



*Environmentally Sustainable, Emergency Medicine*

# GreenED Handbook



**RCEM**  
Royal College  
*of* Emergency  
Medicine

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## Background

The *GreenED* Toolkit is composed of the Digital Handbook and other resources available for download on the *GreenED* webpage [greened.rcem.ac.uk](https://greened.rcem.ac.uk).

The purpose of the Toolkit is to provide guidance on how to implement the *GreenED* Framework 2.0. It will contain relevant healthcare sustainability resources (both external and developed by RCEM's *GreenED* team / ESIG members), collated in a user-friendly way so as to: save time and effort of Emergency Department (ED) staff, both individuals and teams; maximise efficiency of action implementation; and serve as a trove of easily accessible references.

Handbook guidance will be cross-cutting, as opposed to the guidance accompanying each specific action within Framework 2.0. However, some action-specific guidance e.g. Bronze #1: 'Setting up a green group' will be featured in the Handbook because of foundational or strategic relevance.

Handbook contents will be integrated with the *GreenED* online platform, access to which will be exclusive to sites who have signed up to the *GreenED* programme for a fee(s). The Handbook will also be available on the public-facing website as an open-access resource for EDs interested in taking action on sustainability but who have not yet signed up to the programme.

NB. Potential partners for resource-development include Greener NHS, The Centre for Sustainable Healthcare (CSH), UK Health Alliance on Climate Change (UKHACC), Healthcare Without Harm and NHS Quality Improvement (QI) experts.

NB. The 'Induction Pack' refers to what participating sites will receive via email when they sign up to the *GreenED* programme, which may consist of: subscription to the online portal; associated support services; and/or accreditation at Bronze, Silver or Gold level. The details of this will be worked out down the line but will include the Digital Handbook, welcome text, and calendar links to monthly catch-up sessions via Teams, amongst other elements.

## Format

See [rcem.ac.uk/reports/](https://rcem.ac.uk/reports/) and [rcem.ac.uk/quality-improvement-resources/](https://rcem.ac.uk/quality-improvement-resources/) for examples of resources, including toolkits, developed by RCEM. One ‘tool’ featured is a [‘Top 10 tips’](#), which is a format that could be adapted to sustainability work within EDs. The ‘Safety Toolkit’ includes separate downloadable parts e.g. [on team working](#).

Website resources refer to downloadable content, as opposed to ‘copy’. The open-access Handbook itself will initially be in PDF form, but may evolve into an interactive workbook that is editable by users as this could provide a way for ED staff to keep track of their progress i.e. take notes, collect data etc.

In future, the Toolkit could potentially be linked to a *GreenED* Hub that provides ‘mind-hive’ functionality to facilitate communication, networking and resource-sharing within and across sites. For instance, a Microsoft Teams channel for team-building, working collaboratively on documents, and project management on a small scale (i.e. distinct from over-arching RCEM *GreenED* project management). This could be national, regional and/or local or site-specific.

For now, resources will be hosted on the website in accessible formats e.g. word docs, spreadsheets, templates for forms, and examples of resources developed using free online tools (such as [Canva](#) to develop visual resources; Survey Monkey for staff survey(s); [Sli.do](#) and [Miro](#) to make meetings and presentations interactive) will be highlighted.

## Digital Handbook

*NB. **Green highlight** indicates potential website resource (in addition to being part of Handbook)*

*NB. Blue Italics indicates notes i.e. not for inclusion in the contents of the Handbook*

*This Digital Handbook is intended to complement the action-specific guidance contained within Framework 2.0. For EDs not signed up to the GreenED programme, and therefore without access to the complete Framework via the online portal, it can be used to work through Bronze, Silver and Gold actions, comprehensive lists of which can be found on [greened.rcem.ac.uk](https://greened.rcem.ac.uk) and downloaded, along with the Handbook itself and other resources.*

## **Contents**

### Background on the climate crisis, healthcare sustainability and emergency care

Health Impacts of Climate Change

High Carbon Healthcare as a Driver of Climate Change

Impact on emergency health services and why we need to act now

### Background on Net Zero NHS and how EDs can play a part

#### The role of Greener NHS

What RCEM is doing about the climate and ecological crisis

ESIG vision statement

### The *GreenED* Programme

#### I. *GreenED* Framework and Online Portal

Framework 1.0 – the Pilot Project

Framework 2.0 (2023 onwards)

Infographics of Bronze, Silver and Gold actions

Table 1: Framework domains

How to use the *GreenED* online portal: licensing and FAQs

Support, Assessment and Accreditation

#### II. Taking Action on Shopfloor Sustainability - Where to Start?

Bronze Action #1 - How to set up (and maintain) a *GreenED* Group

'Top Tips' on green team building

Silver Action #1 - Senior Support

'Top Tips' on securing senior buy-in/support

Gold Action #1 - Protected staff time

Job Description(s) - clinical fellow in sustainability post

'How to integrate sustainability into consultant job plans'

#### III. How to use *GreenED* actions for your portfolio

The 2021 RCEM curriculum for trainees and CESR applicants

QIPs - see section VI

Example Management Projects

The ACP curriculum

#### IV. Stakeholder Engagement

Who's who within your emergency department, hospital, Trust and beyond?

Stakeholder map

'Top Tips' on stakeholder engagement outside the ED

V. **Carbon footprinting an ED: a crash course**

Carbon Hotspots

Table 2: Example Carbon Hotspots in EDs

Baseline Assessment: **Departmental survey**

VI. 'Green' Quality Improvement for EDs

The SusQI model: principles and methodology

'Finding the wins': Environmental, financial and patient/staff benefits

Example Green QIPs

**Infographic: 'Spectrum of Green QIP'**

Communicating wins and challenges

The *GreenED* network

**Visual assets: example posters, slide bank**

**Key Dates: Environmental Awareness Days**

RCEM's *GreenED* team - get in touch

References

## **Background on the climate crisis, healthcare sustainability and emergency care**

*Although the world economy and health systems are recovering from a substantial acute global health crisis, climate change poses a much greater health threat in the coming decades. It is crucial that organisations and institutions capitalise on the insights generated from the pandemic to improve adaptability and resilience.*

### **– The 2021 report of the *Lancet* Countdown on health and climate change: code red for a healthy future**

#### **Health impacts of climate change**

The impacts of climate change on health and healthcare systems are global and local.<sup>1</sup>

The COVID-19 pandemic has highlighted the need for the NHS to prepare for the climate-related health emergencies that lie ahead. These include heatwave exposure, healthcare infrastructure breakdown, trauma presentations during severe weather events, emerging infectious diseases, increasing displacement of people, and the mental health effects that all of these will bring.<sup>2</sup> Healthcare professionals have a responsibility to accordingly upscale efforts to reduce our own contribution to the drivers of climate change: carbon emissions.

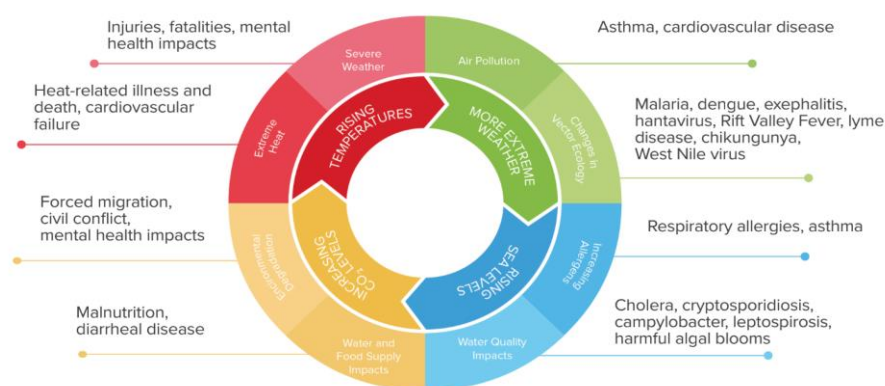


Figure 1: Impact of climate change on human health (Source: U.S. Centers for Disease Control and Prevention)

#### **High carbon healthcare as a driver of climate change and related environmental crises**

<sup>1</sup> <https://www.lancetcountdown.org/2022-report/>

<sup>2</sup> <https://www.lancetcountdown.org/data-platform/health-hazards-exposures-and-impacts>

It is currently estimated that the NHS is responsible for 4% of the UK's total carbon emissions (CO<sub>2</sub>e<sup>3</sup>) and over a third of its public sector emissions, making it the biggest public-sector emitter.<sup>4</sup>

Alongside global warming, healthcare impacts on the environment in other ways - through air pollution and environmental contamination caused by plastic and pharmaceutical waste.

Carbon emissions in healthcare settings including EDs can be divided in three categories: Scope 1 (direct emissions from health care facilities e.g use of nitrous oxide), Scope 2 (indirect emissions from purchased energy e.g heating and lighting our buildings) and Scope 3 (all indirect emissions, not included in scope 2, that occur in the value chain, including both upstream and downstream emissions e.g the energy used to produce the products we use to provide emergency care).

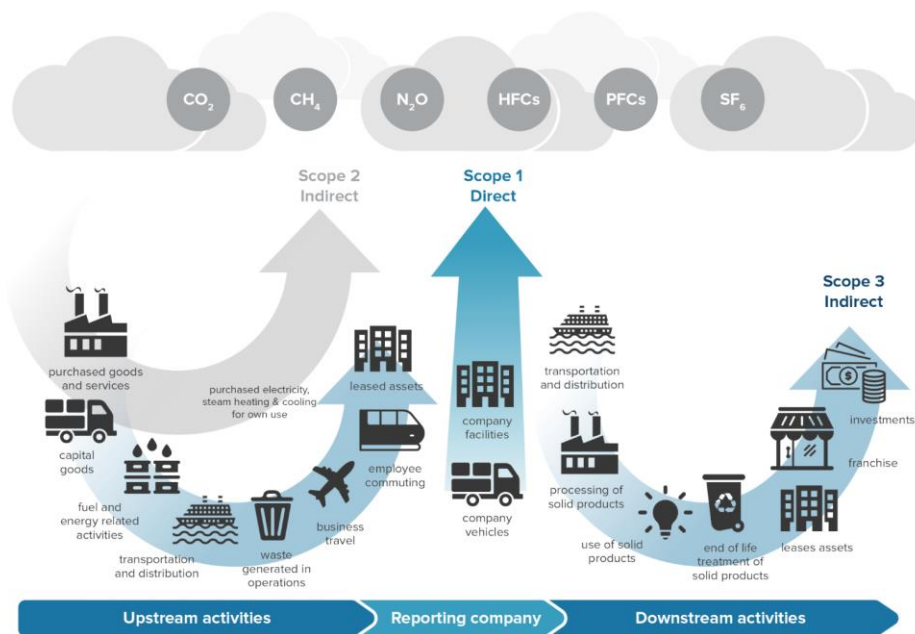


Figure 3: Greenhouse Gas Protocol Scopes 1, 2, and 3. (Source: Greenhouse Gas Protocol)

Source: *Greenhouse Gas Protocol*

<sup>3</sup> To take into account the emission of greenhouse gases other than CO<sub>2</sub> when calculating carbon emissions, scientists have devised an equivalent measure – CO<sub>2</sub>e (carbon dioxide equivalent). This allows other greenhouse gases to be represented in terms of CO<sub>2</sub> based on their relative global warming potential.

<sup>4</sup> REFERENCE NEEDED



## Impact on emergency health services and why we need to act now

The NHS' response to the COVID-19 pandemic has demonstrated what can be achieved in a short space of time when confronted by an emergency. It is imperative that this urgent response is applied to the rapidly-unfolding climate and ecological emergency.



Emergency clinicians across the UK have been a critical part of the pandemic response and, over the next decade and beyond, will play an important role in caring for patients affected by the climate emergency.

EDs are resource-intensive, high pressure environments. There is a lot of room for improvement in the way we use those resources, despite departmental imperatives (e.g. maintaining the highest possible standards of patient care) and constraints (e.g. stretched budgets, understaffing, lack of time). Even in a busy clinical workplace, there are sustainability 'wins' which can be initiated from the 'bottom up' by staff themselves. Making these changes has the potential to benefit not only the environment but also to ensure sustainability and quality of service provision in the immediate-, medium- and long-term.<sup>5</sup>

Low carbon healthcare is better healthcare. Optimising the efficiency of resource-use is more cost-effective. In the context of the emergency care crisis, there are financial incentives that can be made alongside carbon savings. For example, reducing unnecessary investigations can broadly result in measurable cost and carbon savings, as well as improved patient experience and/or health outcomes (e.g. reduced exposure to radiation from imaging).<sup>6</sup>

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<sup>5</sup> <https://choosingwisely.co.uk/recommendations-archive/#1476654326462-140275b8-1d63>

<sup>6</sup> Choosing Wisely / ?GIRFT

## **Background on Net Zero NHS and how EDs can play a part**

In 2019 the UK became the first major economy in the world to make a legally-binding commitment to cut emissions of carbon dioxide and other greenhouse gases to net zero by 2050. This follows on from the 2008 Climate Change Act, which set statutory targets of 34% emissions reduction by 2020 and 50% by 2025, against a 1990 baseline.<sup>7</sup>

The NHS was one of the first health systems to start measuring carbon emissions<sup>8</sup> and produce a carbon reduction strategy.<sup>9</sup> In 2020 the NHS Chief Executive launched the 'For a Greener NHS' campaign, part of a multi-pronged approach to inject momentum into the national drive towards carbon neutrality. Later that year, NHS England announced its plan to achieve a Net Zero NHS by 2040 – with an interim target of an 80% reduction in CO<sub>2</sub>e by 2028-2032 – becoming the first health system in the world to do so.

A core element of this transition will be the grassroots mobilisation of NHS staff.<sup>10</sup> As the largest employer in Europe, with 1.3 million staff, and a national 'anchor institution', the NHS is not only part of 'the problem' with respect to climate change; it is also in a strong position to contribute to the solution.

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<sup>7</sup> [www.sduhealth.org.uk/policy-strategy/legal-policy-framework/climate-change-act.aspx](http://www.sduhealth.org.uk/policy-strategy/legal-policy-framework/climate-change-act.aspx)

<sup>8</sup> REFERENCE

<sup>9</sup> REFERENCE

<sup>10</sup> <https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/areas-of-focus/>

## The role of Greener NHS



Delivering a 'Net Zero'  
National Health Service



<https://www.england.nhs.uk/greenernhs/>

<https://www.england.nhs.uk/greenernhs/national-ambition/>

<https://www.supplychain.nhs.uk/sustainability/net-zero-supply-chain-and-suppliers/>

## What RCEM is doing about the climate and ecological crisis

The emergency medicine community, in the UK and internationally<sup>11,12,13,14</sup>, has started to mobilise around the climate agenda. In 2019, the Royal College of Emergency Medicine (RCEM) – in response to suggestions proposed by concerned members, and growing public awareness – divested from fossil fuels, made a formal declaration of a climate emergency, co-launched the annual Lancet Countdown Report and started reducing the environmental footprint of the college and its activities. It also set up the Environmental Specialist Interest Group (ESIG), tasked with researching and developing ways to assess and improve the environmental sustainability of everyday clinical practice, as part of a wider advocacy and education remit. With an estimated 130 EDs in England and Wales alone, understanding how these sites of acute care provision within hospitals can mitigate their environmental impacts is a crucial challenge to address.

RCEM is a founding member of the UK Health Alliance on Climate Change (UKHACC). UKHACC is an alliance of UK-based health organisations representing about 1 million health professionals. Through UKHACC, RCEM has used its voice to advocate for the health benefits of swift societal action on climate change.

Recently UKHACC has created a set of guiding principles for health organisations to demonstrate leadership and take steps to mitigate and adapt to climate change.<sup>15</sup> RCEM continues to show its climate leadership by endorsing and working to achieve these commitments.

In responding to a problem as immense as the climate and ecological emergency – and the threat it poses to health and healthcare around the world – it is necessary to break the whole into small parts i.e. quantifiable drops in the bucket all add up. There is a lot that shopfloor staff can do. *GreenED* is the means through which the specialty can make a significant contribution to NHS England's world-leading strategy to deliver a Net Zero NHS by 2040, as part of wider national and global carbon neutrality targets.

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<sup>11</sup> Lemery J. Peering through the hourglass. *Emerg Med J* 2017;34:272-274

<sup>12</sup> [ACEM position statement on climate change](#)

<sup>13</sup> The Climate Smart Emergency Department: A Primer. *Annals of Emergency Medicine* 2020

<sup>14</sup> Climate Change and Health: An urgent call to academic emergency medicine. *Academic Emergency Medicine* 2018

<sup>15</sup> <https://ukhealthalliance.org/about/our-commitments/>

## ESIG vision statement

### The GreenED programme

*Think Big, Start Small, Scale Quickly*

The aim of *GreenED* is to equip ED staff to measure and reduce the environmental impacts of everyday departmental practices while maintaining or improving standards of patient care. Alongside this there will be a focus on identifying and – where possible – quantifying potential co-benefits in the form of cost savings, improved operational efficiency (e.g. staff time, resource use) and/or increased well-being (e.g. patient experience, staff morale / motivation arising from effective teamwork, acting in line with shared concerns, and being part of a values-led workplace<sup>16</sup>).

## *GreenED aims*

↓ environmental impact

↑ environmental engagement

↑/- maintain or improve standards of patient care

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<sup>16</sup> *How Companies Can Tap Sustainability to Motivate Staff*  
<https://knowledge.wharton.upenn.edu/article/how-companies-tap-sustainability-to-motivate-staff/>

## I. **GreenED Framework and Online Portal** ([see Framework folder](#))

### **Framework 1.0 - the Pilot Project**<sup>17</sup>

RCEM's *GreenED* pilot project ran from November 2021 to July 2022. It aimed to standardise and stratify what actions ED staff could take at work to improve operational sustainability while maintaining or improving standards of patient care. At the outset, a working group of junior doctors, consultants and an advanced care practitioner were engaged on what actions might be feasible and this was condensed into the *GreenED* Framework 1.0. The process was based on the already successful [LEAF programme](#), which is a certification in sustainable laboratory operations managed by University College London (UCL).

Eight EDs were engaged in implementing Framework 1.0. Outcomes included estimated carbon savings of 153.7 tCO<sub>2</sub>e and financial savings of at least £40,000.

### **Framework 2.0 (2023 onwards)**

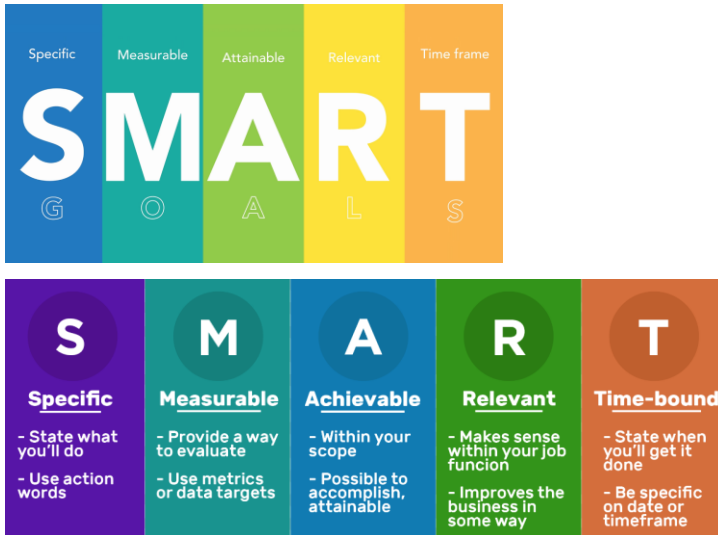
The Framework structures actions into 3 levels of feasibility, with Bronze being the easiest to achieve and Gold being the hardest – and 6 domains (See Table 1 below), mapped to Greener NHS categories. This is to enable a systematic, stepwise approach to tackling shopfloor sustainability issues.

The actions are designed to be specific and measurable ('SMART') but also adaptable to different EDs.

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<sup>17</sup> RCEM pilot report 2022

Create SMART infographic with GreenED visual style



Infographics of Bronze, Silver and Gold actions




## BRONZE FRAMEWORK

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**MULTI-DISCIPLINARY  
GREENED WORKING  
GROUP ESTABLISHED**



**SUSTAINABILITY  
INITIATIVES ARE PART  
OF STAFF INDUCTION**



**ED HAS ELIMINATED  
SINGLE-USE PLASTIC  
CUPS AND CUTLERY**



**WASTE STREAMS  
REVIEWED AND  
RECYCLING IN PLACE**



**COMPUTER  
ELECTRICITY USE  
MINIMISED**



**ED EXCLUSIVELY  
USES RECYCLED  
PAPER**



**EQUIPMENT AND  
LIGHTING OFF  
WHEN NOT IN USE**



**REMOTE WORKING  
SUPPORTED ON NON  
CLINICAL SHIFTS**



**RESPOND TO STAFF  
AND PATIENT  
SUGGESTIONS**



**ACCESSIBLE HEALTH  
AND SUSTAINABILITY  
COMMUNICATIONS**



**DRY POWDER  
INHALERS AVAILABLE  
IN THE ED**



**REDUCED CANNULATION  
OR VENEPUNCTURE  
EQUIPMENT**



**DISCHARGE MEDICATIONS  
REVIEWED TO ELIMINATE  
EXCESSIVE DISPENSING**

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 ENVIRONMENT@RCEM.AC.UK



The actions have been split into five domains to help identify related actions

<b>Domain</b>	<b>Definition</b>
Organisational & Leadership	These actions focus on organisational structures in emergency departments, trusts and healthboards to make the implementation of environmentally sustainable changes more likely to succeed.
Facilities & Estates	These actions work to ensure that the physical structures and functions of an emergency department are as sustainable as possible
Anaesthetic Gases	These actions focus on reducing the use of anaesthetic gases with high global warming potential.
Procurement	These actions highlight sustainable changes in how emergency departments procure equipment and opportunities in reducing single use items
Patient Pathways	These actions focus on the patient journey, and show how we can make more sustainable choices in the management plans that we create.
Transport & Air Quality	These actions work to reduced the environmental impact of staff and patient travel to and from the emergency department

*Table 1: Framework domains*

### **How to use the GreenED online portal: licensing and FAQs**

Through the online portal, participating EDs will be able to input qualitative feedback and quantifiable impacts from green interventions to a centralised data collection system. This, in turn, will inform the actions and over time will build the evidence-base for sustainable EM i.e. the Framework will be updated periodically via an iterative process. Results will feed into wider sustainability targets at both the Trust and the national level. Greener NHS are working closely with RCEM to ensure data sent in by individual sites is aligned with Net Zero NHS metrics and targets.

### **Support, Assessment and Accreditation**

## II. Taking Action - Where to Start?

The general idea is to start with Bronze actions; they are often precursors for achieving Silver and Gold actions in the same domain, and going for Bronze-level accreditation provides a focus for collective efforts. However, the Framework allows flexibility to address Silver and Gold actions in parallel. This is in recognition of the fact that what's easy to change in one ED might be a lot harder in another, and because different EDs will have already achieved or be close to achieving different actions prior to initiating the Framework (for example, some EDs might already have Methoxyflurane available as an alternative to nitrous oxide).

In terms of domains, 'Organisational and Leadership' is the first for all levels to encourage early prioritisation of these actions because together they represent a solid foundation on which to implement *GreenED* locally, maintain momentum and ensure success into the future. These emphasise a team-based approach and the importance of increasing staff capacity to implement green initiatives on an ongoing basis. This means the work doesn't stall or fall apart when one staff member moves on!

### **Bronze Action #1 - How to set up (and maintain) a *GreenED* group**

A group of motivated ED staff, both clinical and non-clinical, will make addressing *GreenED* actions more fun, effective and sustainable. It doesn't have to be a big group but the more multi-disciplinary the green team, the better. Nurses, doctors, healthcare assistants (HCAs), housekeepers/cleaners and office staff, including administrators and managers i.e. clinical, domestic, administrative and managerial staff members, will each have different perspectives on departmental problems. What's more, a diversity of experiences will lead to more ideas for how to solve them.

Your hospital/Trust should have a sustainability manager and may already have a green network mobilised around delivering a Sustainable Development Management Plan (SDMP). But if there are no ED staff involved yet, here are some ideas for how to start up a green group.

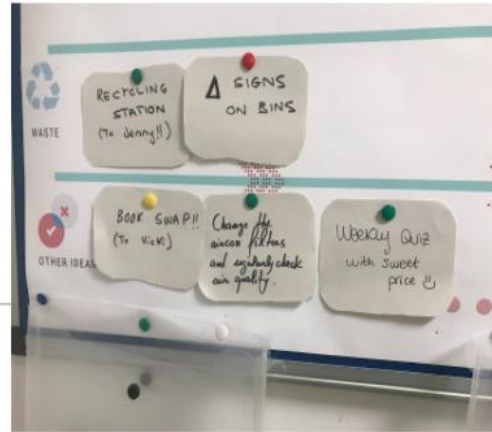
**'Top Tips' on green team building** *NB. adapted from ['how to set up a green group'](#) infographic*

- Start the conversion. There is already a lot of interest out there<sup>18</sup>. Positive engagement with colleagues is far more likely to elicit responses.
- Connect up ED colleagues who are already interested in taking action on climate change and other environmental crises such as plastic pollution. There may be colleagues who are motivated by related concerns such as departmental waste in general, inefficient resource use, messy staff rooms, disposability culture.
- Identify clinical, domestic, administrative and managerial 'green champions' to help set up and lead the group
- Not (just) another Whatsapp group... whatever works for your team to communicate ideas. A regular meet-up. Get an allocated notice board/space, ideally with recycled paper posters and QR codes for links
- Host a climate focus day and recruit staff who are interested to join
- Consider running a sustainability tour occasionally with the group to refresh information that may have been forgotten from induction



*GreenED Team at the Royal Free Hospital, London, in 2021*

<sup>18</sup> Research indicates such initiatives align with the values and concerns of health professionals, who are alarmed by the climate crisis. For instance, the SDU's 2017-2019 staff and sustainability survey found that the vast majority of NHS staff believe it is important to be environmentally responsible in the workplace and at home – with 98% believing it is important for the health and care system to support the environment.



*Other tools e.g. template to facilitate taking and sharing notes from team catch-ups - can be integrated into Framework and/or 'top tips' +/- website*

## Silver Action #2 - Senior support

Junior staff are often the ones driving forward the environmental agenda. However, engaging senior staff members early on will make departmental changes a lot easier to make. The difficulties faced without it were a key finding from the GreenED pilot in 2022.<sup>19</sup> Support and buy-in from both clinical leads and managers will help to ensure continued success in improving both cultural and practical aspects of environmental sustainability. Importantly, it will buffer/safeguard against/mitigate the risk of individual efforts going to waste - this sort of work within NHS Trusts often being likened to 'wading through treacle'.

### 'Top Tips' on securing senior buy-in/support

- RCEM position statement (*currently in development, will link when published*)
- Sustainability as a pillar of quality - improved service provision / patient experience
- Cost incentives / financial savings
- Time savings / staff well being
- Sustainability/Caron targets becoming mandatory
- Need for adaptation / mitigation to prepare EDs for what's to come e.g. risk of departments flooding

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<sup>19</sup> GreenED pilot report

## **Gold Action #1 - Protected staff time**

Sustainability work takes time and energy, two things that are in short supply amongst NHS staff. In the pandemic, the rate of burnout in emergency medics has been particularly high. Although GreenED may . Protected time for doctors, ACPs, nurses and other ED staff, both clinical and non-clinical, will be essential to the task of embed sustainability into emergency medicine as a specialty.

There are several ways protected time can be provided to staff who are tackling environmental issues and addressing *GreenED* actions. 'Admin days' can be allocated to nursing staff and HCAs on an ad hoc basis for specific projects. Clinical fellowships in environmental sustainability have been undertaken by middle grade doctors in several EDs in England already. These may be tied to a Quality Improvement role, or offered as a more generic post, typically with an 80/20% clinical/non-clinical split. One highlight from the pilot project was that a pilot site lead was offered a sustainability post as the result of the effort they put into addressing *GreenED* Bronze actions.

*Insert testimony from Frances as pilot site lead given protected time - an example of how addressing actions can lead to others being achieved.*

At the consultant level, environmental sustainability will likely become a standard aspect of departmental management and performance metrics in the near future, requiring SPAs for senior staff to ensure Net Zero NHS targets are on track.

In the meantime, taking the steps to ensure protected time in itself achieves a *GreenED* action!

Job Description(s) - clinical fellow in sustainability post

'How to integrate sustainability into consultant job plans'

### III. How to use *GreenED* actions for your portfolio

#### The 2021 RCEM curriculum

The *GreenED* programme can now easily be mapped to the RCEM training curriculum as well as CESR goals. Below are some suggestions but be creative and let us know how we can help you! There are multiple example QI projects and templates on the *GreenED* portal.

- SLO-9: Support, Supervise and Educate - organise a local or regional teaching day / session focusing on *GreenED* issues
- SLO-10: Participate in research and manage data appropriately. Address *GreenED* actions. Calculate emissions and track change within your department. Evidence using QIAT forms.
- SLO-11: Participate in and promote activity to improve the quality and safety of patient care. *GreenED* goals are closely linked to quality and safety.
- SLO-12: Manage, administer and lead - become your local green champion and make a real impact on healthcare sustainability.

**QIPs - see section V on Green QI below**

RCEM QIAT (2021) Primary Quality Improvement Assessment Tool ST1-2	
Trainee Name	
Trainee GMC	
Trainee Post	
Date of Completion	

**Part A – For trainee to complete** – Please use this tool to describe the Quality Improvement activity you have undertaken this year. This may include any activity or projects you have assisted with, or undertaken yourself. At ST6 you will be expected to attach a full report of the project you have undertaken for CCT.

1 - The project
1.1 – Analysis of problem
Please write a focused description of the problem that the QI/Patient safety project was designed to tackle, with why you think it was a problem in your department. What evidence do you have to back up your opinion? How might this improve care for patients?
<b>Problem</b> – In Charing Cross Hospital ED (Majors) too many cannulas are being inserted into patients and then never used for administering drugs.
<b>Objective data</b> During the initial data collection it was found that 75% of patients were cannulated as part of their triage process, either in RAT or from the waiting room (break-down data comparing the two routes was not done). A further 11% of patients were cannulated later in their attendance in the emergency department, bringing the total of patients cannulated to 86%. Of the 86% of patients that had a cannula, only 62% were used for IV medications.
<b>Subjective data</b> Patients were asked their thoughts on the experience of having a cannula. 60% of patients surveyed described having a cannula as either uncomfortable or painful (or words similar).
<b>Cost and environmental impact</b> Cannulation and venepuncture were compared in terms of their cost and environmental impact. Sources indicate that cannulation costs roughly twice as much as venepuncture alone <sup>15,21</sup> and simply comparing the amount of single-use plastic produced from the equipment needed for cannulation versus that which is required for venepuncture in Charing Cross ED demonstrated that cannulation has roughly twice the environmental impact as well.

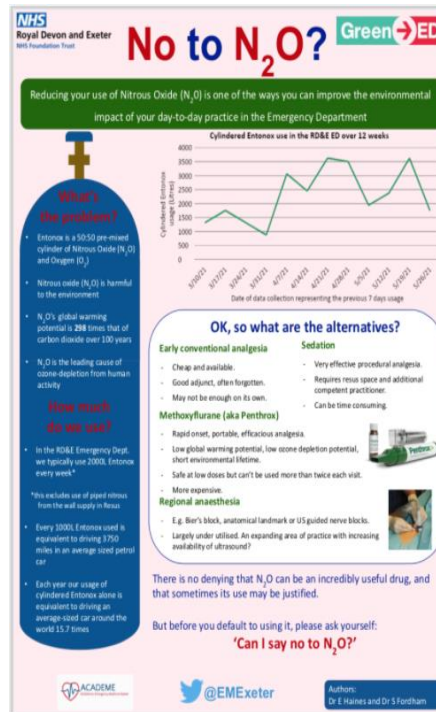
#### Example QIAT form

- SLO-12: Manage, administer and lead - become your local green champion and make a real impact on healthcare sustainability.



**Example Management Projects** [see folder from Phase 1](#)


- Switching from nitrous oxide (Entonox) to methoxyflurane (Pentrox)



- Reusable suture packs

**THE EUROPEAN EMERGENCY MEDICINE CONGRESS**  
EUSEM BERLIN  
CityCube Berlin, Germany 15-19 OCTOBER 2022

**REUSABLE SUTURE KITS FOR THE FUTURE**  
DR HANNAH WEBB, DR DONNA PEEL  
UNIVERSITY SUSSEX HOSPITAL NHS TRUST, RCEM ENVIRONMENTAL SPECIALIST INTEREST GROUP



**Background:** In UK Emergency Departments (ED) single-use suture kits have become commonplace, whilst surgical theatres have maintained reusable instruments and sterilizing processes. As part of Greener NHS goals, we are aiming to reduce the environmental impact of our services and one of the largest hotspots in the acute setting is medical instruments and equipment. Procurement of products often focusses solely on the purchasing costs, but not the cost of disposal or the working conditions of those manufacturing them. Contaminated sharps are one of the highest carbon contributors, they are incinerated at >1100 degrees Celsius and therefore produce 1074 Kg CO<sub>2</sub>e per tonne. We compared our single use suture kits with a potential product switch to reusables, considering their cost, environmental impact, and quality. Our aim is to make a significant reduction in our carbon footprint, without significantly impacting clinical practice or cost.

**Results:**  
Staff opinion  
We designed a 6 question survey to canvas staff opinion. 26 members of staff responded, 24 of them agreed or strongly agreed that this was a necessary project and they supported it, one was neutral, one disagreed. 23 didn't want any extra tools added and general comments were positive, but highlighted the concern that staff might accidentally throw reusable kits away.

Cost of single use kits.  
Between April-June 2021 our department used 560 suture packs. Estimating a similar use across the year we totalled 2240 kits used at a cost of £5893.44 to buy and £963.20 to dispose. Disposal data was modelled in a collaborative project between Unity Insights, our NHS trust and KSS Academic Health Science Network. The cost of disposal of sharps is £854 per tonne, but also includes a charge per consignment and the cost of sharps bins. This calculation estimates that it costs £0.55 to dispose, a single suture kit. Therefore total cost per use is £3.06.

Cost of reusable kits.  
Procuring one reusable set of instruments would cost £141.81 (incl. VAT), however divided over its lifespan of 400 uses, the cost would be £0.35. We use approximately 6 sets a day, so 30 sets with a turn around time of 48 hours for sterilisation would allow for a buffer of variation of demand.  
Our ED is not charged for sterilisation processing, but the estimated cost per sterilisation is £3.17, repair and final disposal per use is £0.26, therefore total cost per use is £3.78. The biggest risk to this switch would be losing the stock by accidental disposal, so we decided to invest in mini-containers as a way of limiting the risk. Each box is sterilisable and costs £235.70. If used 1825 times (every 3 days) over a 15 year cycle, this would be £0.13 per use. Total cost with the boxes would be £3.78 + 0.13 = £3.91. Our initial purchase cost of 30 sets and containers is £11,325.30.

**Carbon footprint.**  
Unity Insights Carbon Savings report on suture kits concluded that disposable kits emit 1.02kg of carbon more than the reusable kit per use (Figure 2). Using carbon conversion factors, if we continued to use single use kits, this would be the equivalent of driving 8,277.5 miles in a medium petrol car over a one year period, compared to 818 miles by switching to reusables.

**Quality comparison**  
The quality of the reusable kit is demonstrated in figure 1. Observation data suggests poor quality of the single use kits, but we intend to gather qualitative feedback from staff on the comparative quality once introduced.


**Figure 2**  
Suture kit carbon dioxide equivalents per use (Rizan, Re: Carbon Savings project, 2021; GOV.UK, 2012).

Type	CO <sub>2</sub> equivalents per use	£ (£/CO <sub>2</sub> e = £245)
Single use	1.14kg	£0.28
Reusable	0.11kg	£0.03
Difference	1.02kg	£0.25

**Discussion & Conclusions:** Ending throwaway culture in healthcare will inevitably help reduce our carbon footprint and improve staff satisfaction, thus benefiting patient care. Conducting life cycle analysis of each carbon intensive process is time intensive and inevitably includes assumptions. However, the precedent is being set that reusables are less carbon intensive and often similar in cost when looking at per use data. Buy in costs may be more expensive, but with uncertainty in supply chains and shortages of some medical equipment, these greener investments may have unexpected, additional benefits in the future. We hope that this project encourages other EDs to look at their single use instruments and drive the medical procurement market towards high quality, reusable instruments.

**Acknowledgements:** RCEM, GreenED, Unity Insights, KSS Academic Health Science Network, Nick Vanderveldt, James Daley, Prof Bhutta and Chantelle Rizan.

**Figure 1: reusable suture instruments**



**Methods:** This is a sustainable product switch case report carried out in a Major Trauma Centre in the South East of the UK starting in August 2021 with ongoing interventions. We conducted baseline assessments of the procurement and disposal of the current single use suture kits used in the department. We then compared the financial costs, carbon costs and quality against the reusable kits made up by our sterile services department. We canvassed staff opinion of the product switch, and what staff would like included in the reusable kits and any problems they foresaw. With this quantitative and qualitative data we approached our ED management to advocate for a product switch. Once approved, we then developed a multi-pronged staff education program before the roll-out of the new reusable kit.

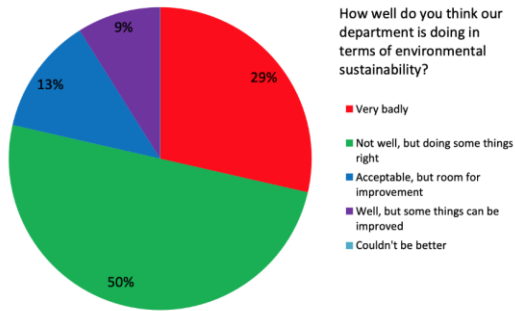
#### IV. Stakeholder engagement

### Who's who within an emergency department, hospital, Trust and beyond?



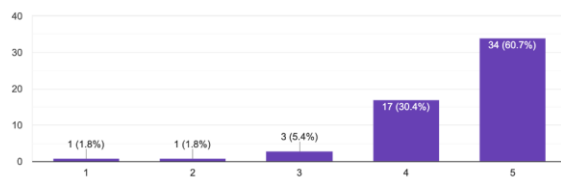
Stakeholder map

To find out what colleagues in your department find important when it comes to environmental sustainability you can use our [staff survey](#). Once you know their priorities you can use this to inform your pitch for sustainable actions and focus on the ones you know colleagues will be keen to act on first.



RF ED departmental survey 2021

On a scale of 1-5, how motivated are you to make our ED more environmentally sustainable?  
56 responses



RF ED departmental survey 2021

### 'Top Tips' on stakeholder engagement outside the ED.

When trying to engage stakeholders outside the emergency department, it is key to have an understanding of how sustainability goals align with goals, agenda or work remit that the stakeholder may have. One of the most powerful alignments is to highlight the cost saving effects of many sustainability projects. Being up to date with initiatives from central government can help too, if you can show that a sustainability action meets a governmental/health board/ICB target that the stakeholder is responsible for then this will help to engage them and move projects forward. You can find a link to NHS sustainability plans for [England](#), [Scotland](#) and [Wales](#) here.

## V. Carbon foot printing an ED: a crash course

One of the ultimate goals of *GreenED* is to get emergency medicine to be as low carbon as possible, thereby contributing to Net Zero NHS targets. To do both we need to understand and measure the carbon costs incurred in everyday emergency healthcare service delivery. RCEM's *GreenED* team has created carbon calculators for specific actions to facilitate this process. Going forward, health professionals will need to gain carbon literacy and skills in assessing the environmental impact of our practice. We recommend the course [Carbon Footprinting for Healthcare](#), run by the Centre for Sustainable Healthcare, as a good place to start.

The main 'Carbon Hotspots'<sup>20</sup> in emergency care provision have been identified as heating and lighting the department, use of anaesthetic gases and procuring and disposing of the day to day items that we use. See Table 2 below for some examples. *GreenED* actions focus on these areas, aiming to have as much impact as possible. The scope of the Framework is further defined by hotspots that ED staff can have an influence on.

Scope(s)	Hotspot	<i>GreenED</i> Action(s)
1	Nitrous Oxide	Domain 3: Anaesthetic Gases
1 and 3	Metered-dose Inhalers (large>small)	

Table 2: Example Carbon Hotspots in EDs



Figure 7: Comparison of large and small volume metered dose inhalers and dry powdered inhalers

<sup>20</sup> REFERENCE Greener NHS Report 'Trust Contributions to Carbon Footprint Plus'

*Reference the Greener NHS Dashboard?*

## Carbon footprint of an ED?

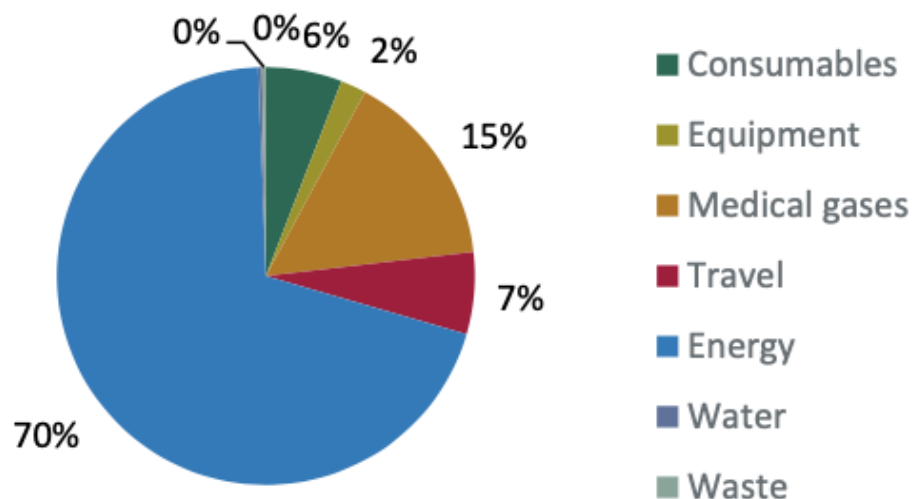


- Typical A&E visit = **13.8 kgCO<sub>2</sub>e** *Care pathways: Guidance on appraising sustainability  
Emergency Department visit module  
Sustainable Development Unit 2015*
- Relevant GHG emissions factors
  - Medical/surgical equipment = **0.3kgCO<sub>2</sub>s/£**
  - Waste incineration = **220kgCO<sub>2</sub>e/tonne**
- Hotspots
  - N<sub>2</sub>O = **38kgCO<sub>2</sub>/30 mins use**  
(1000L - 3670 miles in avg.sized petrol car)
  - MDIs = **28kgCO<sub>2</sub>/inhaler**



21

### Contribution analysis GHG emissions



*The above image is from the Sustainable Healthcare Coalition<sup>22</sup> and highlights the breakdown of the carbon costs of a visit to ED with an ankle fracture.*

<sup>21</sup> SHC ED module SDU 2015

<sup>22</sup> [https://shcoalition.org/wp-content/uploads/2019/10/6\\_3.-Sustainable-Care-Pathways-Guidance-Emergency-Department-Visit-Module-Oct-2015.pdf](https://shcoalition.org/wp-content/uploads/2019/10/6_3.-Sustainable-Care-Pathways-Guidance-Emergency-Department-Visit-Module-Oct-2015.pdf)

Baseline Assessment:

Departmental survey [See original template and Royal Free version +/- list of carbon conversion factors](#)

## VI. 'Green' Quality Improvement for EDs ([see Phase 1 folder and Phase II folder](#))

*Planning for sustainability is so fundamental to health and to the continuation of care provision that sustainability should be considered an aspect of quality in healthcare.*

### – Centre for Sustainable Healthcare

#### Sustainability as a dimension of quality

Environmental sustainability has been identified as a 7th dimension of quality in healthcare. This may or may not be integrated into your Trust's QI programme yet.



Fig 1. Domains of quality (adapted by the Royal College of Physicians from the Institute of Medicine).<sup>1</sup>

#### Box 1: The dimensions of quality

##### People working in systems deliver care that is:

**Safe** Delivering care in a way that minimises things going wrong and maximises things going right.

**Effective** Providing services that are informed by consistent and up-to-date high-quality training, guidelines and evidence.

**Caring** Delivering care with compassion, dignity and mutual respect.

**Responsive and personalised** Ensuring services are shaped by what matters to people, and empowering people to make informed decisions and design their own care.

##### Health care organisations and systems are:

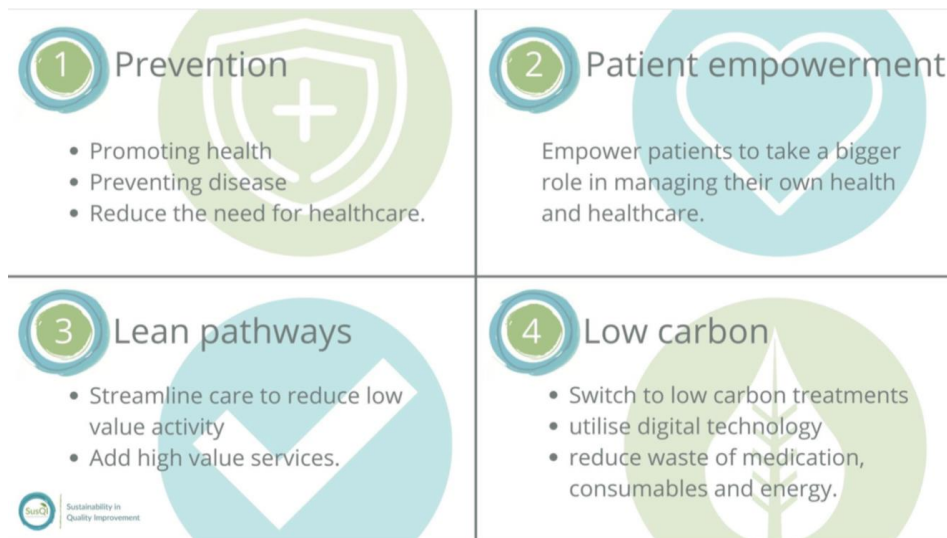
**Well-led** Driven by collective and compassionate leadership, underpinned by a shared vision, values and learning, a just and inclusive culture and proportionate governance.

**Sustainably-resourced** Focused on delivering optimum outcomes within available finances, and reducing the negative impact on public health and the environment.

**Equitable** Committed to understanding and reducing variation and inequalities and ensuring that everybody has access to high-quality care and outcomes.

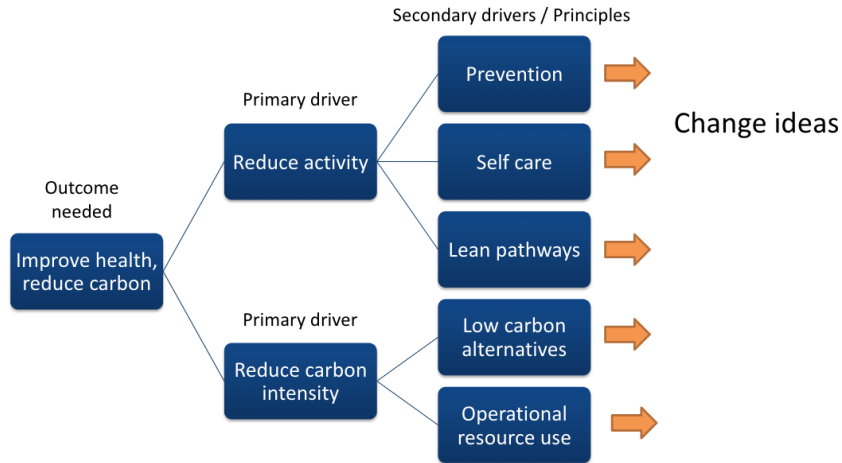
**The Sustainable QI model: principles and methodology**

The Centre for Sustainable Healthcare (CSH) has developed a model of environmental sustainable quality improvement or 'SusQI' in healthcare based on four principles: prevention, patient self-care, lean service delivery and low carbon alternatives.



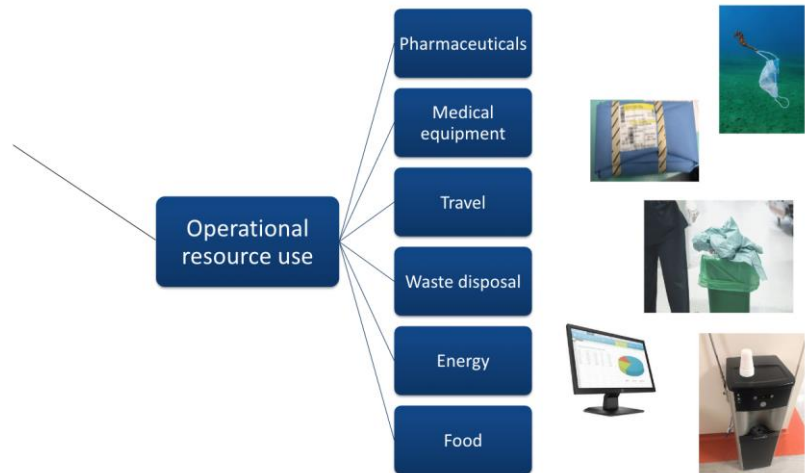
These can be further broken down using their SusQI driver diagram:

### Principles of sustainable clinical practice



*Mortimer-F. The Sustainable Physician  
Clinical Medicine 2010, Vol 10, No 2: 110-11*

The first 4 secondary drivers align with the principles of sustainable healthcare. The 5th, operational resource use, covers aspects that are not related to direct clinical care. However, they are an important part of day-to-day practical and clinical staff have professional responsibilities, as reflected in mandatory training modules on waste disposal.





### **‘Finding the wins’: Environmental, financial and patient/staff benefits**

Environmental targets will very likely become a required component of developments in medicine, as they already are in other industries. Will this filter down to all QIPs? Possibly; at the very least you would be encouraged to do so. Regardless, it will enrich the quality of your QIP.

By using a sustainability lens you can easily factor environmental impacts into a traditional QIP.

There are different levels at which this can be done.

1. Piggyback approach: Simply measuring an additional metric without any changes to the QIP intervention
2. ‘Add-on’ approach: Adding an additional feature to a QIP
3. The ‘Green QIP’: Many *GreenED* Framework actions can be potentially addressed as QIPs using an individual or multi-disciplinary approach.

Outcome measures can include quantified carbon and any associated cost savings as well as other aspects of operational efficiency and quality such as staff time savings and improved patient experience and/or health outcomes.

These outcomes may or may not be in tension with one another at any given time. Balancing measures, which may be positive or negative, can be extrapolated from the CSH’s ‘triple bottom line’ concept where aspects of clinical care are assessed in relation to their environmental, social and financial impacts. As *GreenED* actions are centred on reducing environmental impacts, these would not be balancing measures. Standards of patient care must always be maintained; as such, this would also not be a balancing measure.

GreenED actions suitable for QIPs can be mapped accordingly:

- 'Wins' are when carbon or other environmental impacts are reduced while breaking even or incurring costs, without impact on patient care - for example, switching to a more expensive but lower carbon inhaler.
- 'Win Wins' are when cost and carbon savings align and can thus be a good 'carrot' approach to enlist senior or managerial support (as per section IV) - for example, improved recycling rates, reduced energy consumption, cheaper reusable alternatives. They may also be when carbon savings align with patient or staff benefits - for example, switching from nitrous oxide to Pentrox in a trauma setting.
- 'Triple Wins' are when environmental and financial wins can be achieved alongside improvements in patient care. Case studies in reducing unnecessary cannulation provide strong examples of this.<sup>23</sup>

### 'Green QIPs'



'A Bit Dim' - Saving energy by optimising monitor settings



'Bin It Better' - Improving waste segregation by ED staff



'Disposable Me' - Eliminating single-use plastic cups and cutlery



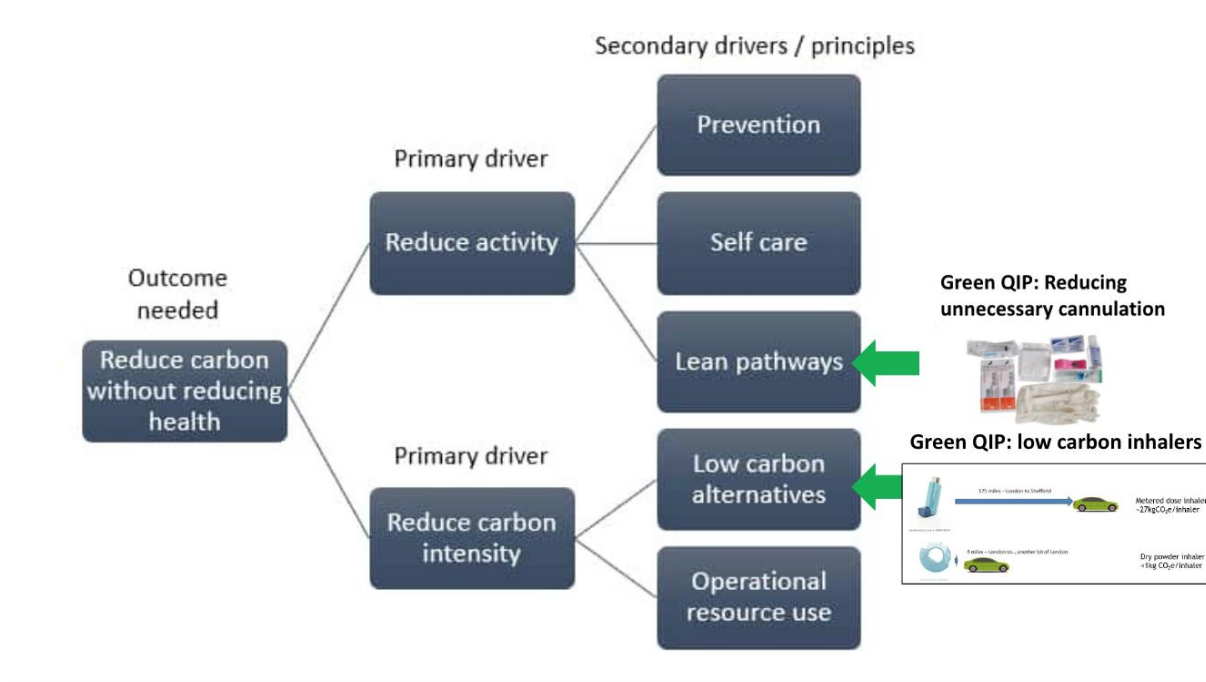
'The Butterfly Effect' - Reducing unnecessary cannulation

?Green Inhalers - switching from MDIs to DPIs in Paeds ED



These Green QIPs can be mapped onto the SusQI driver diagram. Reducing unnecessary cannulation and switching to green inhalers align with the principles lean pathways and low carbon alternatives, respectively. Optimising monitor settings, improving waste segregation and eliminating single plastic in catering would all fall under 'Operational resource use'.

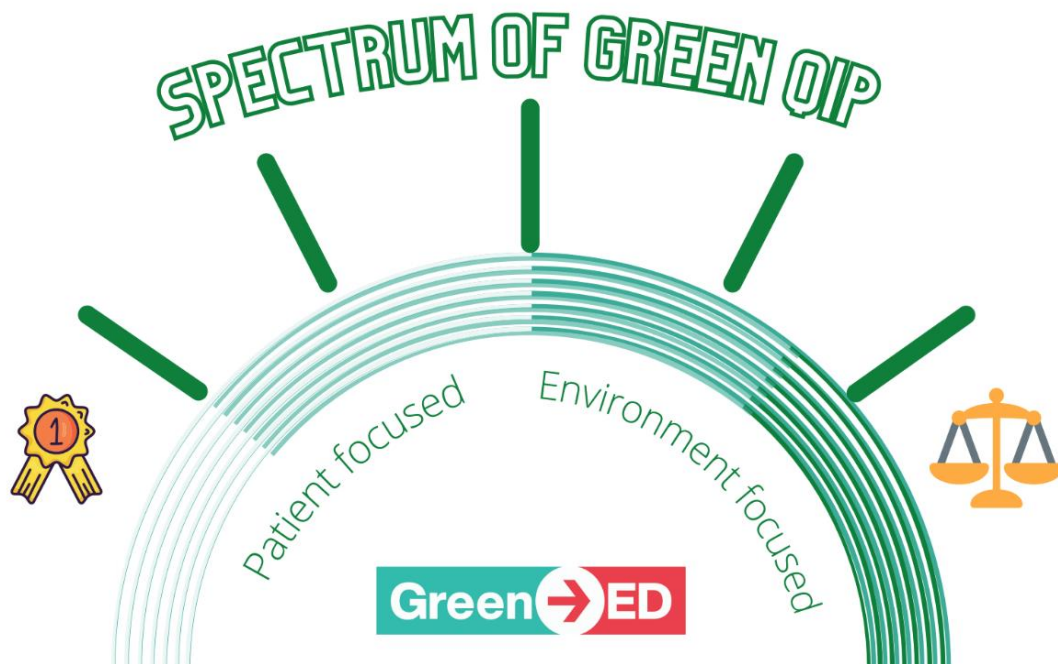
<sup>23</sup> [CSH green ward competition \(cannulation project\)](#), [Greener NHS case study: reducing unnecessary cannulation \(Charing Cross hospital\)](#)



**Example Green QIPs (case studies)** - see [sub-folder \('Quick Green QIPs'\)](#)

- 'A Bit Dim': saving energy by optimising monitor settings ['How To' document](#) and [PID](#)
- 'Bin It Better': improving waste segregation [PID](#) and [workbook](#) (see also [this link](#))
- 'The Butterfly Effect': reducing unnecessary cannulation [PID template](#); [example PID \(Royal Free\)](#),
- 'Disposable Me': reducing single-use plastic in ED catering (see [PID](#))
- Greener Inhalers - see [PID](#), [Royal Free website link](#), ['Quick Green QIP'](#)

**Infographic: 'Spectrum of Green QIP'**



## VII. Communicating wins and challenges

### The *GreenED* network

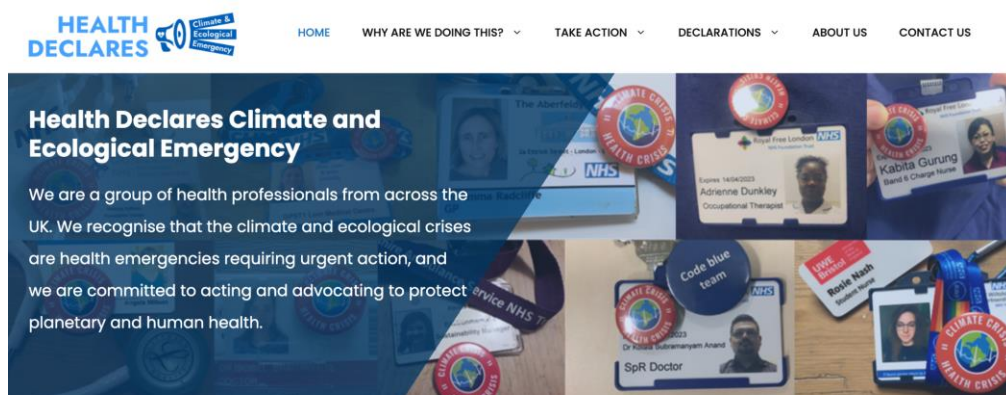
The [Emergency Care Sustainability Network](#), hosted by the CSH, is an online community for healthcare professionals passionate about reducing the environmental impacts of emergency care. The network is intended to be a place to share examples of how to tackle this problem and generate ideas of how to further improve the environmental sustainability and resilience of emergency care in the NHS.

You can sign up and flag it to *GreenED* team members to sign up too!



Another way to soundboard ideas, communicate challenges and share progress and wins is more locally, via social media, both personal and departmental, and other comms channels within your ED, hospital or Trust e.g. Twitter, in

Although it has been developed within and is run by RCEM, *GreenED* originated as a grassroots-driven initiative, led by worried emergency medics trying to do something about the climate and ecological crisis. It is part of a wide network of groups working on climate and health in the UK.



**We are calling on our healthcare organisations to:**



eco\_medics    Following ▾    Message    +    ...

124 posts    4,947 followers    390 following

**Eco Medics**  
Medical & health  
Eco Medics - on a mission to make the healthcare industry sustainable  
[linktr.ee/ecomedics](http://linktr.ee/ecomedics)

Followed by rosalingchung, greened\_uk, joywrightuk + 2 more



**Visual assets: example posters, slide-bank**

**ECO ANXIETY STRESSING YOU OUT?**



**FIND OUT WHAT WE'RE DOING AS A DEPARTMENT TO HELP....**

Royal Free London **NHS** Foundation Trust

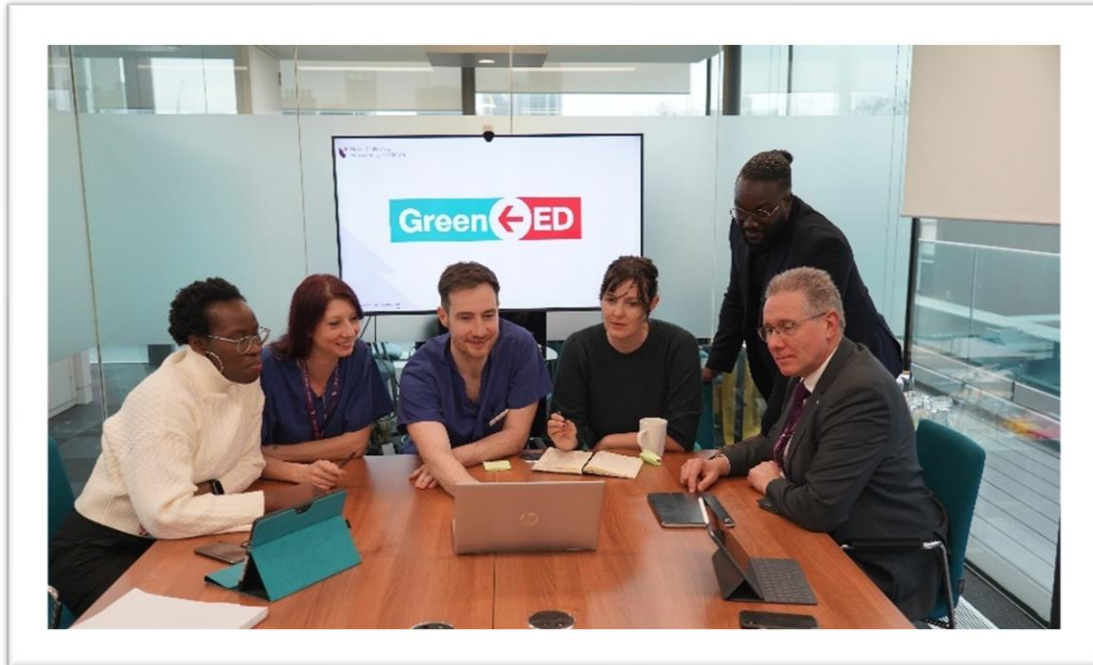


**Key dates:** [Environmental Awareness Days](#)

**RCEM's**

**GreenED team - get in touch**

*Insert emails and headshots with background blurb / GreenED role description*





## **References**

*As per footnotes plus:*

- Greener NHS report(s) incl Carbon Footprint Plus
- CSH
- Healthcare without harm report on healthcare's climate footprint 2019
- HCWH report on measuring and reducing plastics 2021
- [Lancet Countdown](#)
- <https://gettingitrightfirsttime.co.uk/>
- [Choosing wisely](#)
- 'Gloves off' resource
- Greener Practice framework
- Academic papers