

NHS Sustainability: From Hero to Net Zero

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Healthcare climate impact



Hospitals are the world's 5th worst polluter.



The NHS produces **590,000t of waste**, costing **£700m annually**.



Single-use medical devices contribute the most waste.



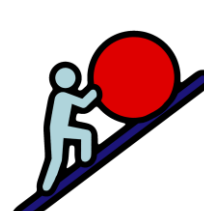
What is the goal?

To reduce single-use devices and their climate impact.



What are the benefits?

Reinvesting saved waste processing funds.



Why is it difficult?

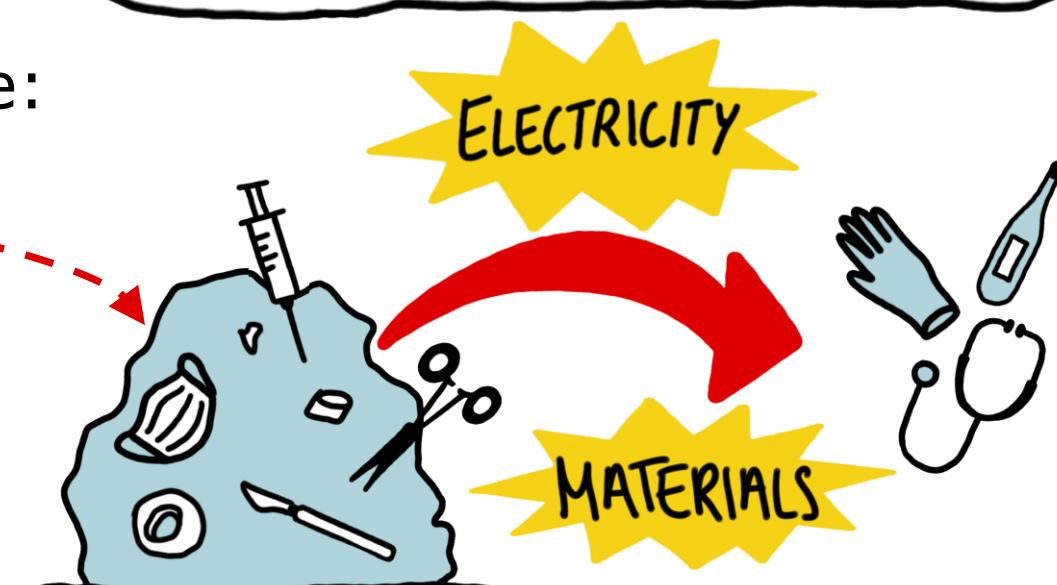
There is no one-size-fits-all solution for sustainable medical devices.

How to reduce single-use devices?

Remanufacturing

- It **"resets"** tools as if they were **new** for safe reuse.
- It is **everywhere!** Take a kitchen knife:
 - Sharpen
 - Use
 - Wash
- Carefully regulated, this works for **single-use medical devices** too.

Remanufacturing may use a lot of resources too!



Is remanufacturing **always** more sustainable?

Custom emissions framework

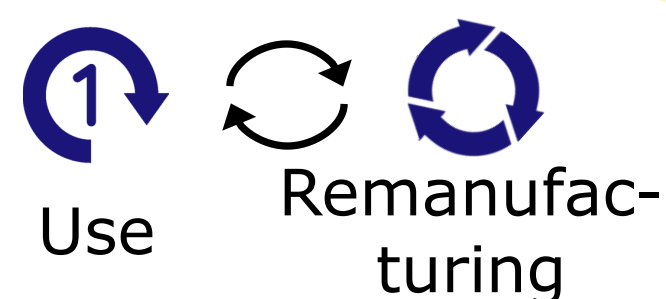
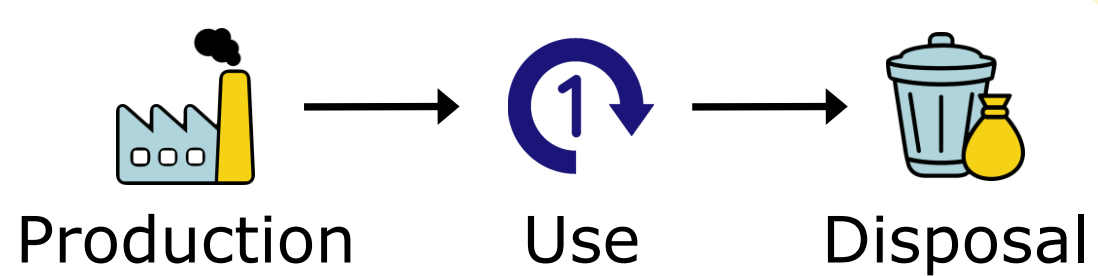
Measuring **custom carbon emissions** is critical, so that **on-paper results reflect real impacts**.

Therefore, we customise device carbon footprints by:

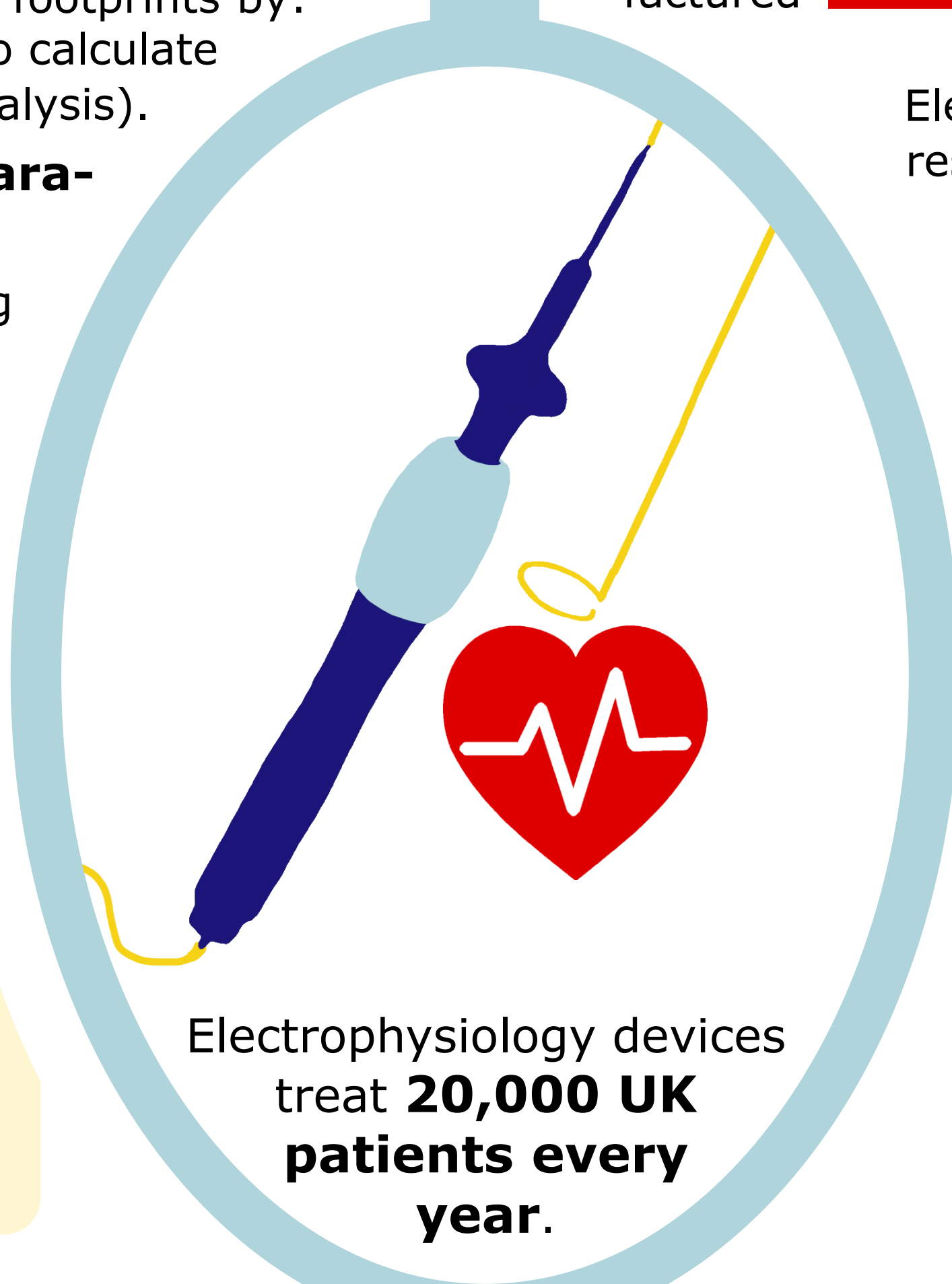
- Modelling every life cycle in/output to calculate **realistic emissions** (Life Cycle Analysis).
- Identifying **impactful life cycle parameters** (Sensitivity Analysis).
- Future-proofing results by integrating **long-term use statistics** (Value Chain Analysis).

Single-use device life cycle

Linear economy



Circular economy



Electrophysiology devices treat **20,000 UK patients every year**.

Sustainable procurement case study

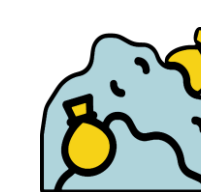
UK electrophysiology devices cost (per year)

New	£5.3 million
Remanufactured	£2.9 million - 45%

Electrophysiology devices surgically restore **healthy heart rhythms**.



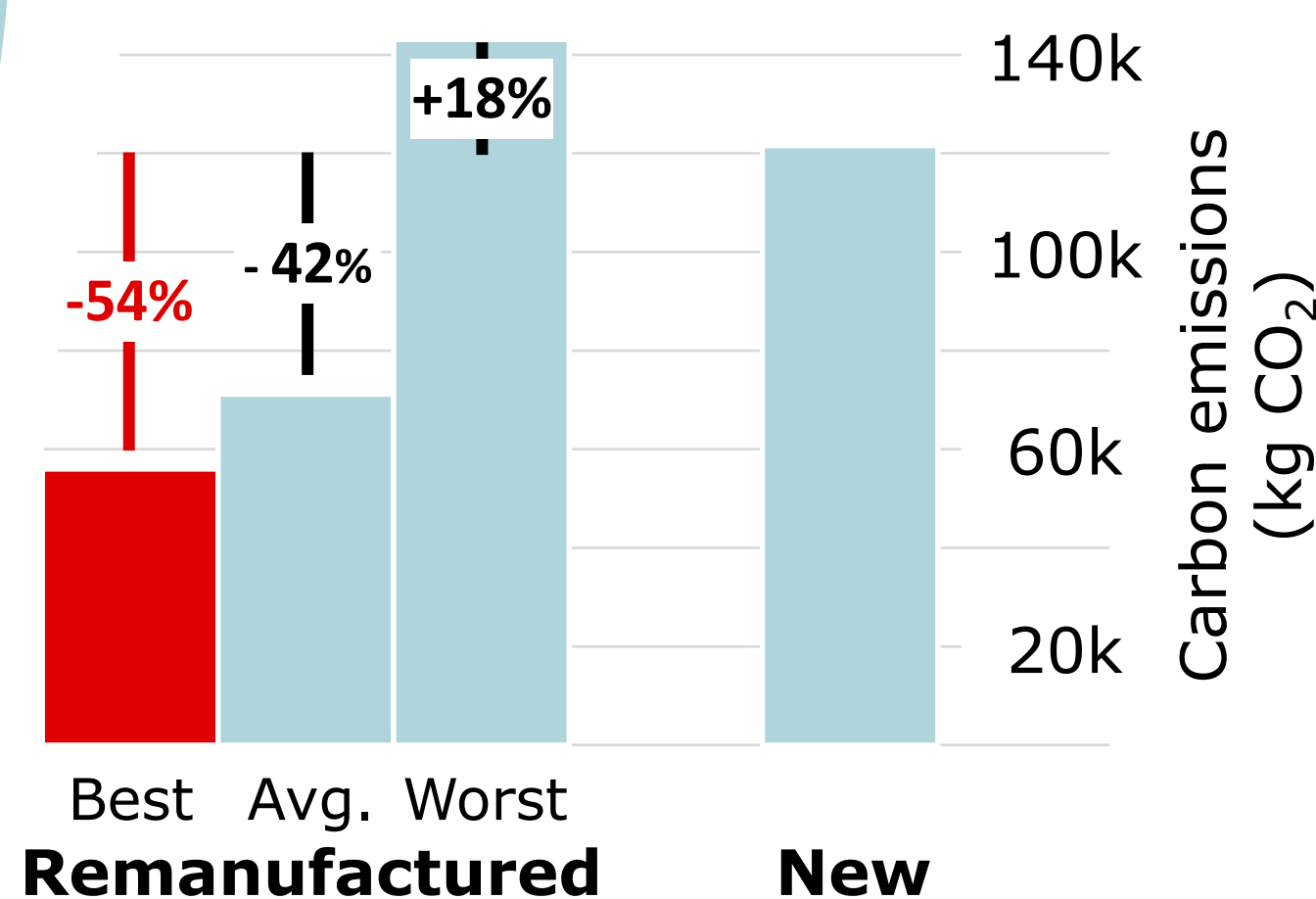
Most are **discarded after one use** – even though they are **safe to remanufacture**.



We explored **3 alternatives** to reduce NHS emissions (varying location, transport, resources).



Electrophysiology device sustainability (per year)



Up to **66,000kg CO₂ saved annually** with the **most sustainable** remanufactured electrophysiology devices.

How many new devices C are needed?

$$U = \sum_{n=0}^N C \times (1 - R)^n$$

U : Nr. total device uses
 C : Nr. new devices
 R : Rejection rate

What are a hospital's device emissions?

$$Emissions_{total} = C \times Emissions_{new} + (U - C) \times Emissions_{reman}$$

$C \times Emissions_{new}$: New device emissions
 $(U - C) \times Emissions_{reman}$: Remanufactured emissions

Personalised emissions **empower hospitals** to find their **most sustainable** device **alternatives**.

"Remove if you must, remanufacture if you may."