



The European Society of
Regional Anaesthesia & Pain Therapy
Crossing Boundaries, Transforming Care

Sustainable Anaesthesia

Green Regional Anaesthesia (RA)



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Sustainable Anaesthesia

Learning Objectives ...

- understand the inter – relationship between healthcare and climate crisis
- describe environmentally responsible resources use that also balance patient safety
- advice in formulating our own environmentally sustainable RA approach



Sustainable Anaesthesia

Why now ...

Our Practice



- 5% global GHG emissions
- 11 kg daily waste / bed
- 10 billion USD annual cost

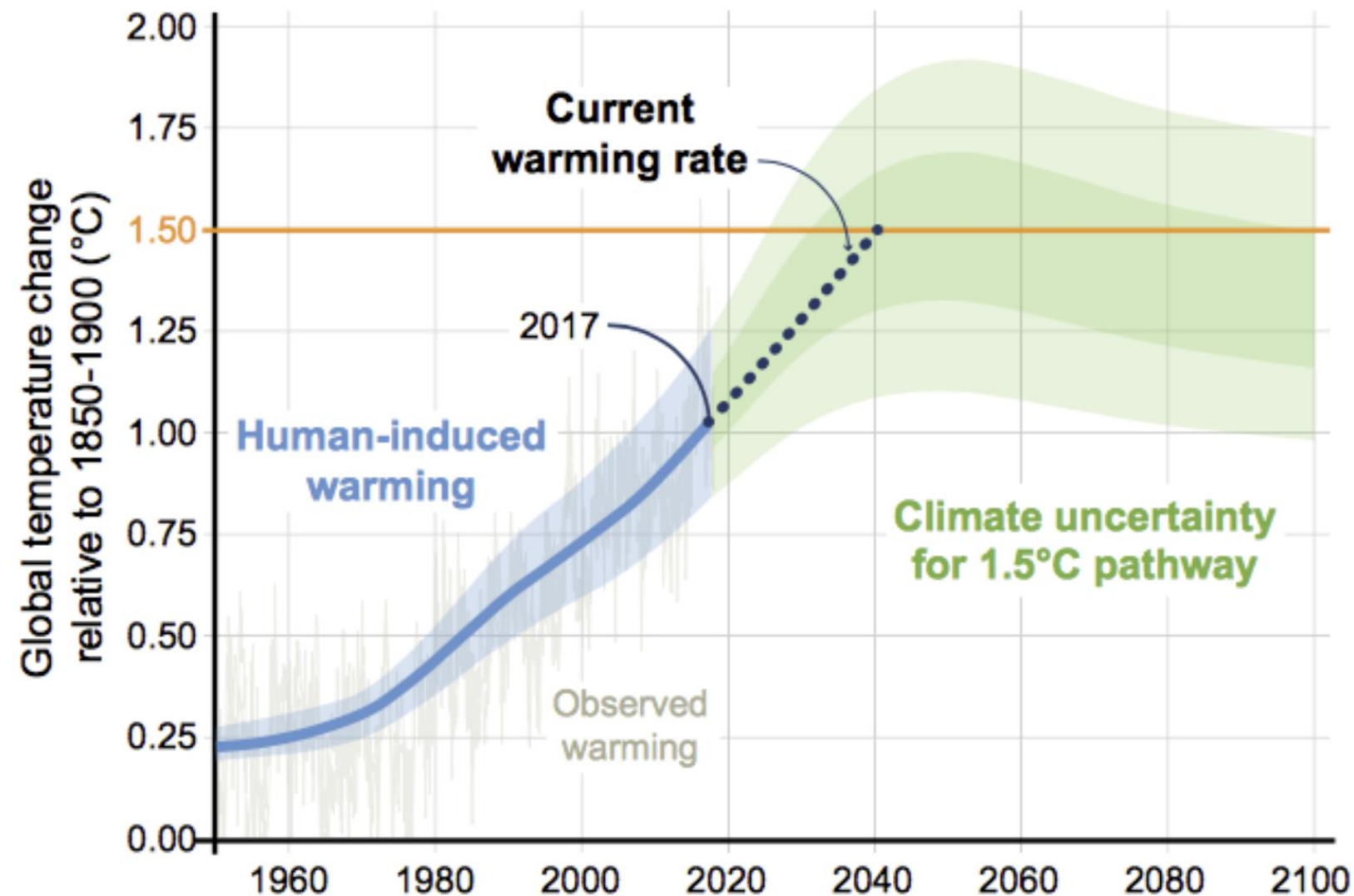


www.thelancet.com/planetary-health Vol 4 July 2020

Healthcare (Basel). 2023 Jan 13;11(2):242. doi: [10.3390/healthcare11020242](https://doi.org/10.3390/healthcare11020242)

Sustainable Anaesthesia

What about warming of our globe ...



Sustainable Anaesthesia

Why limiting temperature matters ...


Int ▾

News Opinion Sport Culture Lifestyle

World Europe US news Americas Asia Australia Middle East Africa Inequality Global development

Extreme weather

August 2025




The long read
'The forest had gone': the storm that moved a mountain

05.00 BST

Two wildfires in US west spur 'fire clouds' with erratic weather systems

1 Aug 2025 17.47 BST




Storm Floris: 90mph gusts hit train services - as it happened

21.30 BST

Storm Floris to hit UK on Monday with unseasonably strong winds forecast

1 Aug 2025 16.26 BST




Rail services in parts of England are cut as tracks disturbed by lack of moisture

4 Aug 2025 17.11 BST

Maryland boy dies after being trapped in storm drain as rains drench east coast

1 Aug 2025 15.58 BST



Woman swept away in flood waters in Hunter region as emergency services respond to more than 1,450 calls

3 Aug 2025 02.41 BST

Weather tracker
Weather tracker: deadly floods devastate northern China

1 Aug 2025 09.20 BST

Sustainable Anaesthesia

Why limiting temperature matters ...

Extreme temperatures

80%

Extreme heatwaves in 2003 and 2010 accounted for 80% of weather-related deaths in Europe from 1970-2019.

40+°C

Extreme temperatures of 40+°C and even 50°C are becoming increasingly frequent worldwide.

1.5°C

Limiting global warming to 1.5°C instead of 2°C could significantly reduce the number of people affected by extreme weather.

1°C

Every degree of global warming is projected to cause a 7% increase in extreme daily rainfall.

2°C

Limiting global warming to 1.5 °C instead of 2 °C could result in around 420 million fewer people being frequently exposed.

390,000 ha

In 2021, the Dixie fire in California burnt a record-breaking 390,000 hectares.

Environmental Sustainability

We need to do something – Role of RA !!!!



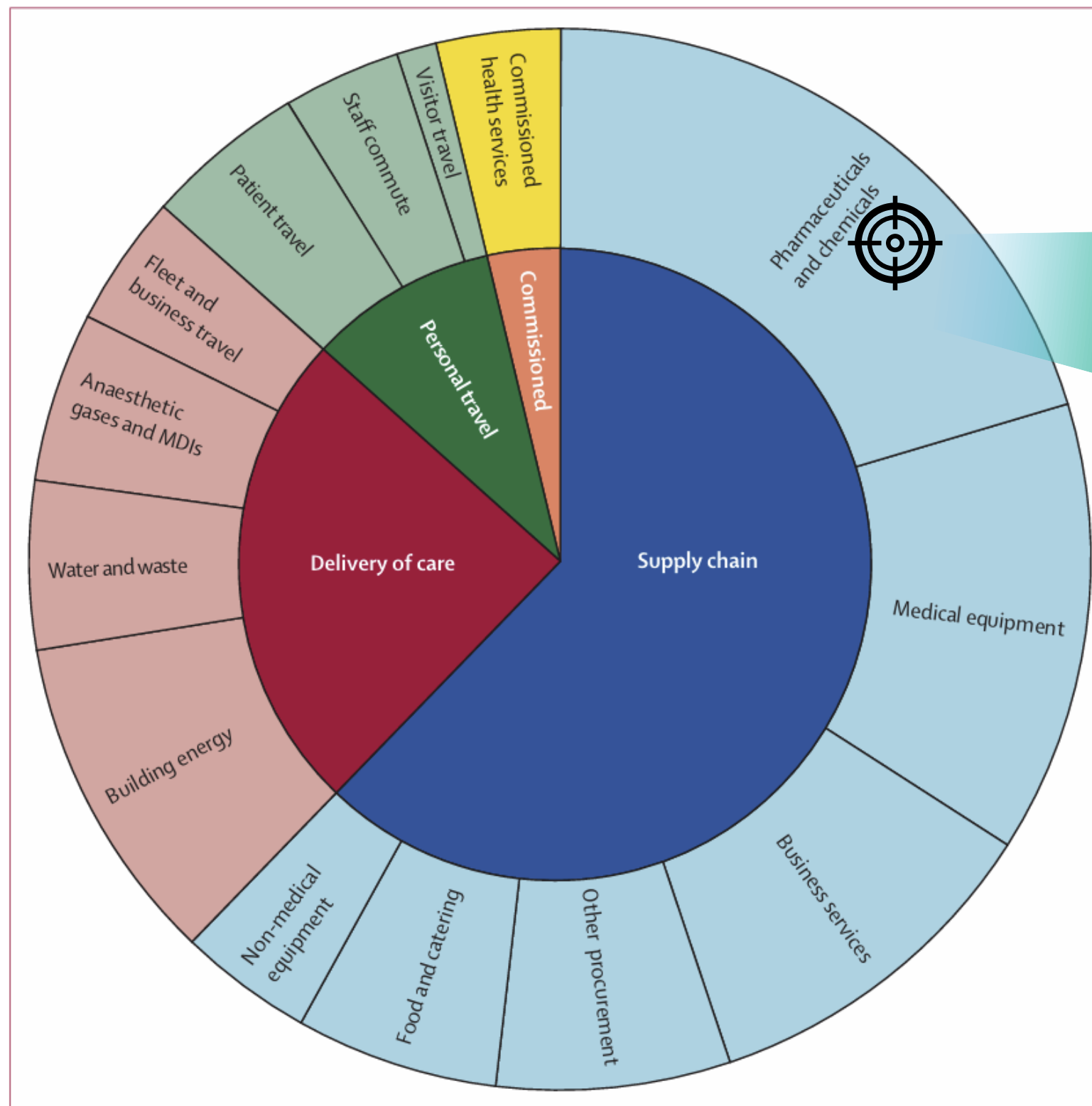
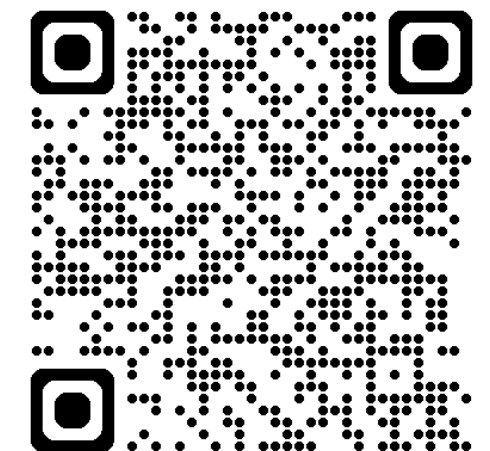


Figure 4: Contribution of different sectors to the greenhouse gas emissions of the NHS England, 2019
 Data available in appendix 1 (p 39). MDI=metered dose inhaler. NHS=National Health Service.



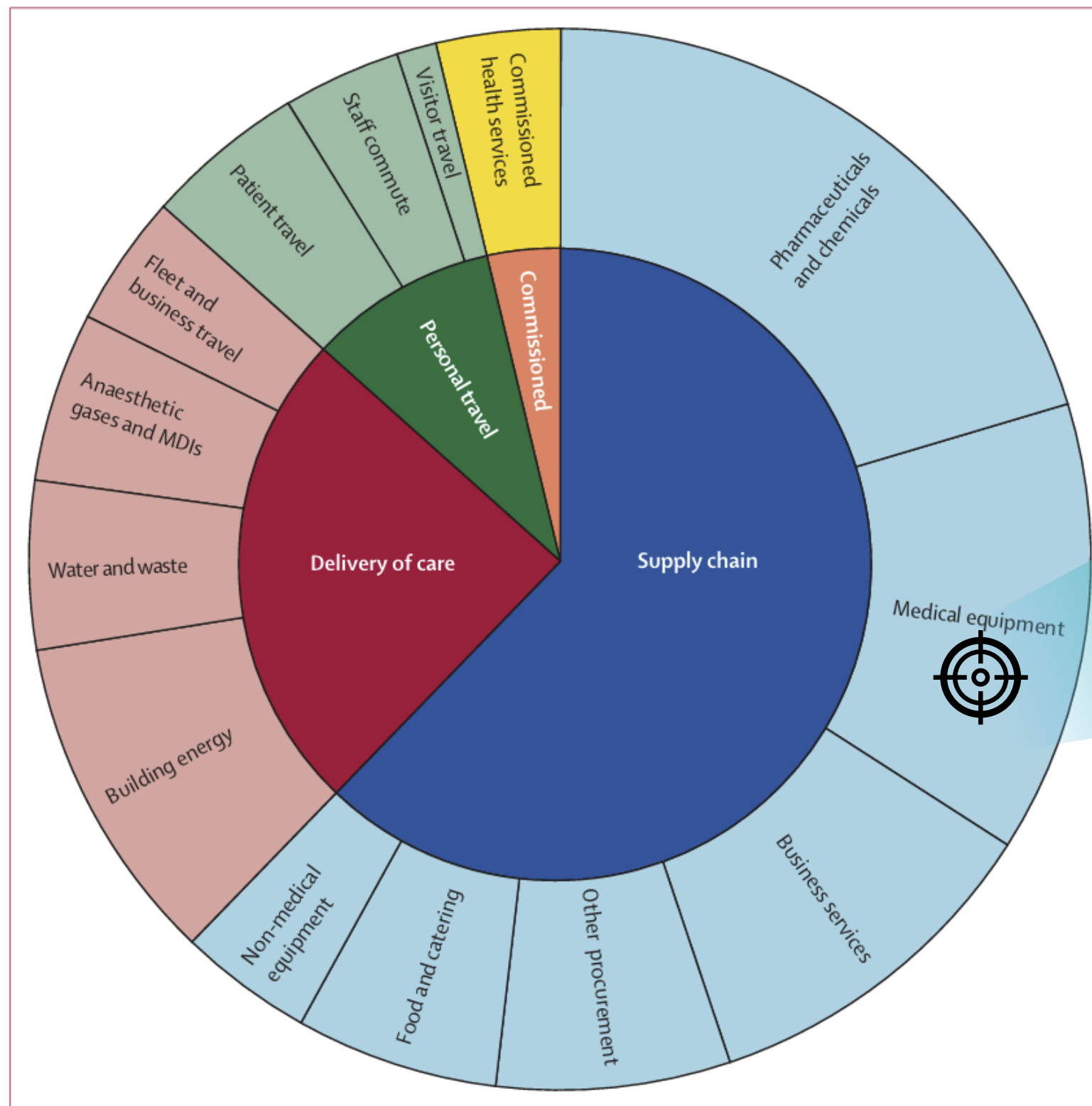
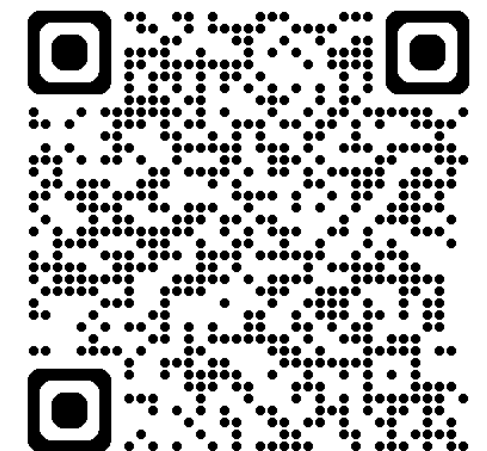


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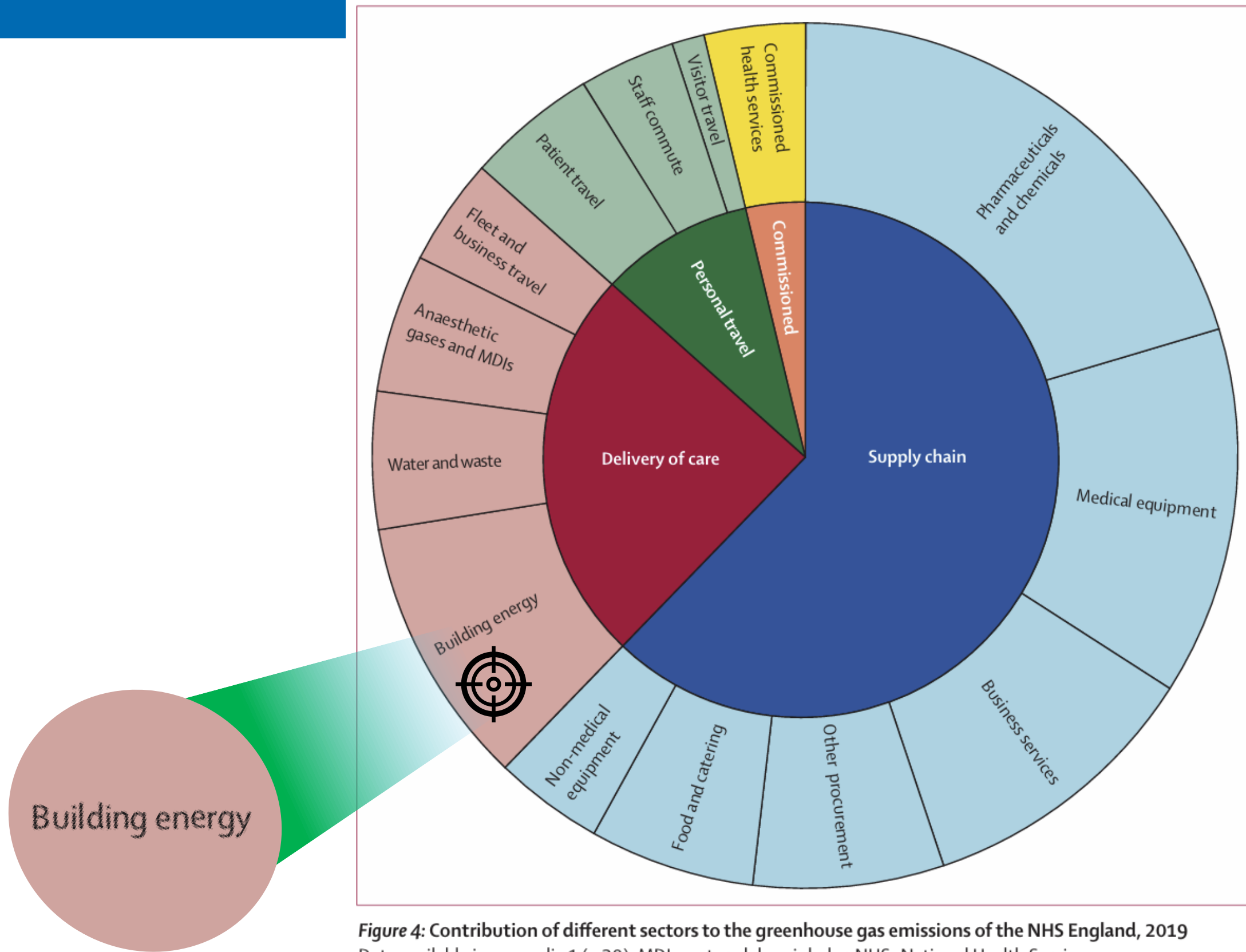
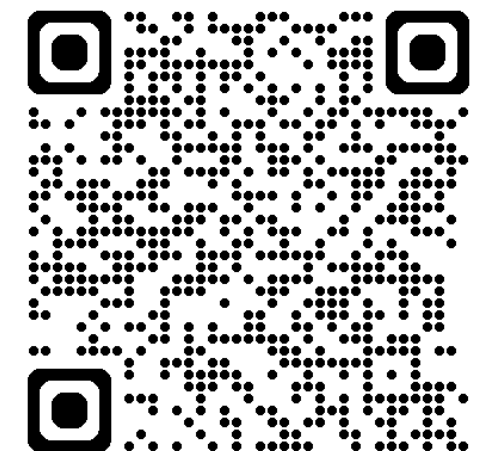


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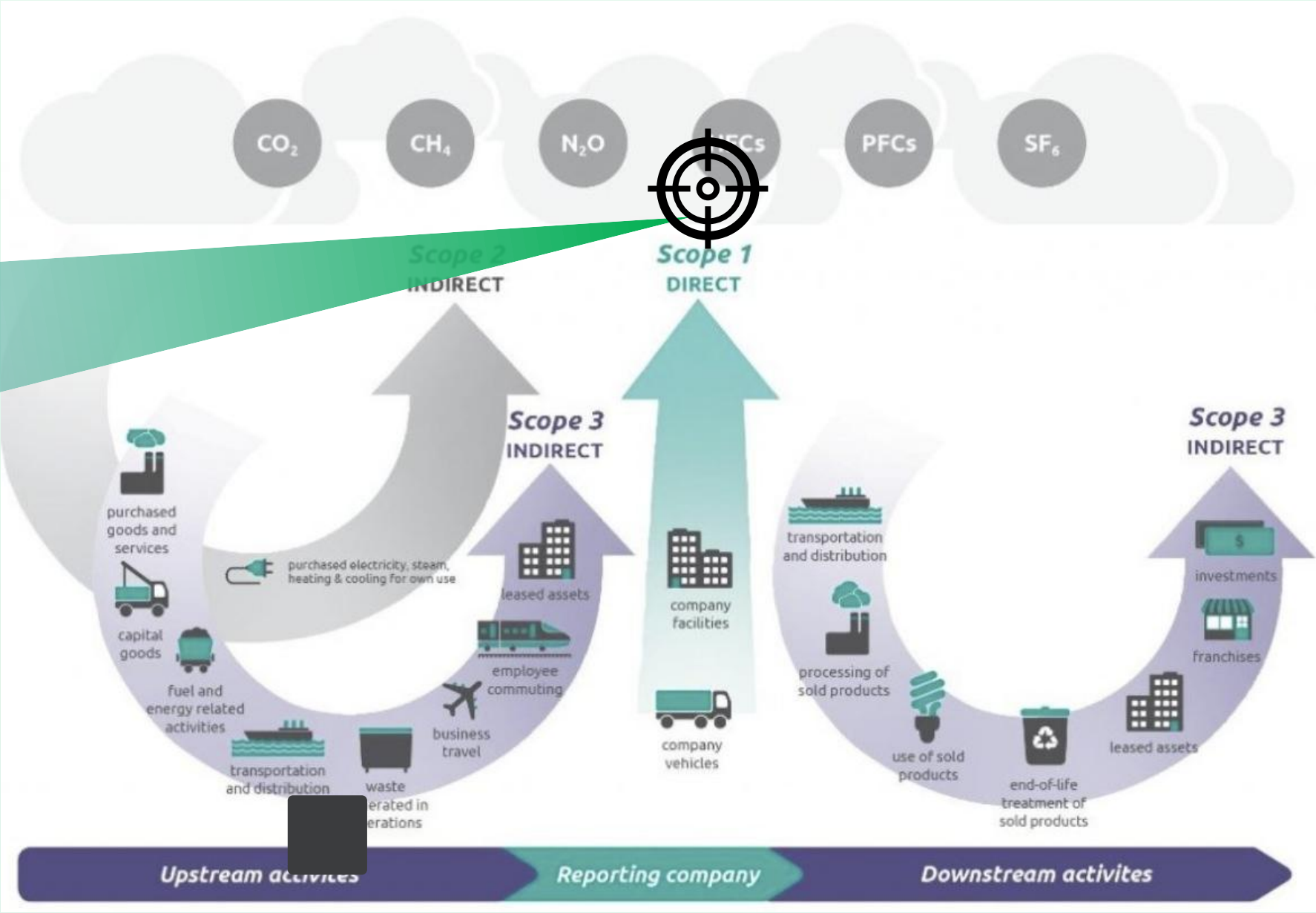


Green RA

Basic Aspects



Reduce or avoid volatile agents

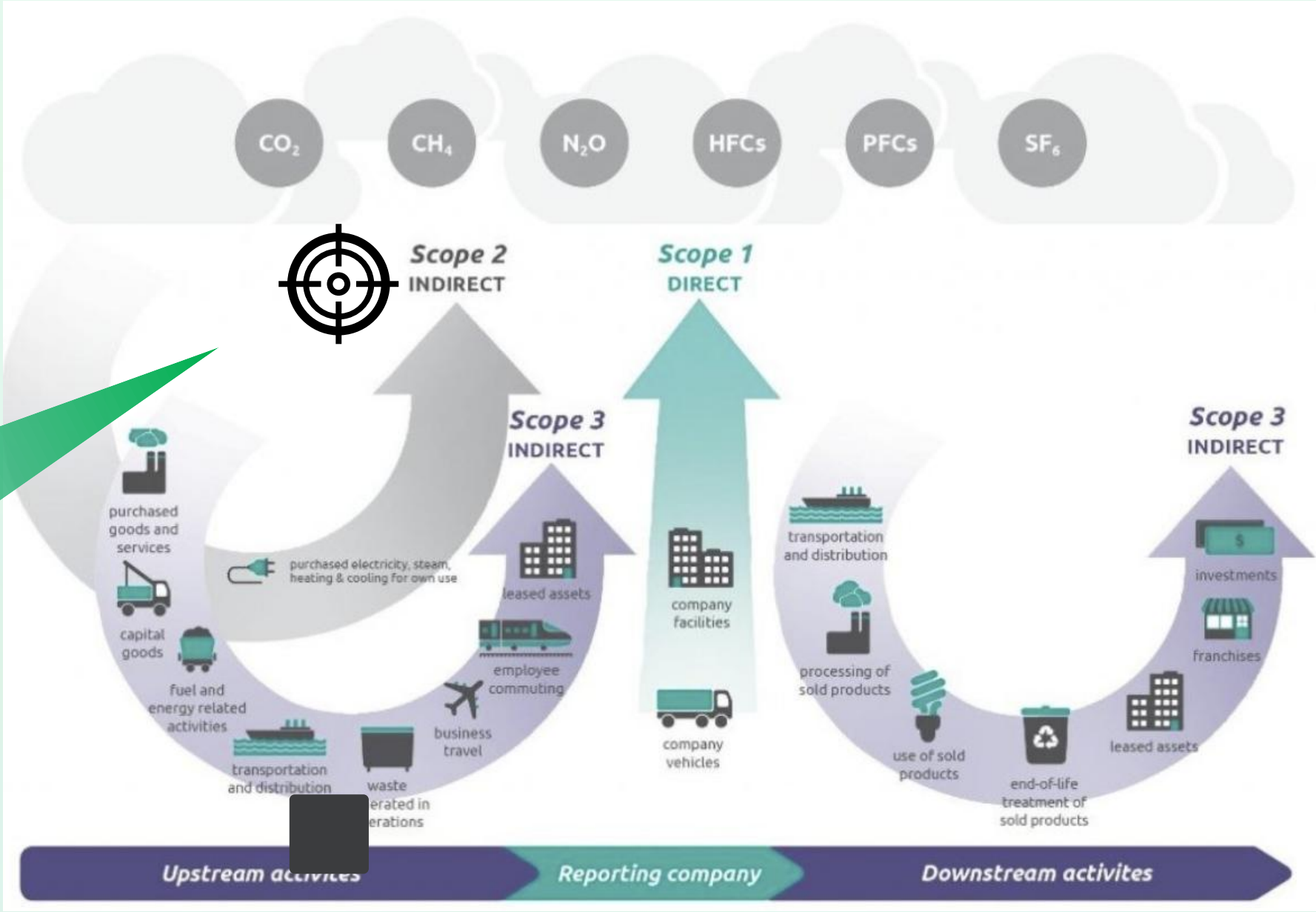


Green RA

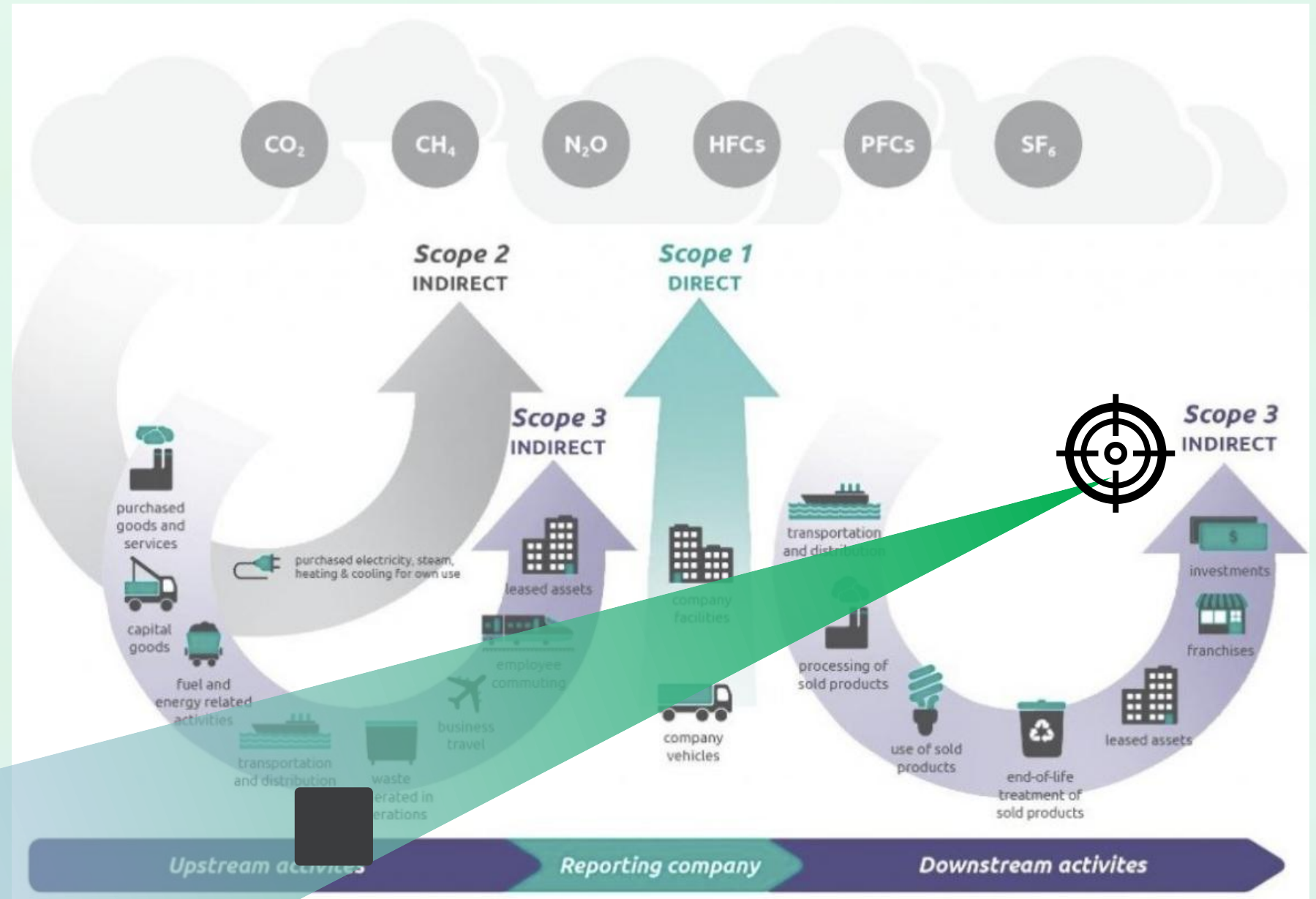
Basic Aspects



Energy efficiency



Aspects of the Greenest Block



Reduce waste



Epidural steroid injections
and serious adverse events

Plus:

RAPM education- Neuraxial anesthesia in
challenging obstetrical patients

The definitive diagnostic test for chronic
regional pain syndrome still alludes us

Taking our understanding of the popliteal
sciatic nerve block to the next level

ASPA



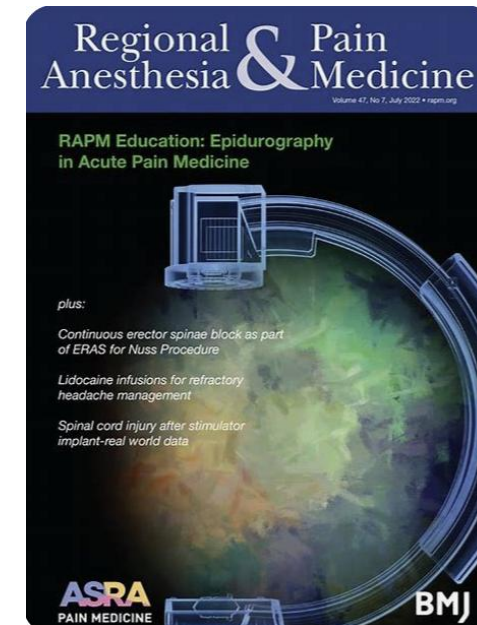
BMJ

➤ Reg Anesth Pain Med. 2020 Sep;45(9):744-745. doi: 10.1136/rapm-2020-101452. Epub 2020

'Green-gional' anesthesia: the non-polluting benefits of regional anesthesia to decrease greenhouse gases and attenuate climate change

Mausam Kuvadia^{1 2}, Cynthia Eden Cummis³, Gregory Liguori¹, Christopher L Wu⁴





➤ [Reg Anesth Pain Med](#). 2025 Apr 1:rapm-2025-106491. doi: 10.1136/rapm-2025-106491.

Online ahead of print.

Ultrasound machine power-down between scans: an energy and cost-saving measure in regional anesthesia

Edward Serghi¹, Tyeren Deacon², Tareq Salah³, Deirdre C Kelleher⁴, Elizabeth Fouts-Palmer⁴, Vivian H Y Ip⁵

Affiliations + expand

PMID: 40169359 DOI: [10.1136/rapm-2025-106491](#)





PHASE 1

Actively switch off
an US machine
when not in use



PHASE 2

Reduce scope 2
emissions
and scope 3



PHASE 3

Many US
Much energy
saved

SIMPLE STRATEGIES

Environmental Impact of Anaesthesia

20-30%

OR Waste

Hospital waste generated by
operating rooms





Pharmaceutical waste



Precise Dosing



Guided Reduction



Avoid Over Preparation



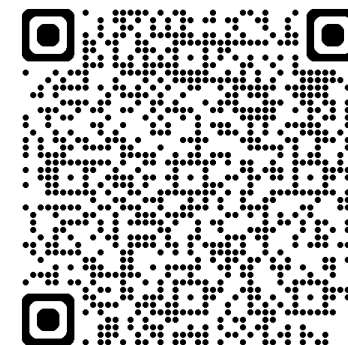
Proper Disposal

ANESTHESIOLOGY

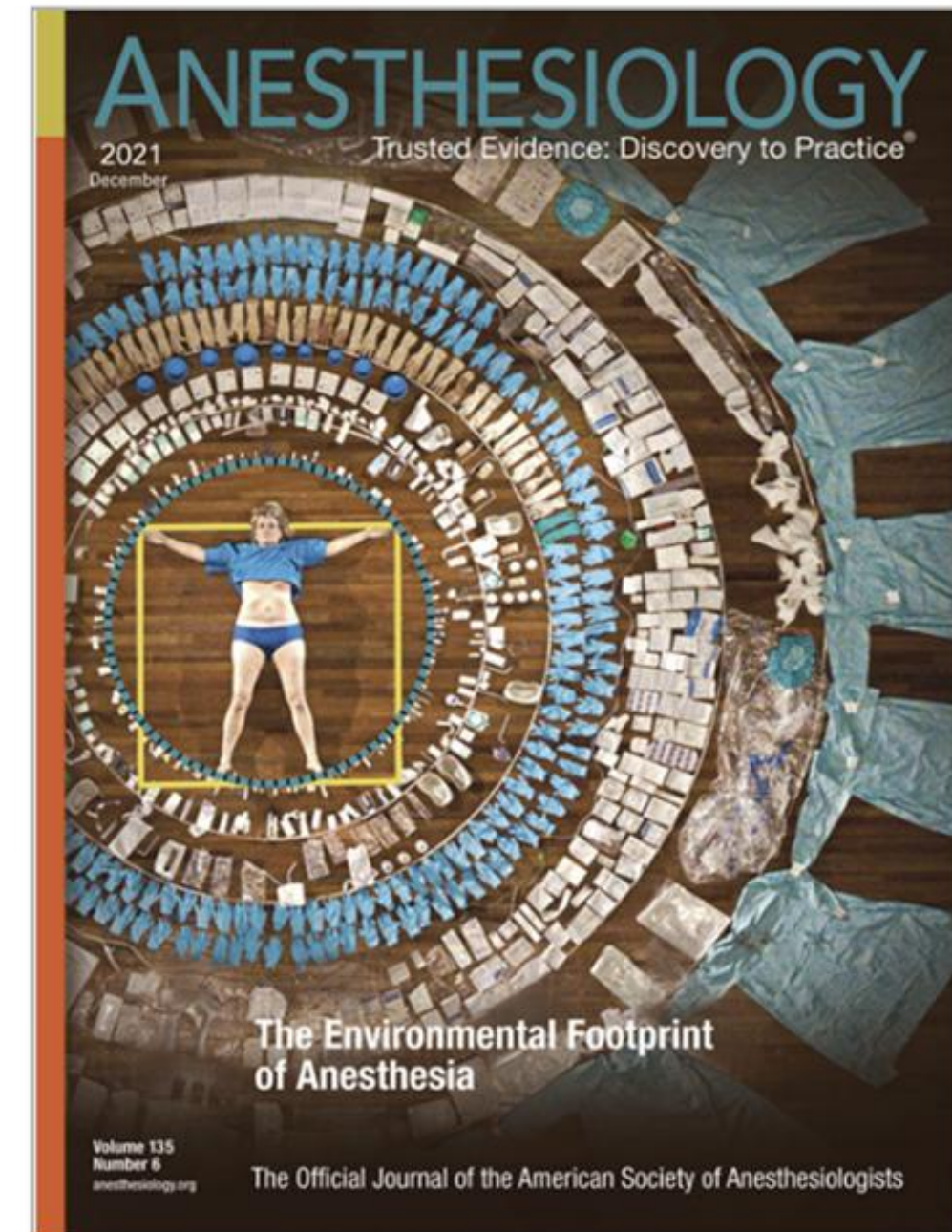
Carbon Footprint of General, Regional, and Combined Anesthesia for Total Knee Replacements

Forbes McGain, F.A.N.Z.C.A, F.C.I.C.M., Ph.D.,
Nicole Sheridan, F.A.N.Z.C.A.,
Kasun Wickramarachchi, B.Sc., M.P.H., M.D.,
Simon Yates, M.D., Brandon Chan, M.B.B.S.,
Scott McAlister, B.Sc., P.grad., Dip.Sci., M.Eng.Sci.

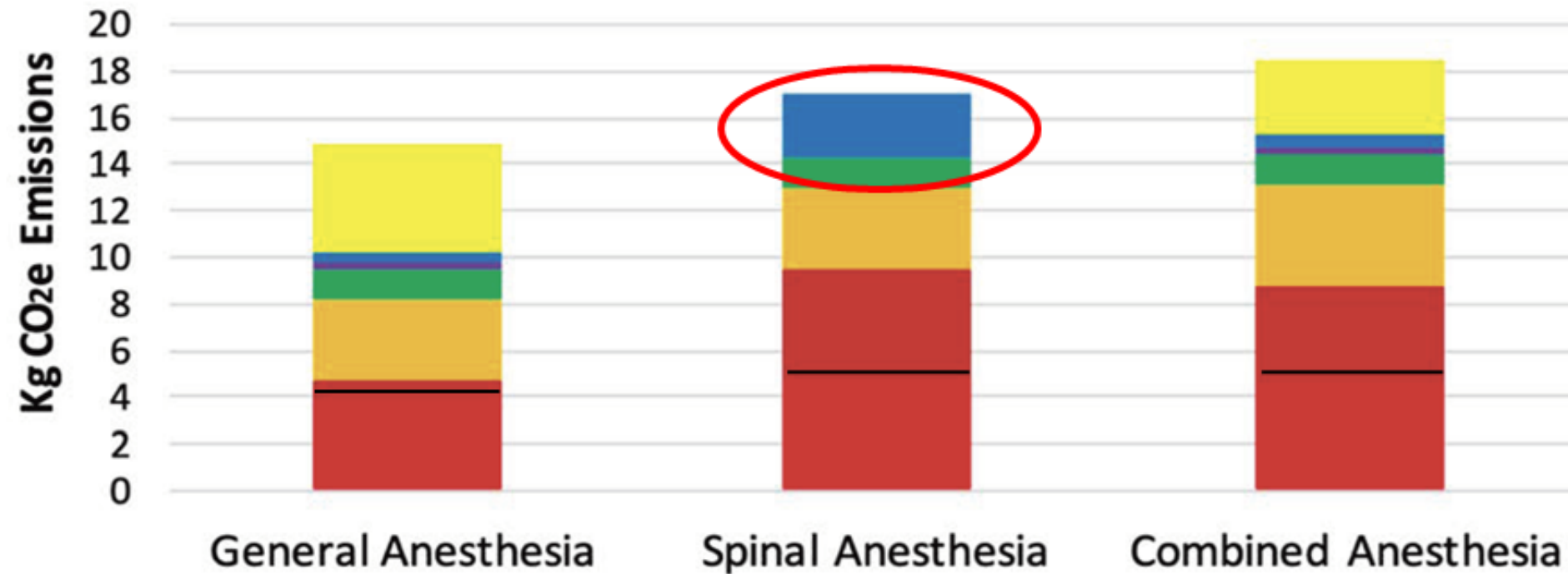
ANESTHESIOLOGY 2021; 135:976–91



Volume 135, Issue 6
December 2021



Categorizations of CO₂e Emissions: General, Spinal, and Combined Anesthesia



Sevoflurane

→ Oxygen

CO₂ absorbant

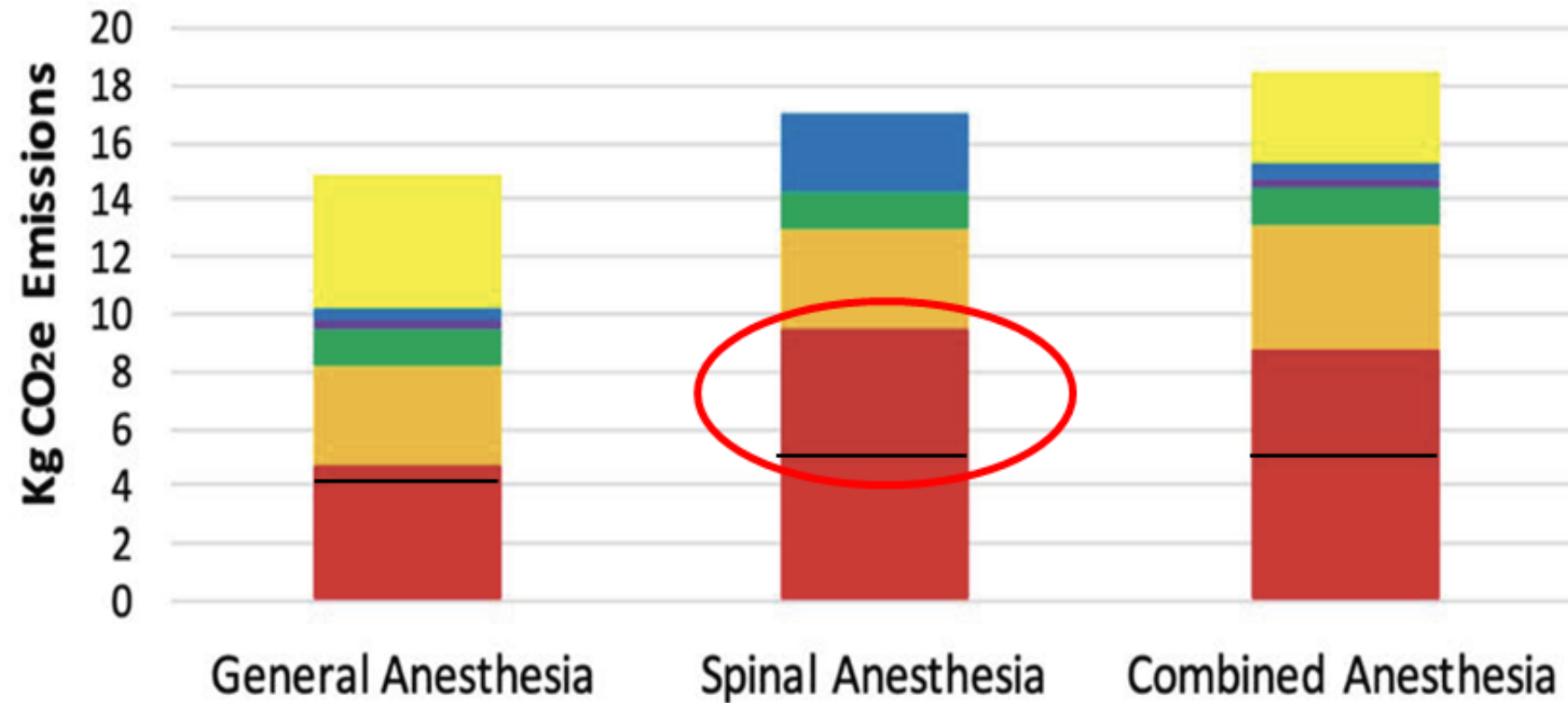
Drugs

Single use- plastics, glass, cotton, etc.

Electricity for cleaning reusables- plastics, gowns etc.

Electricity for warmer, scavenging, and anesthesia machine

Categorizations of CO₂e Emissions: General, Spinal, and Combined Anesthesia



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REPORTS OF ORIGINAL INVESTIGATIONS

Environmental responsibility in resource utilization during the practice of regional anesthesia: a Canadian Anesthesiologists' Society Delphi consensus study

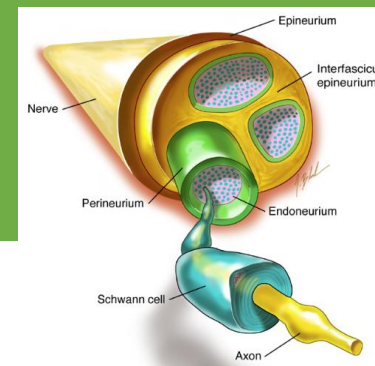
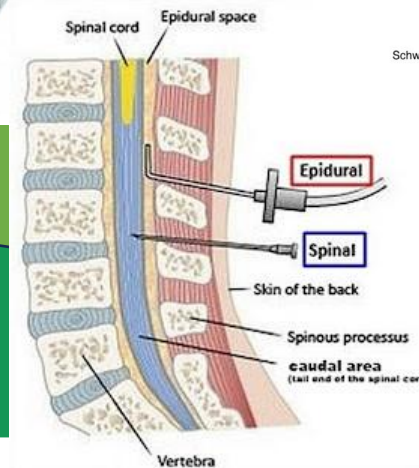
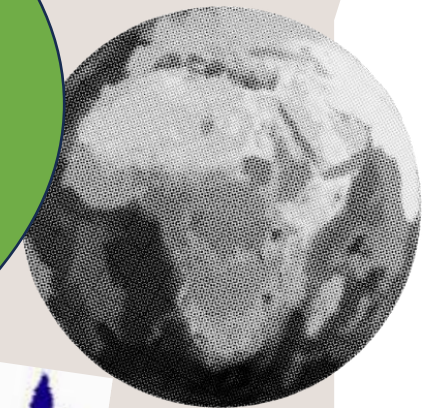
La responsabilité environnementale dans l'utilisation des ressources pendant la pratique de l'anesthésie locorégionale : une étude consensuelle par la méthode Delphi de la Société canadienne des anesthésiologistes

Vivian H. Y. Ip, MBChB, FRCA  · Clifford L. Shelton, MBChB, PhD, FRCA · Forbes McGain, PhD, FANZCA, FCICM · Danielle Eusuf, MBChB, FRCA · Deirdre C. Kelleher, MD · Galaxy Li, MD · Alan J. R. Macfarlane, MBChB, MRCP, FRCA · Julien Raft, MD · Kristopher M. Schroeder, MD; FASA · Thomas Volk, MD · Rakesh V. Sondekoppam, MBBS on behalf of and Collaborators



Results

36 experts (78% response rate)



Highlights

1

Sterile gown unnecessary

Pre-made pack - Minimal equipment and can be used as sterile workspace during catheter placement

2

3

US Full sleeve cover only for real-time needling, NOT for pre-scan over intact skin

Sedation level and O2 - individualized

4

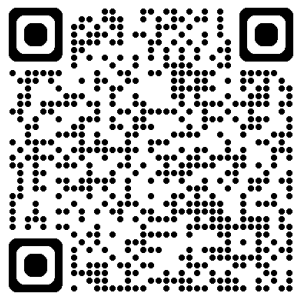
Balancing Patient Safety

➤ Reg Anesth Pain Med. 2025 Apr 1:rapm-2024-105651. doi: 10.1136/rapm-2024-105651.

Online ahead of print.

ASRA Pain Medicine consensus practice infection control guidelines for regional anesthesia and pain medicine

David Anthony Provenzano¹, Michael Hanes², Christine Hunt³, Honorio T Benzon^{4 5}, Jay S Grider⁶, Kelly Cawcutt⁷, Tina L Doshi^{8 9 10}, Salim Hayek^{11 12}, Bryan Hoelzer¹³, Rebecca L Johnson¹⁴, Hari Kalagara¹⁵, Sandra Kopp¹⁶, Randy W Loftus¹⁴, Alan James Robert Macfarlane^{17 18}, Ameet S Nagpal¹⁹, Stephanie A Neuman²⁰, Amit Pawa^{21 22}, Amy C S Pearson²³, Julie Pilitsis²⁴, Eellan Sivanesan²⁵, Rakesh V Sondekoppam²⁶, Jan Van Zundert^{27 28}, Samer Narouze²⁹



Balancing Patient Safety

➤ Reg Anesth Pain Med. 2025 Apr 1:rapm-2024-105651. doi: 10.1136/rapm-2024-105651.
Online ahead of print.

- *Sterile gown use is not necessary during short-term continuous regional therapy of 4 days or less. Evidence: grade B.*

David Anthony Provenzano¹, Michael Hanes², Christine Hunt³, Honorio I Benzon^{4 5},
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Amy C S Pearson²³, Julie Pilitsis²⁴, Eellan Sivanesan²⁵, Rakesh V Sondekoppam²⁶,
Jan Van Zundert^{27 28}, Samer Narouze²⁹

Adhesive plastic film probe cover

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Transparent adhesive film dressings are not endorsed by US manufacturers or approved by the FDA for probe covers. Level of certainty: high.

Alan James Robert Macfarlane^{17 18}, Ameet S Nagpal¹⁹, Stephanie A Neuman²⁰, Amit Pawar^{21 22},
Amy C S Pearson²³, Julie Pilitsis²⁴, Eellan Sivanesan²⁵, Rakesh V Sondekoppam²⁶,
Jan Van Zundert^{27 28}, Samer Narouze²⁹

Strong Consensus

SPINAL

SETUP

Clean site with antimicrobial skin preparation
Sterile drape required
Minimal common equipment for premade pack
No US probe cover for pre-scan
Full sleeve US probe cover for real-time
needling



Strong Consensus

PERIPHERAL NERVE BLOCK

SETUP

Clean site with antimicrobial skin preparation

Sterile drape NOT required

Minimal common equipment for premade pack

Sterile tray NOT required

Aseptic non-touch technique can be used

No US probe cover for pre-scan



Strong Consensus



TRADITIONAL PNB CATHETER

SETUP

Clean site with antimicrobial skin preparation

Sterile drape required

Minimal common equipment for premade pack

Premade pack CAN be used as sterile workspace

No US probe cover for pre-scan

Full sleeve US probe cover for real-time needling

Strong Consensus

CATHETER-OVER-NEEDLE

SETUP

Clean site with antimicrobial skin preparation one time

Sterile drape required

Minimal common equipment for premade pack

Premade pack can be used as sterile workspace

No US probe cover for pre-scan

Full sleeve US probe cover for real-time needling





► J Infect Prev. 2017 Aug 4;19(1):6–15. doi: [10.1177/1757177417720996](https://doi.org/10.1177/1757177417720996)

Implementing the Aseptic Non Touch Technique (ANTT®) clinical practice framework for aseptic technique: a pragmatic evaluation using a mixed methods approach in two London hospitals

[Simon Clare](#)^{1,✉}, [Stephen Rowley](#)¹





Conclusion



Evidence Over Ritual



Customized Care Plan



RA can be 'Green'

Thank you for your attention!!!

