DESHEALTH

AUTUMN SCHOOL

TU DELFT

Module 2 Environmental Assessment and Hotspots

- Carbon Footprint by Marta Santamaria - ESCI
- Life Cycle Assessment by Sandra Ceballos Santos – ESCI

- Short break

- Different types of environmental assessment
- MFA of Medicines at the ICU by Jasper Klasen – Erasmus MC
- Explanation of IDEMAT LCA tool

- Exercise: Environmental assessment of your product

TU Delft

Erasmus MC

DESHEALTH

AUTUMN SCHOOL

TU DELFT

Different types of environmental assessment in the healthcare sector

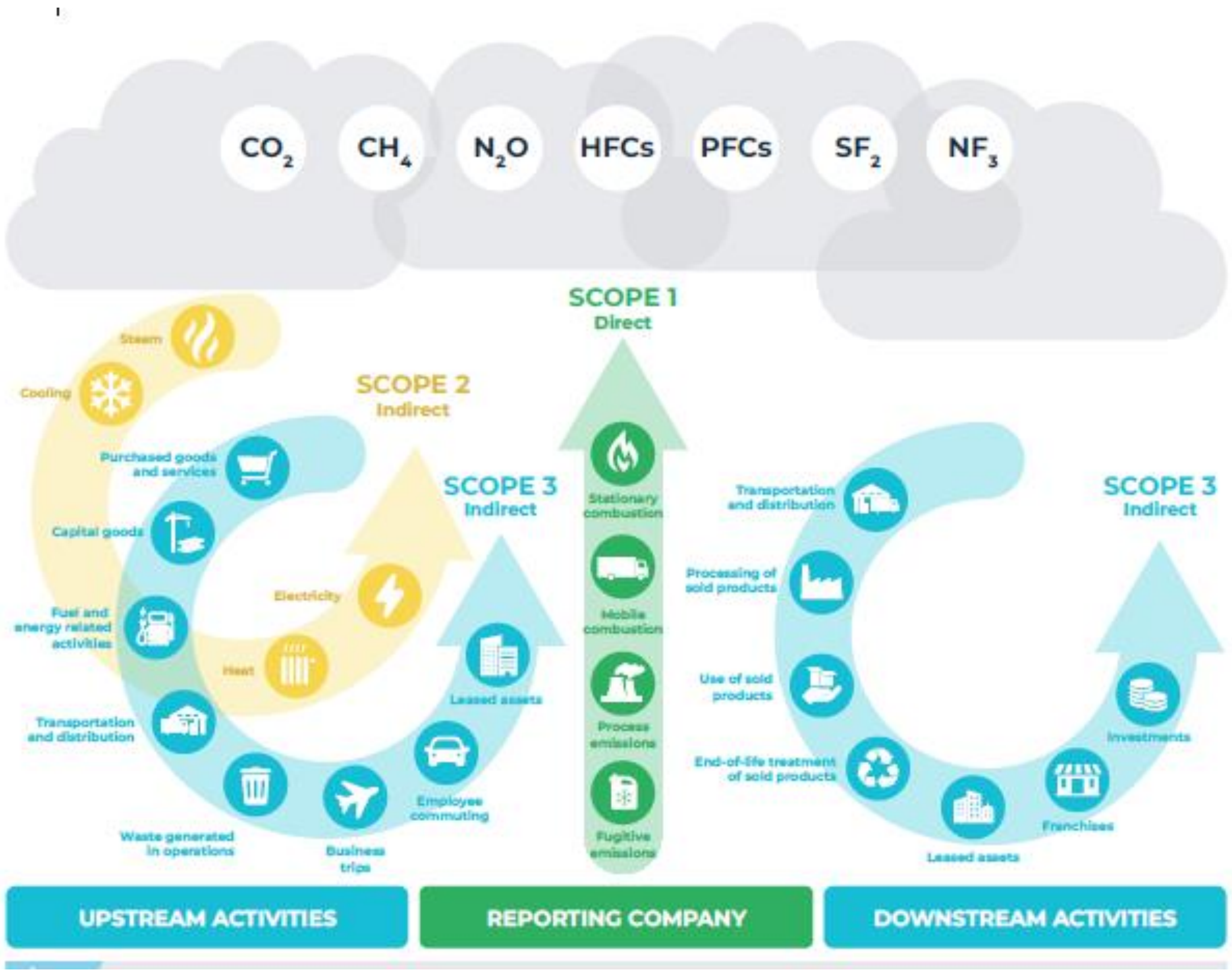
1. Scope 1, 2 & 3

2. National level
3. Hospital level
4. Department level
5. Care pathway level
6. Product level

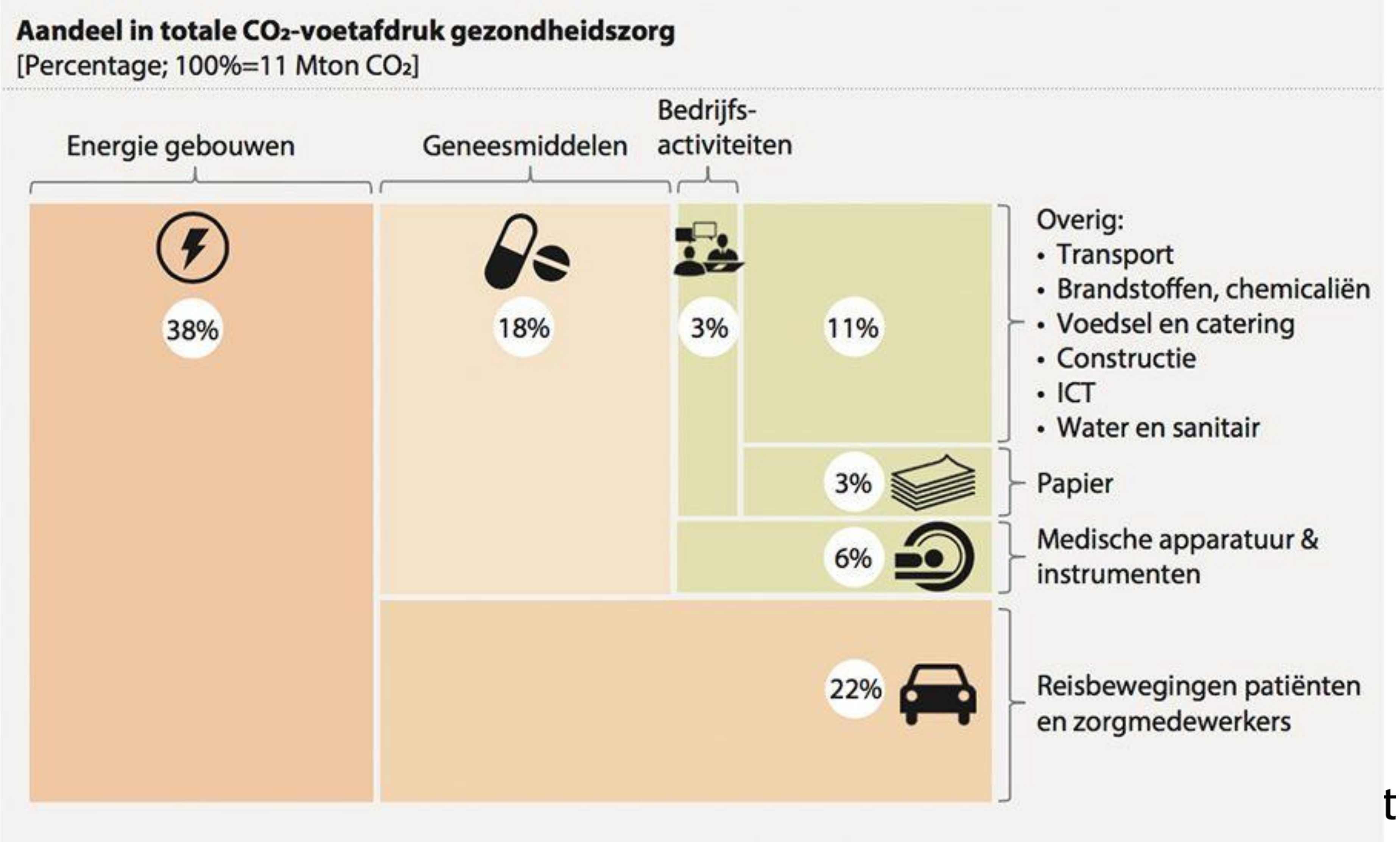
7. Spend-based versus activity based
8. Waste audit

1. Scope 1, 2, 3

- **Scope 1** direct emissions from sources the company owns or controls (e.g., boilers, vehicles).
- **Scope 2** covers indirect emissions from purchased energy like electricity.
- **Scope 3** includes all other indirect emissions across a company's value chain.



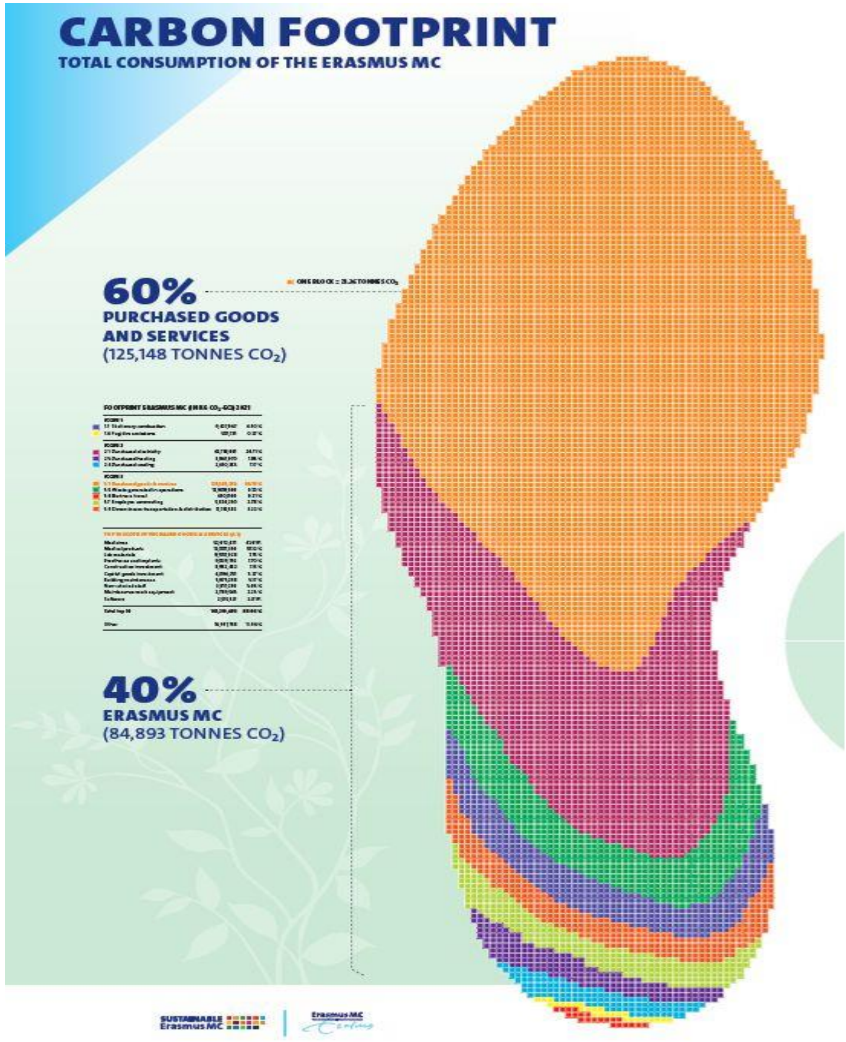
2. National level

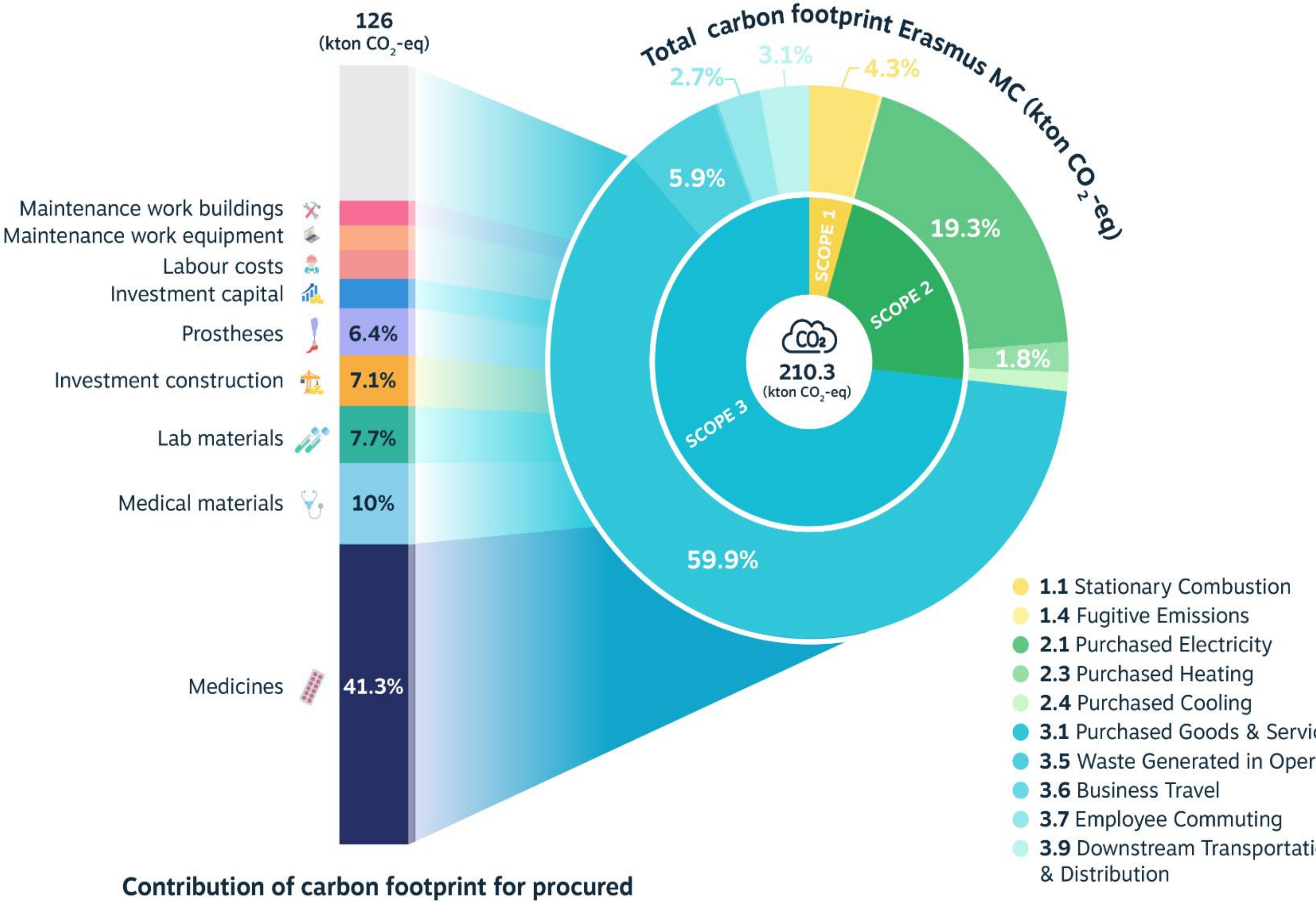


t

Erasmus MC

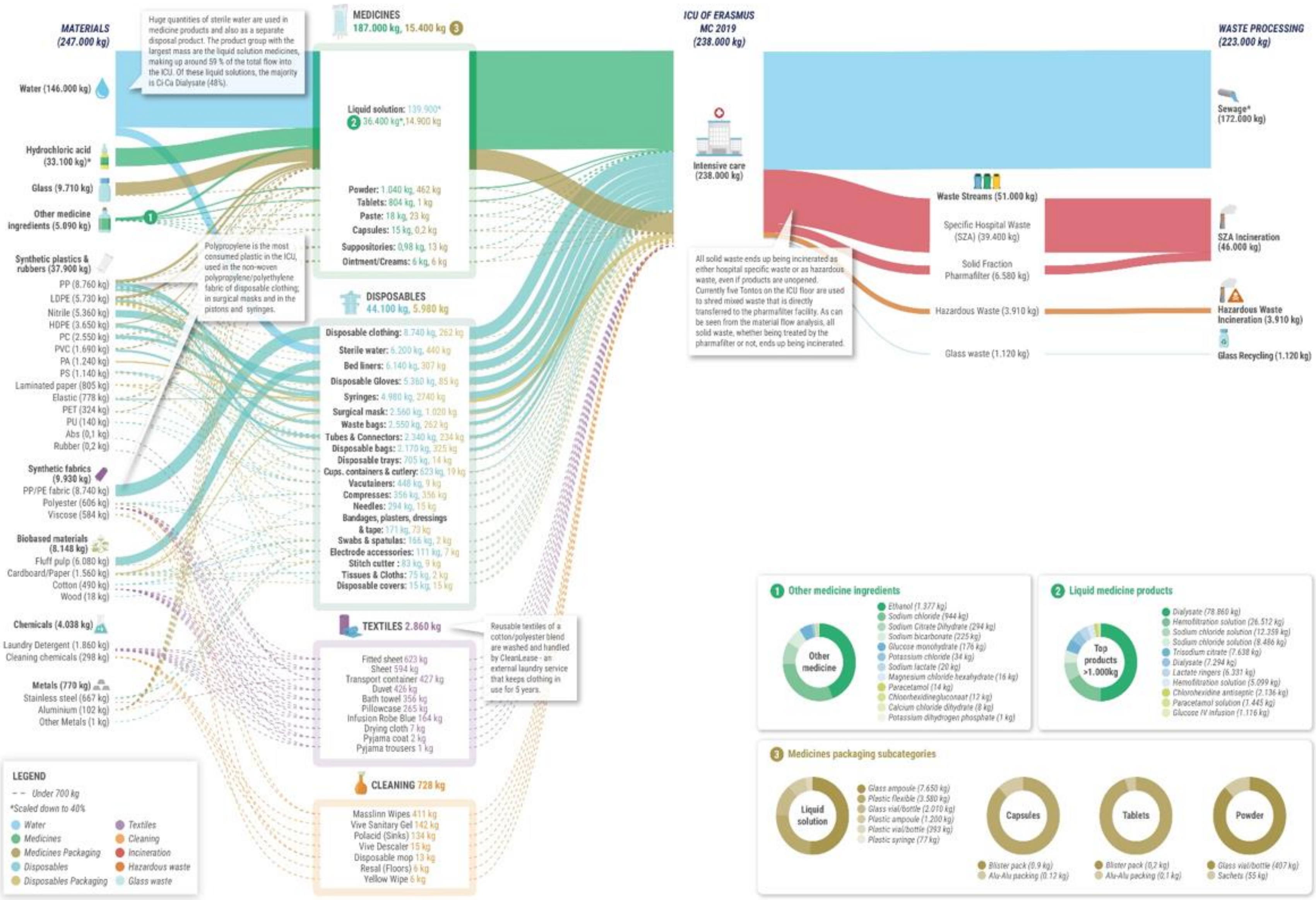
3. Hospital level





Contribution of carbon footprint for procured goods and services per category

4. Department level – Material Flow Analysis

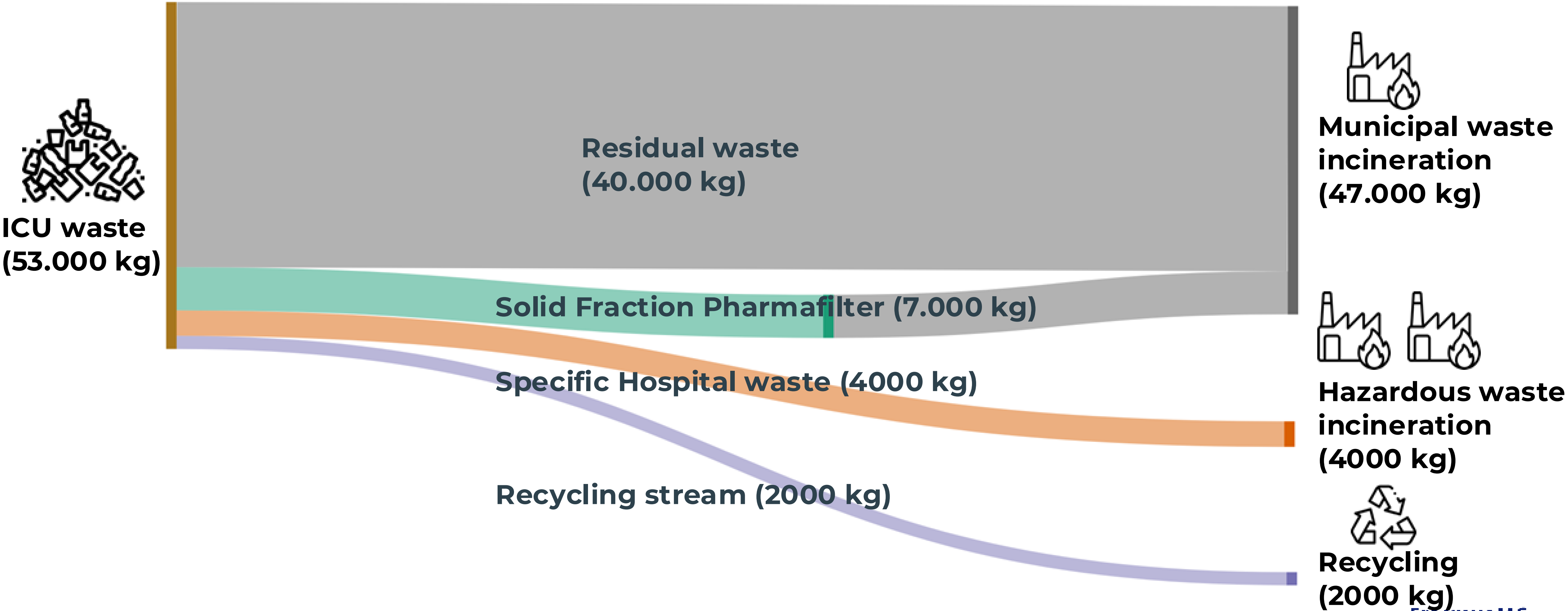


Products per patient per day

Delft

Erasmus MC

Waste flows



Waste per year. The amounts are based on 2019 procurement data (Browne-Wilkinson et al., 2021).

ORIGINAL

Circular material flow in the intensive care unit—environmental effects and identification of hotspots

Nicole Hunfeld[1,2*], Jan Carel Diehl[3], Maarten Timmermann[4], Pieter van Exter[5], Joris Bouwens[5], Savanna Browne-Wilkinson[5], Nine de Planque[6] and Diederik Gommers[1]

Abstract

Purpose: The healthcare sector is responsible for 6–7% of CO_2 emissions. The intensive care unit (ICU) contributes to these CO_2 emissions and a shift from a linear system to a circular system is needed. The aim of our research was to perform a material flow analysis (MFA) in an academic ICU. Secondary aims were to obtain information and numbers on mass, carbon footprint, agricultural land occupation and water usage and to determine so-called "environmental hotspots" in the ICU.

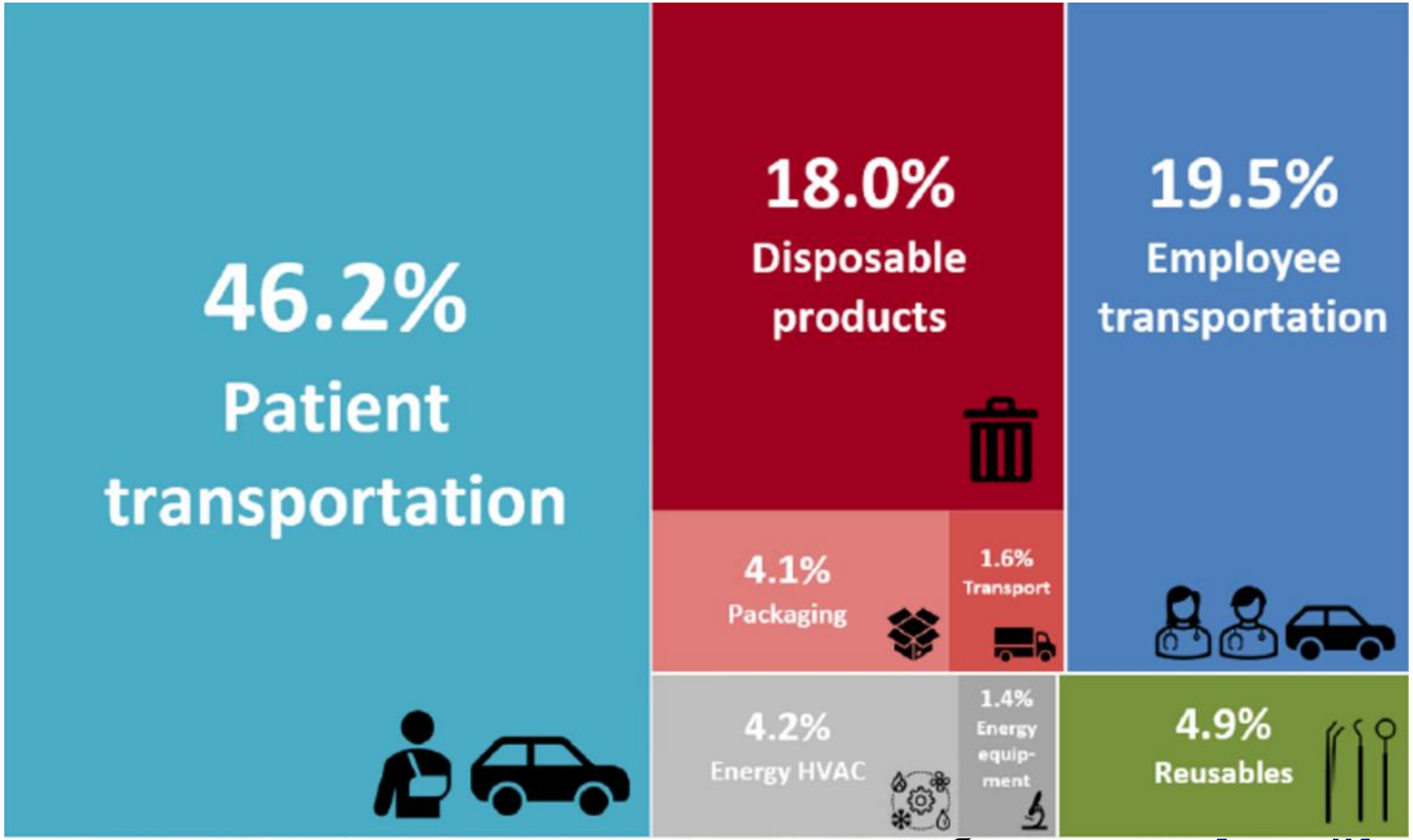
Methods: A material flow analysis was performed over the year 2019, followed by an environmental footprint analysis of materials and environmental hotspot identification.

Results: 2839 patients were admitted to our ICU in 2019. The average length of stay was 4.6 days. Our MFA showed a material mass inflow of 247,000 kg in 2019 for intensive care, of which 50,000 kg is incinerated as (hazardous) hospital waste. The environmental impact per patient resulted in 17 kg of mass, 12 kg CO_2 eq, 300 L of water usage and 4 m^2

TU Delft   Erasmus MC

5. Care pathway level – one

- impact analysis cataract surgery



- Careract disposables

5. Care pathway level – compare two

BJU Int 2025 doi:10.1111/bju.16876

BJUI
BJU International

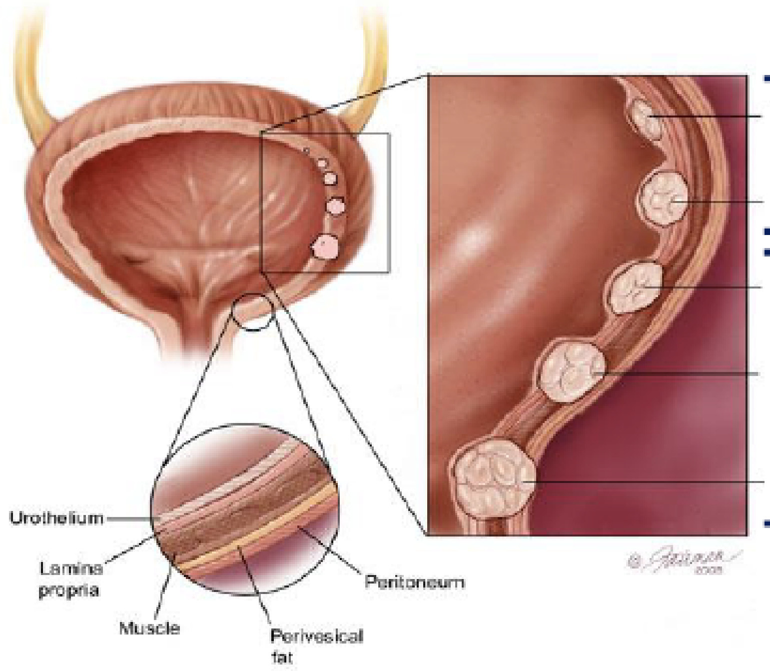
Original Article

Carbon footprint and staff demands of surgery and chemoradiation for muscle-invasive bladder cancer

Vera C. Rutten[1], Simone A. W. Hesseling[2], Martine Franckena[3], Tahlita C. M. Zuiverloon[1], Debbie G. J. Robbrecht[4], Maarten J. IJzerman[5,6], Wenxin Lin[2], Daan Mes[2], Nicole Hunfeld[7,8] and Joost L. Boormans[1]

TU Delft
Erasmus MC

BLADDER CANCER



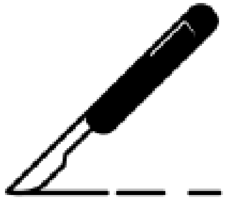
Non-muscle invasive (NMIBC)
(75%)

Muscle-invasive (MIBC)
(25%)

Trimodality therapy (TMT)
Removal of bladder tumor (TURBT) + chemoradiation

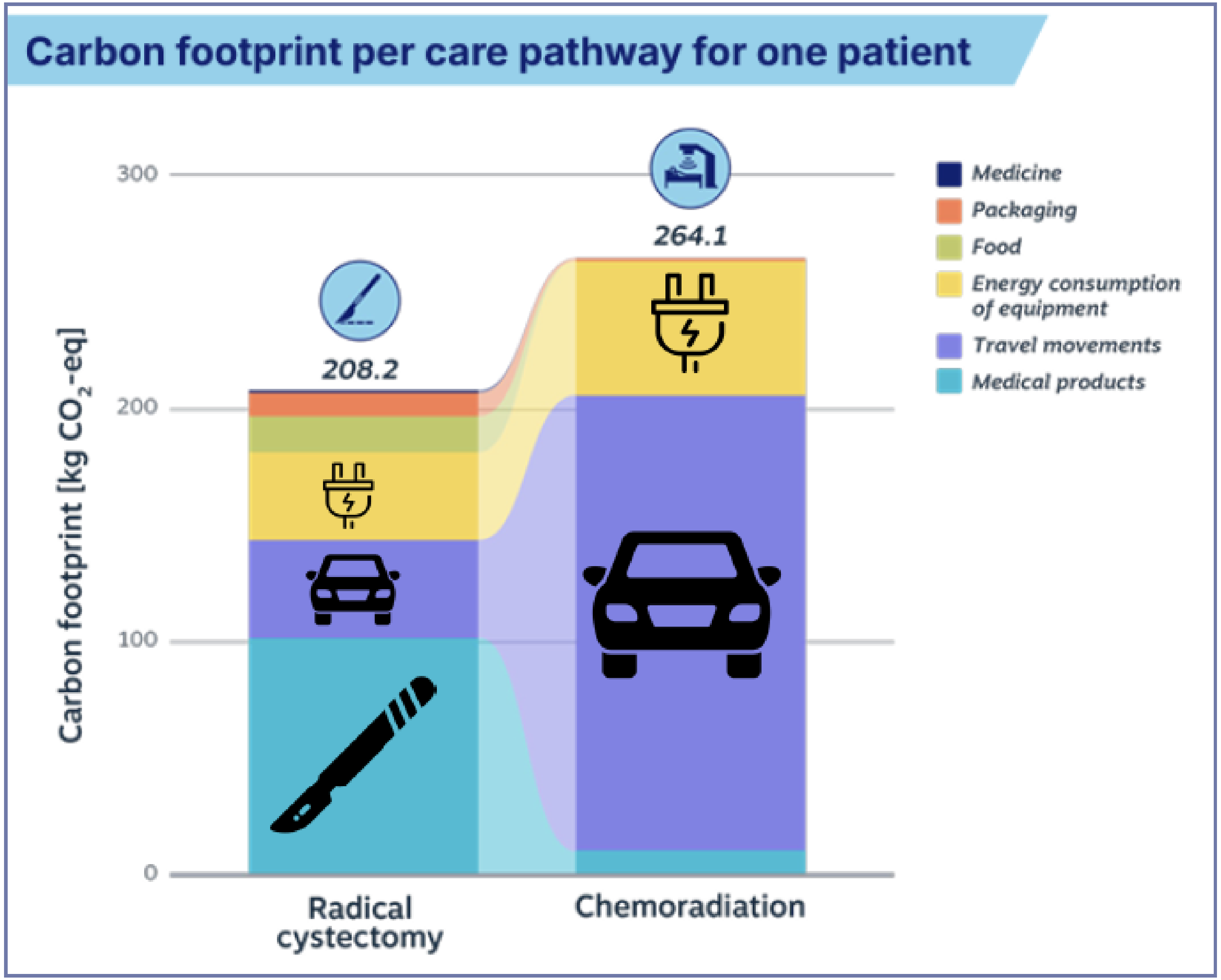
OR

Radical cystectomy (RC)
Complete removal of bladder and surrounding lymph nodes



Erasmus MC

CARBON FOOTPRINT OF TMT EXCEEDS RC



18%

20%

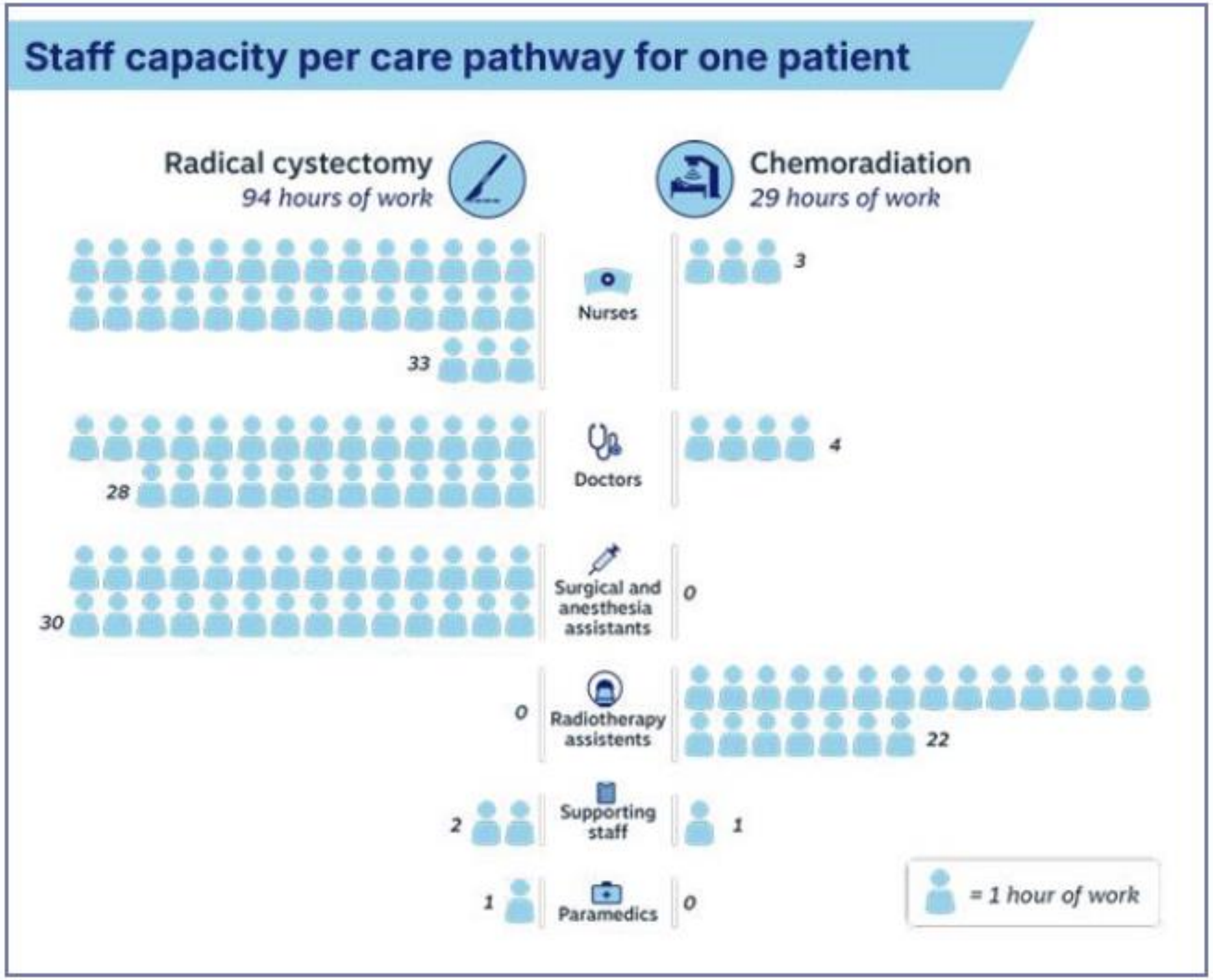
49%

22%

74%

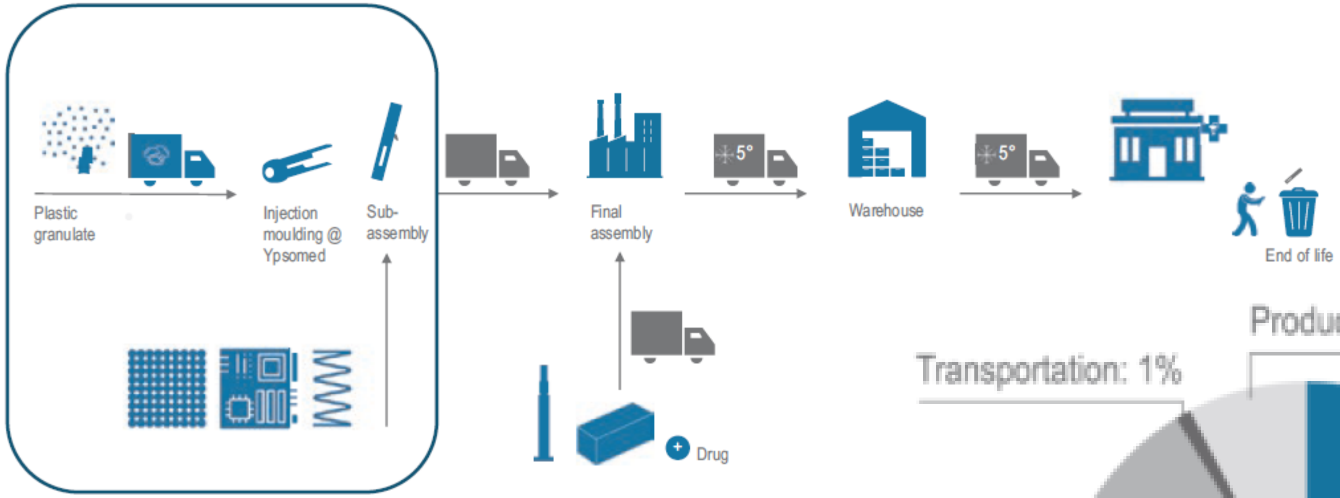
ıus MC

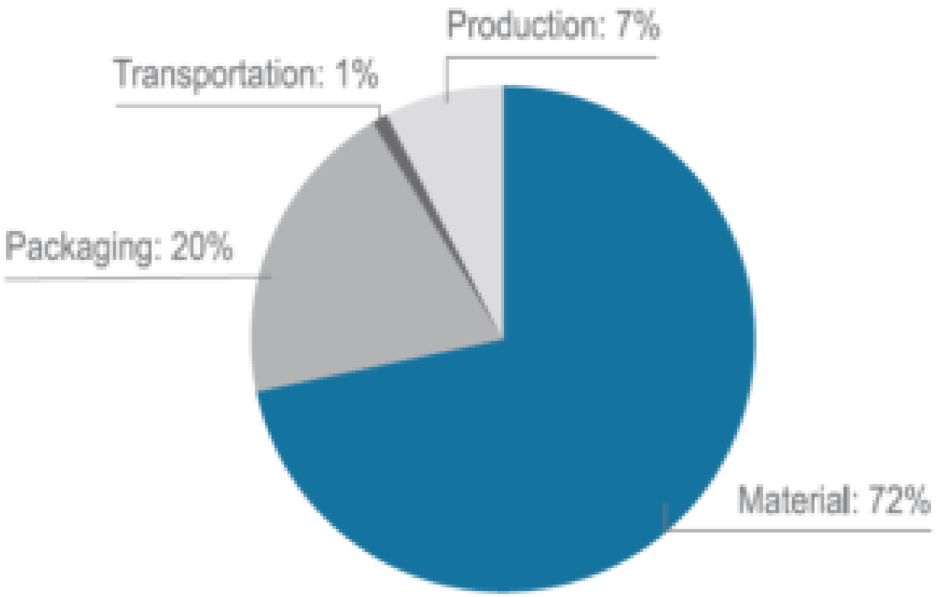
RC REQUIRES 3X MORE STAFF HOURS



6. Product level: Life Cycle Assessment (LCA)

Alliance to Zero



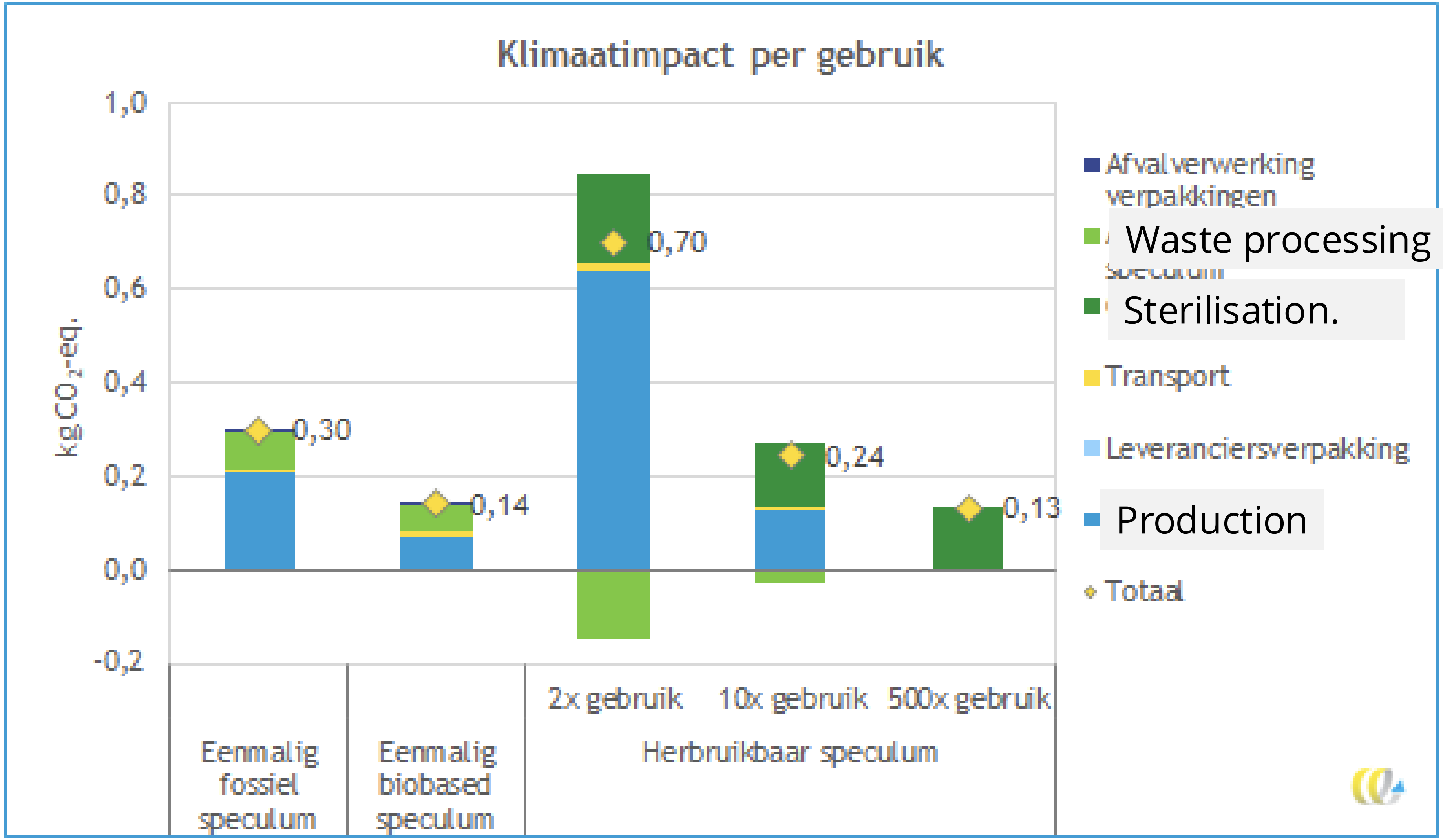


TU Delft

Erasmus MC

Product level – compare single use versus reusable

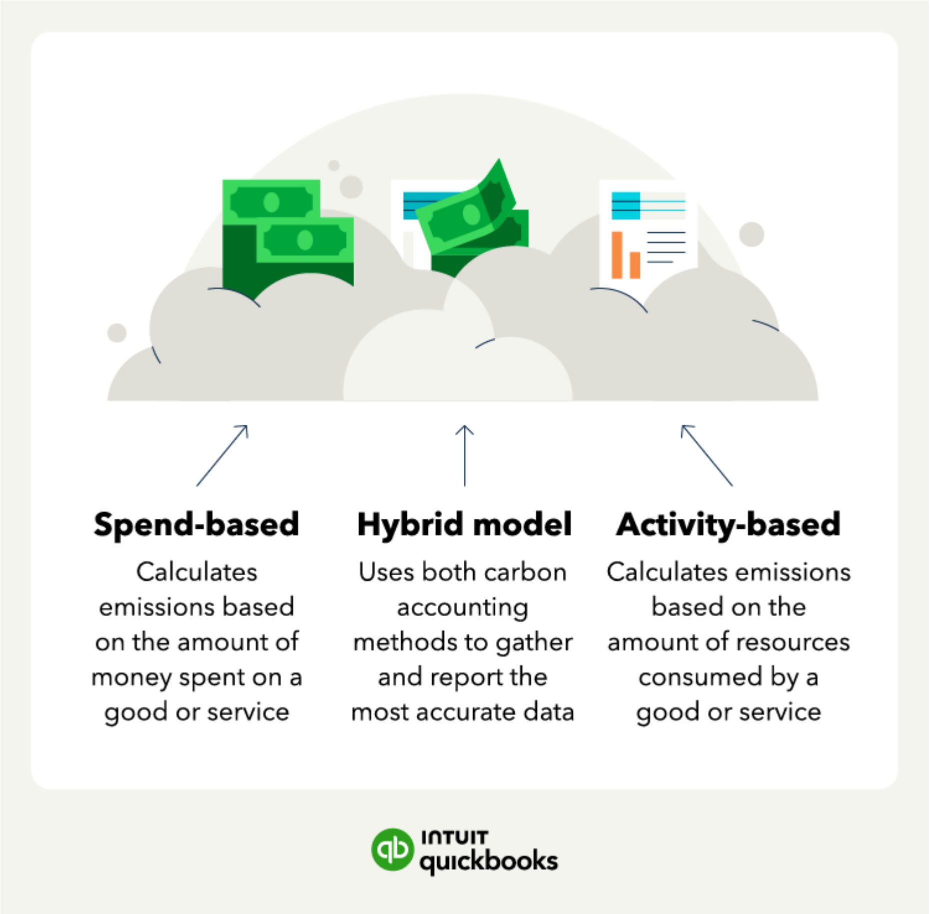
- Acrylic disposable speculum
- Stainless steel reusable speculums.



Single use Plastic Speculum

Reusable Metal Speculum

7. Spend based versus activity based LCA



Spend data		Activity data
£	Vs.	kWh used Miles flown Kgs of waste
Easy to get, but high-level		Harder to get, but more accurate

TU Delft Erasmus MC

8. Waste Audit

9. Questions