KEYNOTE

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LECTURES



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Lecture #3

13:00 CET

March 2023

Wednesday 29th

HOW SUSTAINABLE IS WASTE MANAGEMENT, REALLY?

Throughout several decades, we have strived to make waste management more environmentally friendly by minimizing emissions, increasing recycling and recovery, and improving our understanding of the physical, biological, and chemical processes involved in waste treatment. Over the years, this has led to tremendous improvements in environmental impacts from waste and waste management. At the same time, focus has moved from end-of-pipe treatment of waste to circular solutions with the intention of increasing resource efficiency. The question is when our solutions are good enough?

Life cycle assessment (LCA) can be used to quantify environmental impacts associated with waste management and treatment technologies in a holistic perspective. Based on data for emissions and consumption of auxiliary materials and resources throughout the waste management system in question, environmental impacts can be calculated and compared for alternative waste solutions. There are numerous examples in literature of LCA modeling and comparison of waste management solutions, both at technology and system level. While this gives us valuable insight into which waste management processes represent higher environmental impacts than others, traditional LCA offers little help in answering the question of whether waste management is environmentally sustainable or not.

This lecture opens a discussion of how to view sustainability of waste management. While waste management represents an environmental load, the environmental benefits associated with recycling and recovery are usually larger than the impacts, thus providing net benefits to society. However, when is this good enough? There are no trivial answers to this question. Not only do we need to see waste management in the context of society, but we also need to be aware of the way we quantify and evaluate the environmental impacts. With respect to LCA, certainly there are many pitfalls. The lecture attempts an outlook into how LCA can assist answering the question of sustainability for waste management.



Prof. Thomas F. Astrup

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Thomas Fruergaard Astrup is Professor at the Department of Environmental and Resource Engineering at the Technical University of Denmark.

His research field includes sustainable management of solid waste and residual resources with core focus on three aspects: 1) resource circularity through recovery, recycling, and utilization, 2) resource quality of waste materials and residual resources, including critical contaminants, and 3) sustainability assessment modelling of residual resource systems. Research activities involve i) life cycle assessment (LCA) and life cycle costing (LCC) modelling of residual resource systems, technologies, and circular solutions, ii) development of models for assessment of resource circularity, and iii) sampling and characterization of waste materials, evaluation of critical contaminants in waste materials.

Responsible for numerous research projects supported by industry and research programmes.

Extensive collaboration with external partners including utility companies, industry, consulting companies, and public authorities.

Supervisor of 30+ PhD students.

140+ peer-reviewed journal publications, H-index = 48, 6500+ citations (Web of Science).