

## Title

**Disposable versus reusable surgical Instruments: what is the real difference in environmental impact?**

## Problem statement

The health care sector is responsible for 8% of the Dutch CO<sub>2</sub> emissions. The hunger for plastics and steel grew as products had to be manufactured in increasing volumes. As the world population is growing and so is the number of patients. This phenomenon is further supported by the introduction of single-use medical products, the so-called disposables. Medical instruments, which were mostly reusable in the previous century, became more complicated and many were converted from reusable to disposable. The waste production of hospitals has increased significantly, although there are many methods for increasing the life span of medical instruments, e.g. by using reusable instead of disposable instruments. This is done by implementing an active program for instrument maintenance, repair and refurbishment. Still, many hospitals prefer to use disposable instruments.



There is a major task to map the difference in CO<sub>2</sub> emissions between disposable and reusable instruments in order for hospital staff to visualize the difference between the use of these two types of instruments. Sustainability is not incorporated in purchasing decisions. Because there is still insufficient data on this topic and because the social relevance is very high, it is very valuable to investigate the difference in CO<sub>2</sub> emissions.

## Research question(s)

The aim is to assess and compare the impact on climate change of disposable surgical instruments versus reusable instruments (i.e. chose 1 or 2 instruments such as a needle holder, tweezer, and scissors) and the impact of repair and maintenance of these instruments?

The research sub questions are:

1. What is the impact on CO<sub>2</sub> emissions of reusable instruments versus disposable instruments, used only once?
2. What is the impact on climate change when reusable instruments are repaired instead of disposed and replaced with a new instrument?
3. What are the financial differences of reusable versus disposable instruments in a time frame of ten years? And the financial impact of product life extension by repair and maintenance?



## Expected type of work

A life cycle assessment (LCA) in combination with using data from the ecoinvent database and interviews (50/50%) with instrument technicians, staff central sterilisation department and medical specialist (all present at Van Straten Medical/CSA services in De Meern). Cost calculations of prices of disposable, new versus repair and maintenance prices to calculate cost differences between the different flows. All data available in De Meern, to be retrieved via interviews and ERP system.

## 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>. [www.sciencedirect.com/science/article/pii/S2352550920313701](http://www.sciencedirect.com/science/article/pii/S2352550920313701)

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