What is the impact of different energy futures on the optimal waste treatment?

Münster, Marie; Pizarro Alonso, Amalia Rosa; Salvucci, Raffaele; Ravn, Hans

Published in:
Book of Abstracts. DTU's Sustain Conference 2015

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

What is the impact of different energy futures on the optimal waste treatment?

Marie Münster*[1], Amalia Pizarro[1], Raffaele Salvucci[1], Hans Ravn[2]

1: DTU Management Engineering; 2: RAMløse-edb

*Corresponding author email: maem@dtu.dk

The framework around management of waste and use of waste for energy is changing. The waste sector faces increased privatization, a growing international market, increasing waste amounts and ambitious goals for increased material recycling. Meanwhile, the energy sector faces increased demand for renewable energy including organic waste as well as increased demand for flexibility in the energy system. In order to take the changed framework into account, it is necessary to develop new decision support tools for waste companies and national authorities to identify expedient investments and avoid suboptimal environmental solutions. There will be increased competition between using waste as an energy resource and as a source of recycled raw-materials, and in order to understand which types of waste will be available for each of these purposes it is necessary to consider the whole waste management sector as well as the energy sector.

Decisions related to investments in the energy and waste sectors are normally separated with different institutions handling the different sectors. This article argues that linked optimisation is necessary in order to avoid sub-optimization. This is particularly true in countries, such as Denmark, with a high share of heat from waste (20%) in the extensive district heating system covering 60% of all buildings.

Waste treatment alternatives are normally analyzed by comparing static alternatives in LCA's or cost benefit analyses. Analyses of combinations of possibilities, which take into account the dynamic nature of the energy systems and the flexibility requirements, are not currently undertaken as shown in the comparison of models for waste management done by Finnveden et.al (Finnveden et al. 2006). On the other hand energy system models only have rudimentary representation of waste technologies and no possibility of prioritizing between energy and material recycling options, as shown in the PhD thesis "Energy System Analysis of Waste-to-Energy technologies" (Münster 2009). A decision support tool has therefore been developed, which target both the demands of waste companies as well as, in an up-scaled version, the demands of national waste and energy authorities, thereby facilitating better planning for the energy and waste sectors.

Linked optimisation of energy and waste systems is here undertaken in the new linear programming tool called OptiWaste. The model optimises both investments and operation taking spatial distribution and fluctuating demands and productions into account. The work was originally presented at the Sardinia 2015 Symposium, but has since then been updated with new analyses.