

Title

Incinerate or innovate? Which hospital waste disposal is actually most sustainable?

Problem statement

Hospitals are waste production organizations and responsible for 8% of the total CO₂ emissions. During the last decades a growing number of disposables were introduced. Developments such as the transformation of reusable medical devices to disposable devices, but also new techniques and robotic surgery introduced even more disposables.



A Fieldlab was set-up in De Meern-Utrecht in co-operation with Medical Delta, TU Delft, LUMC, participating hospitals, Gemeente Utrecht and GreenCycl. A recycle/production line was built in this Fieldlab where medical waste such as blue wrapping paper, PET and PE packaging, instruments, are melted and reprocessed to raw material. This raw material is used to produce new medical devices at the same location.

Currently however, there is no clear vision regarding the amount of CO₂ emissions between medical waste collected from the hospital and reprocessed to new raw materials and new products in De Meern, as compared to the medical waste which is burned in the incineration oven at Zavin in Dordrecht.

Research question(s)

What is the difference in CO₂ emissions for the following two medical waste stream flows:

1. Collecting medical plastic waste from hospitals in the Netherlands, transport to the Fieldlab in De Meern where it is reprocessed to new raw material and to new medical products.
2. Collecting medical waste from hospital in the Netherlands, transport to Zavin in Dordrecht and incinerate the waste.
 - Subquestion: To what extent can this be extrapolated to other waste streams and can you therefore answer the more general question of reducing waste in society?

Expected type of work

A life cycle assessment or equivalent method to calculate climate change impact in combination with using data from ecoinvent. Interviews with participants in LUMC, HMC and staff of GreenCycl to research what the mean waste streams are and how the work flows need to be changed for separating and collecting waste. Use the data from ecoinvent and relate this to the melting process and energy in the Fieldlab.



Remarks

Full support is available, both for setting-up an LCA method or an alternative database method as well as for retrieving the data. Furthermore, accessibility in a network of hospitals and healthcare professionals is available to visit or to interview.

The facilities of Van Straten Medical are situated at Rijnzathe 2 and Molensteijn 1c in De Meern - Utrecht, directly situated by the highways A12 and A2. Public transportation with bus stops in front of the facilities. A Central Sterilization Department as well as an instrument manufacturing and a recycle-production FieldLab are situated on the same premises.

References

- van Straten, B., Ligtelijn, S., Droog, L. et al. A life cycle assessment of reprocessing face masks during the Covid-19 pandemic. Sci Rep 11, 17680 (2021). <https://doi.org/10.1038/s41598-021-97188-5> A life cycle assessment of reprocessing face masks during the Covid-19 pandemic | Scientific Reports (nature.com)
- B. van Straten, J. Dankelman, A. van der Eijk, T. Horeman, A Circular Healthcare Economy; a feasibility study to reduce surgical stainless steel waste, Sustainable Production and Consumption, Volume 27, 2021. <https://doi.org/10.1016/j.spc.2020.10.030>

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