through and out of the economy, in terms of the demand for products and substances.
Chapters 5, 6 and 8 of this thesis.
3. Substance Flow Analysis (SFA) can be greatly improved by modeling not only the economic behavior of a given substance, but also the economic behavior of the products which contain relevant flows of this substance.
Chapters 5, 6 and 8 of this thesis.
4. In contrast to for example LCA modeling, in SFA there is no need for the tricky definition of a boundary between economy and environment.
Chapter 3 of this thesis.
5. The effectiveness of metal policies can be greatly improved when the fact is realized that different metals naturally occur together in the same ore.
Chapter 8 of this thesis.
6. The fixed stock paradigm, used for the assessment of long-term availability of non-renewable mineral commodities, can be improved by including the commodities' prices instead of replacing this paradigm by the opportunity-cost paradigm as proposed by Tilton and Lagos (2007).
Tilton, J. E. and Lagos, G. Resource Policy, 2007, doi:10.1016/j.resourpol.2007.04.001.
7. Despite the argument by economists that the world is not running out of resources, Cohen (2007) is correct in his concern that the expected depletion of some rare metals will increasingly motivate civil wars and lead to conflicts among countries.
David Cohen. New Scientist magazine, 2605, 23 May 2007.
8. In contrast to the proposal of Pehnt (2006) that LCA as a whole can be made dynamic, this is only possible for some core processes in a given life cycle.
Pehnt M. Renewable Energy, Vol. 31, 1, 2006.
9. The use of matrix operations and data cubes in SFA can, for multiple-substance and comparative studies, be improved by using the general formula proposed by Lofving et. al. (2006).
Lofving, E., Grimvall, A., and Palm, V. Journal of Industrial Ecology, Vol.10. 1-2, 2006.
10. Use of fly- and bottom-ash for construction purposes without preceding treatment is unsustainable practice.