



- Desflurane
- Scottish Environmental Anaesthetists Group  
SEA-G

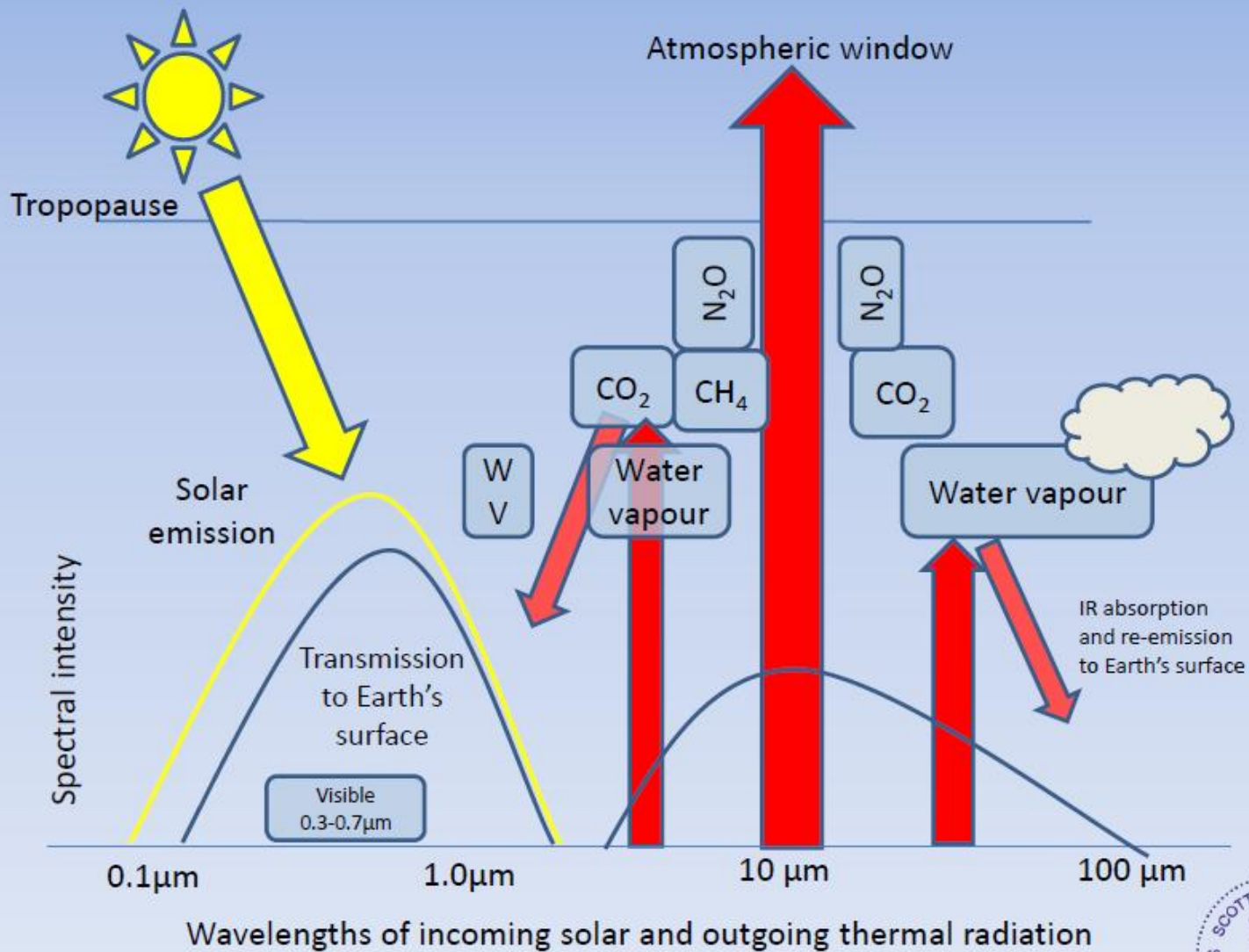
**Atmospheric science, anaesthesia, and the environment**

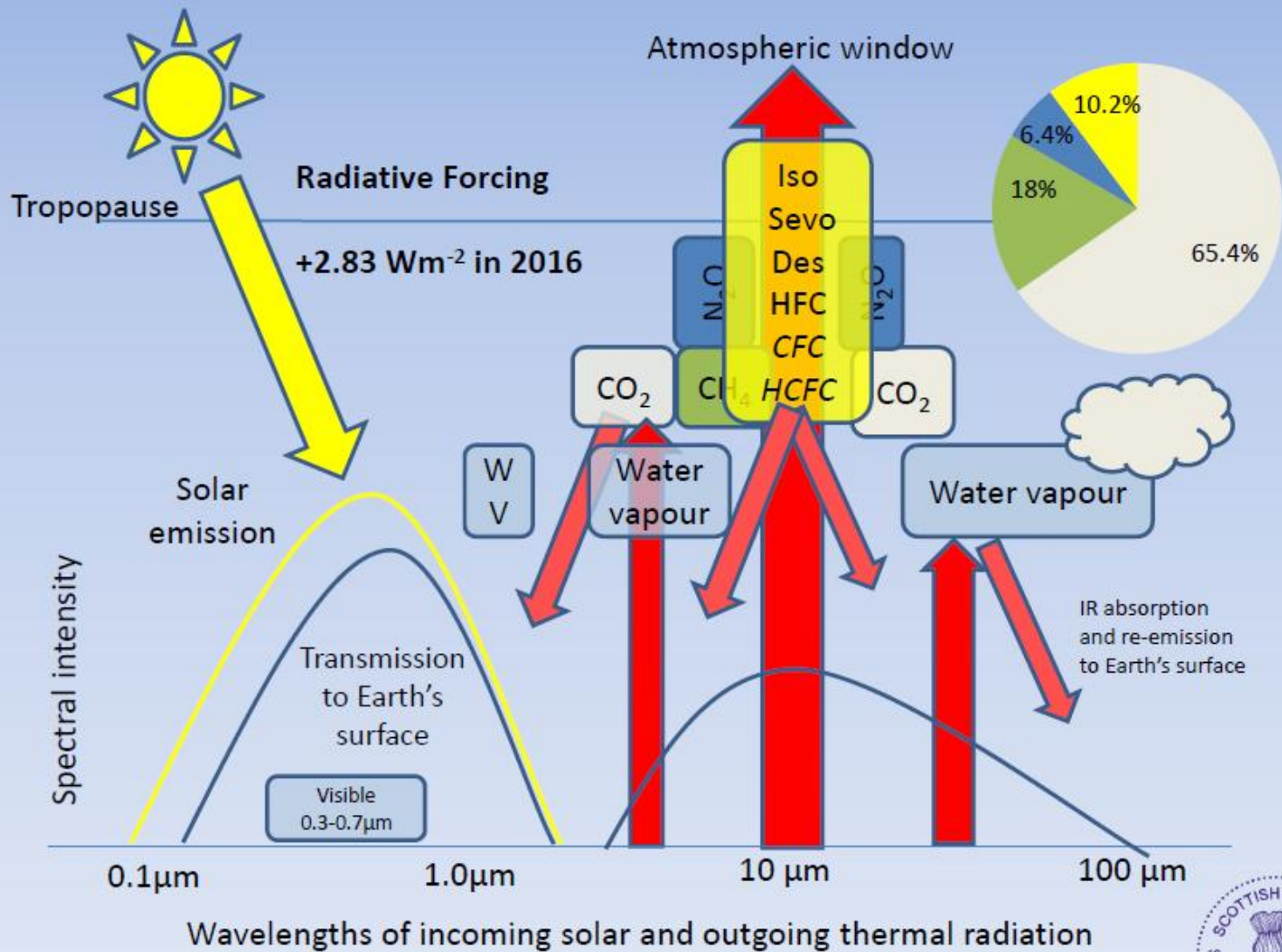
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*Continuing Education in Anaesthesia Critical Care & Pain*, Volume 15, Issue 4, 1 August 2015, Pages 173–179





# Inhaled agents

	IR absorption range ( $\mu\text{m}$ )	Tropospheric lifetime (yr)	GWP <sub>100</sub>	CO <sub>2</sub> e Kg (container)
Isoflurane	7.5-9.5 $\mu\text{m}$	3.2	510	190 (250ml)
Sevoflurane	7-10 $\mu\text{m}$	1.1	130	44 (250ml)
Desflurane	7.5-9.5 $\mu\text{m}$	14	2540	886 (240ml)
Nitrous oxide	4.5, 7.6, 12.5 $\mu\text{m}$	110	310	1054 (size E)

## Carbon dioxide equivalency (CO<sub>2</sub>e)

The amount of CO<sub>2</sub> that has the same warming effect as the GHG over the 100 year period

$$CO_2e \text{ for a gas} = \text{mass released} \times GWP \text{ of the gas}$$

We need to talk about Des!

# Education

- Tell people
- Give them real life comparisons





8.6 m side volume  $636 \text{ m}^3$

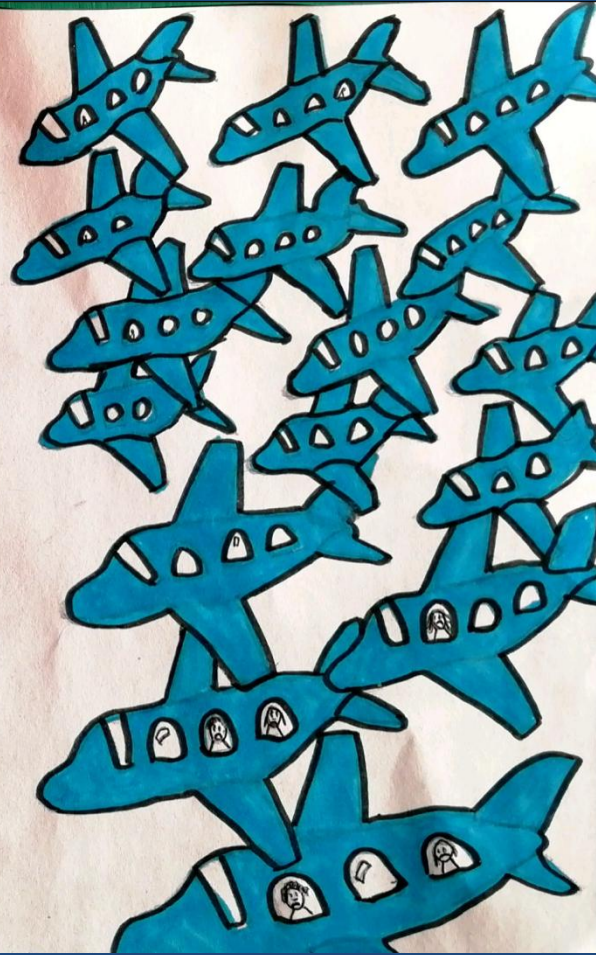
1 bottle desflurane

240 ml of desflurane has the same warming effect as  $860 \text{ kg CO}_2$





Roise Ní Eadhra



- 8 hours of Desflurane at 2l/min @ 1 MAC

= ? Km

In an average car

- 8 hours of Desflurane at 2l/min @ 1 MAC

= 6770km

in an average car

- 8 hours of Desflurane at 0.5l/min @ 1 MAC

= 1692km

in an average car

- 8 hours of sevoflurane at 0.5l/min @ 1 MAC

= 28km

in an average car



Anaesthetic impact calculator.

<https://play.google.com/store/apps/details?id=com.sleekwater.anaesthesia&hl=en>  
<https://itunes.apple.com/gb/app/anaesthetic-impact-calculator/id1070999985?mt=8>

# Departmental agreement

- Remove Desflurane from anaesthetic machines
- Still available, but not to hand



# Departmental agreement

- Remove Desflurane from anaesthetic machines
- Still available, but not to hand
- *The power of laziness*



We reduced our hospital's CO2e

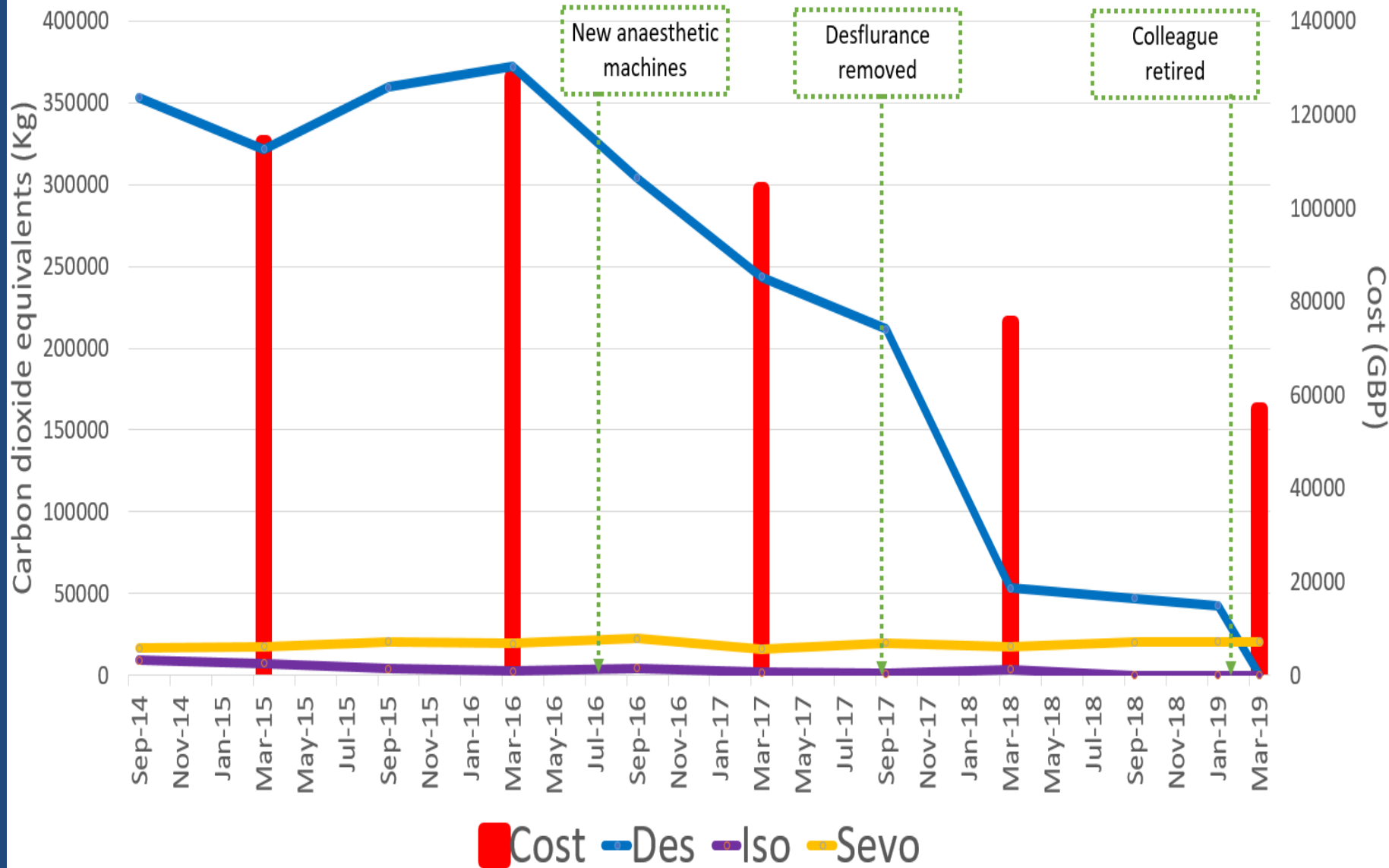
By 4.5%

We reduced our hospital's CO<sub>2</sub>e

By 4.5%

*It's easy*

# Carbon dioxide equivalents and cost of volatile agents used at Raigmore hospital from September 2014 - March 2019



Why is anyone using it?



# Difficulties for national organisations / Governments

- Politicians didn't grasp the concept
- AAGBI/RCOA
- Cannot be seen to favour one agent over another
- Open to legal action ?

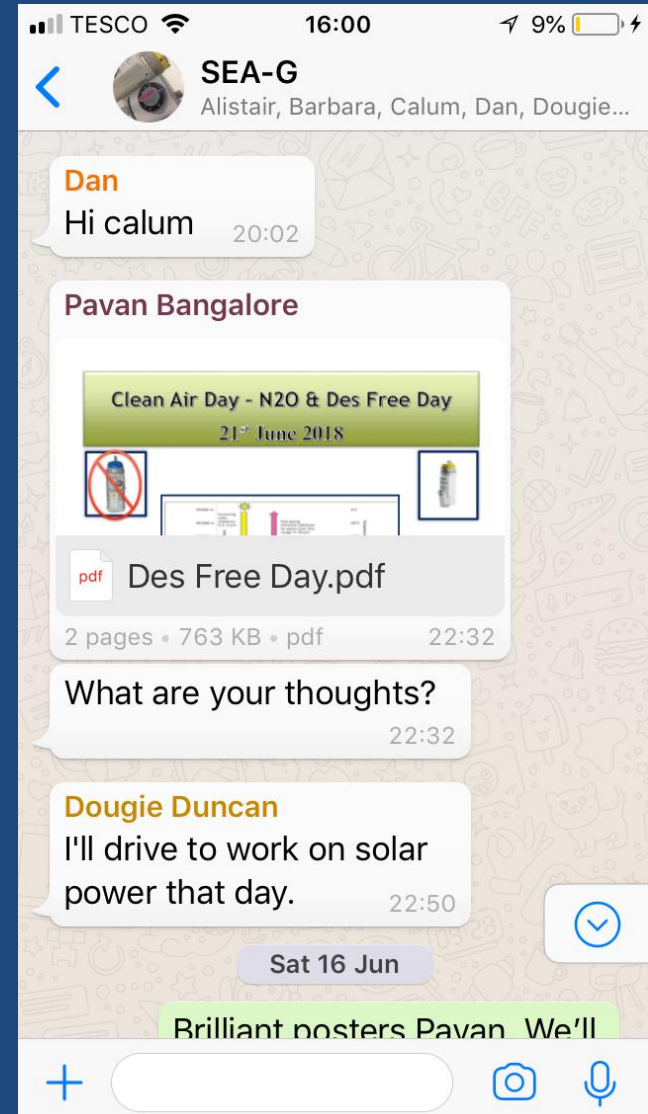
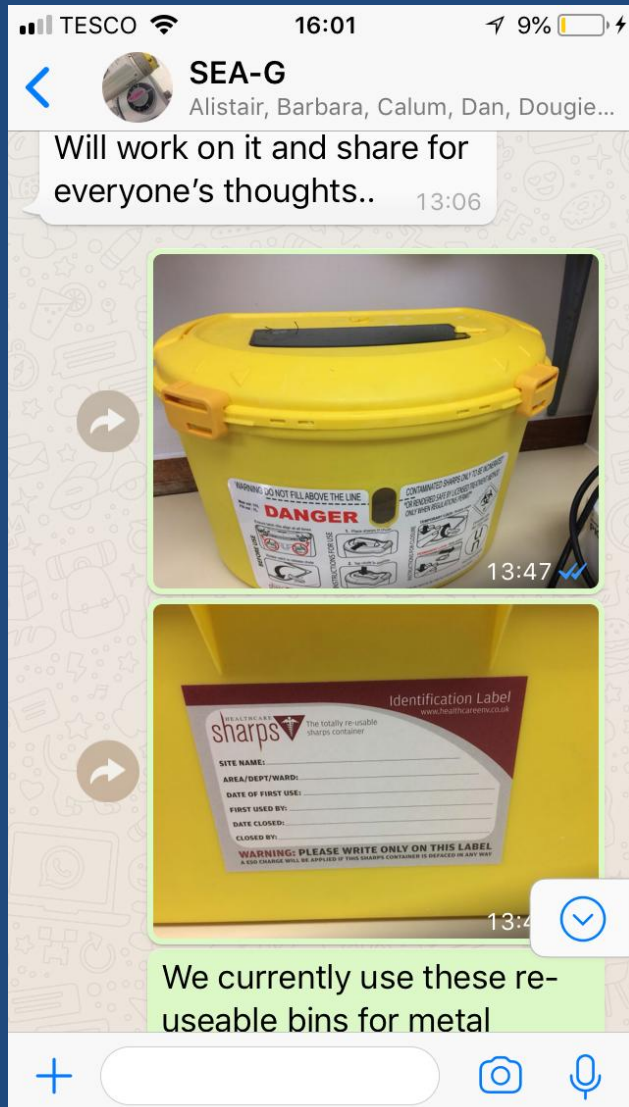
# DIY

## Grassroots conversation

- Personal choice
- New ideas, quickly implemented
- Avoid things that don't work



# Scottish Environmental Anaesthetists Group SEA-G



# SEA-G conversations

- Banning Des
- Waste segregation and recycling
- Plastic recycling
- Metal recycling
- Glass recycling (!!drug disposal!!)
- Lifecycle carbon cost of TIVA
- Salary sacrifice ULEV and e-bikes
- Theatre Suction disposal
- Wise list requirement for SMC/NSS

## The Neo-Ecosteryl System

The ECOSTERYL process is the first technology to recover plastics as the waste is treated. During the initial stage the Ecosteryl process decontaminates and shreds the waste to 20mm. The below figure describes the process from entry of material to end result.



1. Upward air density separator

2. Transfer belt

3. Optical sorter (colour and material)

4. Lights drop-out cyclone

5. Lights discharge

6. Positively ejected material

7. Drop down material

# Green theatre

## Neptune<sup>®</sup> 3 Waste Management System

Moving  
surgical suction  
**forward**



# Take homes

- 5% of the carbon footprint (CO<sub>2</sub>e) of the acute sector NHS is attributable to exhaled anaesthetic agents.
- Banning Desflurane will reduce that to 0.5%
- Reducing the environmental impact of anaesthesia, can be achieved through behaviour change.



"Daddy, what did YOU do  
to prevent climate change?"

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