

Sustainability in medicines optimisation

Recommendations on lowering the inhaler carbon footprint plus implementation resources are available in the [PrescQIPP inhaler carbon footprint](#) resources. This bulletin focuses on sustainability and reducing the carbon footprint of medicines more broadly.

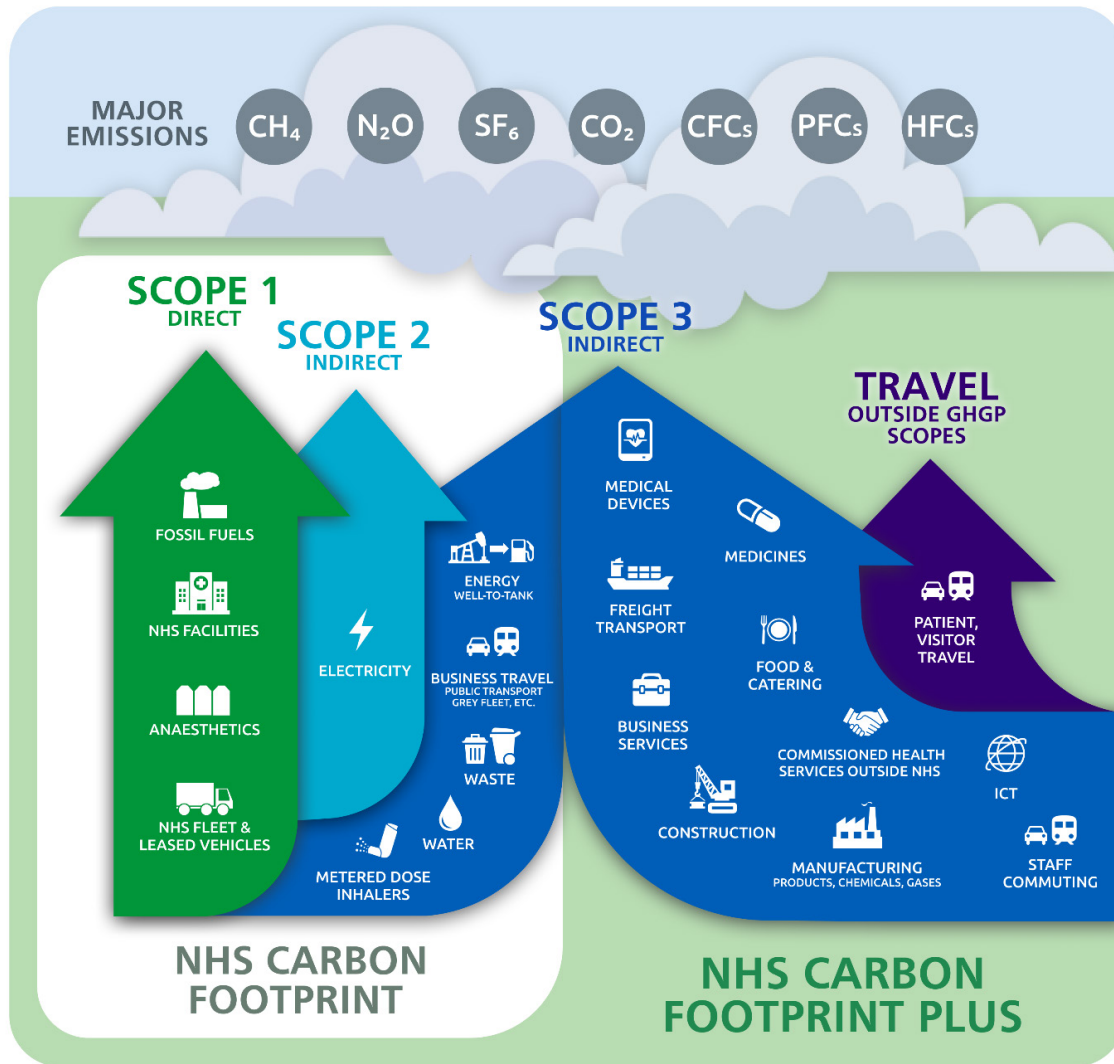
Recommendations

- Ensure that all staff have undertaken carbon awareness training so that they appreciate the impact which global warming has on the planet, healthcare and medicines in addition to the part they can play individually associated with the work they do to reduce the medicine carbon footprint.
- Each organisation should appoint a medicines optimisation sustainability lead.
- Ensure that medicines sustainability is a standing agenda item for team meetings and clinical networks.
- Discuss, agree and regularly review a carbon footprint lowering strategy across the local health system.
- Consider the medicine carbon footprint reduction initiatives examples in table 1, national guidance and other initiatives for incorporation into this strategy.
- Consider using a planning tool to support strategy development, e.g. attachment 5 – a sustainability in medicines optimisation project planning tool.
- Incorporate consideration of the environmental impact of medicine optimisation initiatives into routine practice, such as area prescribing committee medicine appraisals.
- Healthcare professionals, where appropriate, should be encouraged to work towards making discussions on sustainability issues routine during contacts with patients and during consultations.
- GPs including the wider general practice team should be aware of how to signpost people to local social prescribing services where available and encourage people to exercise and eat healthy diets.
- Review the [PrescQIPP inhaler carbon footprint](#) and [inhaler carbon footprint clinical snapshot](#) resources for respiratory and inhaler sustainability initiatives.

Background

The World Health Organisation (WHO) say that climate change is expected to cause approximately 250,000 additional deaths per year from malnutrition, malaria, diarrhoea and heat stress between 2030 and 2050. Climate change impacts health both directly and indirectly, and is strongly mediated by environmental, social and public health determinants.¹ Reducing emissions of greenhouse gases can result in improved health. All four UK health services have committed to net zero carbon emissions.²

NHS England set out the direction, scale and pace of change in the report, [Delivering a 'Net Zero' National Health Service](#).³ The carbon emissions that are included in the report are the NHS Carbon Footprint and the NHS Carbon Footprint Plus as illustrated in Figure 1.

Figure 1. Greenhouse Gas Protocol (GHGP) scopes in the context of the NHS in England³

The estimated benefits of a net zero NHS by 2040 are:

- 5,770 lives saved per year from reductions in air pollution.
- 38,400 lives saved per year from increased levels of physical activity.³

The report outlines actions to be taken to reduce NHS carbon emissions. These include optimising prescribing, substituting high carbon products for low-carbon alternatives and improvements in production and waste processes.³

The 2020/21 NHS Standard Contract first set out the requirement for providers to put in place and implement a Green Plan detailing their plans and actions on, for instance, cutting carbon emissions, reducing the use of single-use plastics, and reducing the levels of waste.⁴ Integrated Care Systems (ICSs) are also expected to develop their own Green Plans based on the strategies of member organisations.⁵ The NHS England guidance, [How to produce a Green Plan: A three-year strategy towards net zero](#) explains how Trusts and ICSs should construct their Green Plans, and the areas and initiatives that the plans should cover. A section on medicines is included. Areas of focus suggested include medicines optimisation and reducing waste, responsible capture or disposal of waste medicines and considering lower carbon alternative medicines.⁵

In England, the NHS England Medicines Optimisation Executive Group (MOEG) has identified and agreed 16 national medicines optimisation opportunities for the NHS in England in 2023/24.⁶

The MOEG have recommended that ICBs choose at **least five** medicines optimisation opportunities to focus on and deliver on alongside their local medicines optimisation priorities.⁶ When organisations are

considering the five or more opportunities, they may wish to consider the carbon reduction potential of the projects as part of the project selection process. The [PrescQIPP Hot Topic national medicines optimisation priorities 23/24 PrescQIPP resources](#) outlines the numerous PrescQIPP resources available to support the implementation of these opportunities.

The [NHS Scotland climate emergency and sustainability strategy: 2022-2026](#) sets out NHS Scotland's aim to become a net zero health service by 2040. Included are five key priority themes:

- Sustainable buildings and land
- Sustainable Travel
- Sustainable Goods and services
- Sustainable Care
- Sustainable Communities

Within sustainable care there are immediate priorities identified such as sustainable care pathways and green health activities, realistic medicine, medicines, and inhalers. Practicing '[Realistic Medicine](#)' in relation to prescribing includes shared decision making, regular review of prescribed medicines, reducing medicine waste and consideration of the environmental impact of individual medicines by clinicians and patients. To reduce greenhouse gas emissions from inhaler propellant the aim is to reduce inhaler carbon emissions by 70% by 2028, and publish an updated Scottish Quality Respiratory guide which will focus on:

- Improving patient outcomes.
- Minimise patient over-use of short acting inhalers.
- Using propellant free inhalers where suitable for the patient.
- Running awareness campaigns for patients and clinicians.
- Include environmentally friendly inhalers in local formularies.
- Support pharmacy medicine and inhaler disposal schemes.
- Follow progress by pharmaceutical companies on the development of low emission propellants for pressurised monitored dose inhalers (pMDIs).

Each Health Board (HB) is required to publish an annual report detailing progress towards actions set out in the strategy. The reports include the HBs National Sustainability Assessment Tool (NSAT) score and examples of best practice which could be adopted across the whole of NHS Scotland.⁷

NHS Wales has set out its 2025 and 2030 carbon emission targets and commitments in the [NHS Wales Decarbonisation Strategic Delivery Plan 2021-2030](#). Decarbonisation initiatives have been structured into six main activity streams: carbon management, buildings, transport, procurement, estate planning and land use and approach to healthcare. The delivery plan sets out 46 initiatives for decarbonising NHS Wales including such things as taking a patient-centric approach to optimise inhaler use, focusing on a reduction in the over-reliance on reliever inhalers, inhaler disposal and recycling, transition to lower carbon footprint inhalers where deemed suitable, develop best practice waste disposal guidance, and develop a plastics in healthcare initiative which aims to tackle personal protective equipment (PPE), single use plastics and packaging waste. HBs and Trusts are required to develop Decarbonisation Action Plans which are updated every two years.⁸

The Climate Change Act (Northern Ireland) 2022 sets a target for Northern Ireland to become net zero by 2050, along with interim targets such as at least a 48% reduction in net emissions compared to baseline by 2030.⁹ The Department for Agriculture, Environment and Rural Affairs (DAERA) on behalf of the Northern Ireland Executive have published a draft [Green Growth Strategy](#) which sets out the long term strategy to lower greenhouse gas emissions, improve the environment and create more green

employment opportunities.¹⁰ A climate action plan is being developed and will set out carbon budget targets and how these will be achieved.⁹

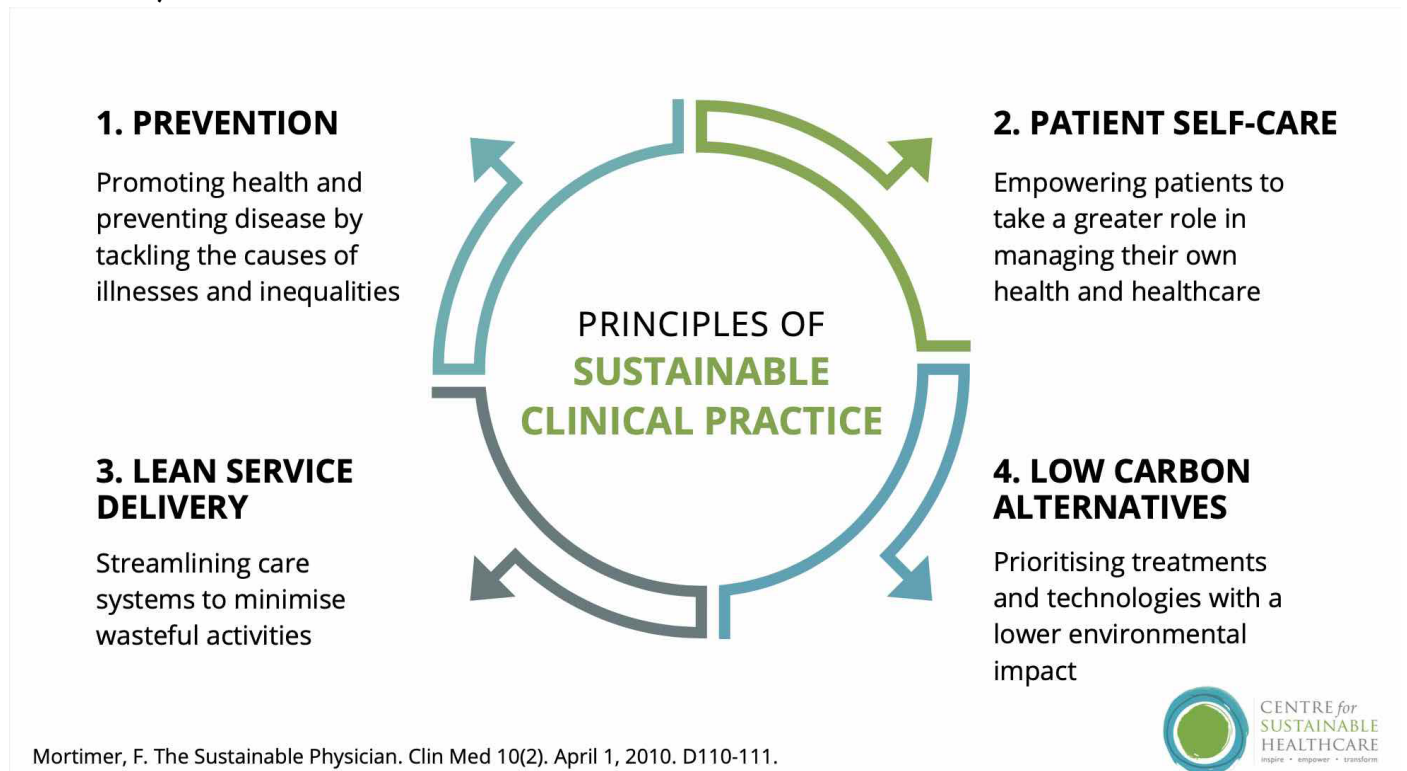
All staff should appreciate the impact that global warming has on the planet, healthcare and medicines and the part they can play individually and associated with the work they do to reduce the medicine carbon footprint. Staff undertaking carbon awareness training would confirm this awareness. The [PrescQIPP 'carbon awareness and sustainability in healthcare' webinar series](#) is six hour long webinars to support raising awareness and understanding for healthcare staff. These are free to access for subscribers. In England, elearning for healthcare also offer a [carbon literacy for healthcare programme](#) which leads to carbon literacy accreditation. A [carbon literacy toolkit and training](#) is also available for the NHS from the Carbon Literacy Trust, free until October 2026 (certification costs £10 per head). The materials allow NHS individuals to host their own training online or in-person to run certified Carbon Literacy sessions.

It is also recommended that each organisation should appoint a medicines optimisation sustainability lead to champion the sustainability agenda.

Sustainable clinical practice

The [Centre for Sustainable Health Care \(CSH\)](#) outlines four principles of sustainable clinical practice, where the first aim is to minimise the need for healthcare activity and then to reduce the environmental impact of activity that is retained, while maintaining or improving health outcomes. Figure 2 illustrates the four principles with a brief explanation on each. The fifth non-clinical principle is for improved operational resource, e.g. reduced packaging or water consumption for particular procedures.¹¹

Figure 2. Principles of Sustainable Clinical Practice (Image supplied by The Centre for Sustainable Healthcare)



Preventing ill health through promoting health, preventing disease and reducing the need for healthcare not only benefits patients, but also increases efficiency and reduces carbon emissions. Tackling the wider determinants of health such as income, employment and education levels and health inequalities to prevent people becoming ill in the first place can support system wide carbon reductions.³

[Social prescribing](#) connects people with activities, groups and services in their community to meet the practical, social and emotional needs that affect their health and wellbeing. In England, social

prescribing link workers are part of primary care networks (PCNs) so that every person can access a social prescribing service through their GP practice. The [Scottish Social Prescribing Network](#) aims to develop the strategic direction of social prescribing which includes to share learning, information, good practice and lessons across different initiatives in Scotland. The [Primary Care Hub](#) in Public Health Wales leads the coordination of the four key social prescribing deliverables, identified in the Connected Communities Strategy and aligns these with the developing national framework; and supports the development and implementation of the national framework for social prescribing. In Northern Ireland, [Integrated Care Partnerships](#) have supported the development of a number of social prescribing services over recent years and social prescribing is increasingly seen as an important way to provide a more person centred and effective approach to improving an individual's health and wellbeing. The Health and Social Care Board and Public Health Agency are partners in a European funded project, VIGOUR, which is focused on the scale up and spread of integrated care initiatives, which, for Northern Ireland, is focused on the development of social prescribing.

[Green social prescribing](#) links people to nature-based interventions and activities, such as local walking for health schemes, community gardening and food-growing projects.

GPs including the wider general practice team, local authorities, pharmacies, multi-disciplinary teams, hospital discharge teams, allied health professionals, fire service, police, job centres, social care services, housing associations and voluntary, community and social enterprise (VCSE) organisations should be aware of how to signpost people to local social prescribing services where available and encourage people to exercise and eat healthy diets. Self-referral is also encouraged.

These non-prescribing services could be introduced as part of a [making every contact count \(MECC\)](#) conversation. MECC is an approach to behaviour change that uses the millions of day-to-day interactions that organisations and people have with other people to support them in making positive changes to their physical and mental health and wellbeing. MECC enables the opportunistic delivery of consistent and concise healthy lifestyle information and enables individuals to engage in conversations about their health at scale across organisations and populations. A MECC interaction takes a matter of minutes and is not intended to add to the busy workloads of health, care and the wider workforce staff, rather it is structured to fit into and complement existing professional clinical, care and social engagement approaches. Evidence suggests that the broad adoption of the MECC approach by people and organisations across health and care could potentially have a significant impact on the health of our population. For example, within community pharmacy, in February 2019, 9,535 community pharmacies in England declared they were a [health living pharmacy](#), who are engaging members of the public, by using every interaction as an opportunity for a health promoting intervention, making every contact count. Referral to community pharmacists for a [New Medicine Service](#) or [Discharge Medicines Service](#) consultation opens an opportunity to offer healthy living advice.

Carbon emissions from medicine use

In 2019, the total NHS carbon footprint in England was 25.0 Megatonnes (Mt) CO₂e. [One megatonne is 1,000,000,000 Kg](#). Pharmaceuticals and chemicals accounted for 5.06 Mt CO₂e, metered dose inhalers accounted for 0.80 Mt CO₂e and anaesthetic gases 0.48 Mt CO₂e.¹²

Inhaler carbon emission values for individual inhalers have already been quantified in the [PrescQIPP inhaler carbon footprint](#) resource (Bulletin 295, attachment 1, inhaler carbon footprint data table).¹³ These values are now also referenced in the Monthly Index of Medical Specialities (MIMS, a prescribing reference used in primary care) inhaler carbon emissions table.¹⁴ The carbon footprint per inhaler values have been applied to primary care inhaler prescribing data in the [PrescQIPP inhaler carbon footprint snapshot](#) allowing NHS organisations to see the inhaler carbon footprint for their organisation. This data has been used by NHS organisations to develop strategies for lowering the inhaler carbon footprint and to monitor progress against carbon emission targets.

Work is underway to record the carbon footprint of other medicines, for example, the Medicine Carbon Footprint (MCF) classifier. [MCF Classifier](#) is a suite of data and support tools providing medicine carbon emissions information within a practical framework to enable carbon-informed medicines use. MCF Classifier applies 'green-by-design' principles to systematically predict global warming potentials of hundreds of medicines and integrates this data with formulary and cost information in user-friendly visualisations. MCF Formulary is an interactive web application, to provide a free, user-friendly and practical interface so that MCF ratings can be explored. MCF Formulary will be launched in 2024.¹⁵ This may support strategies which move away from using high carbon footprint medicines to ones with a lower carbon footprint. However, it has been suggested that as all medicines have a carbon footprint and can result in environmental pollution, reducing the use of medicines overall is the most effective step to take. This would entail focusing on factors such as overprescribing, pharmaceutical waste, antibiotic resistance, repeat prescriptions, non-adherence, dependence forming medicines, lifestyle medicines and lack of preventative healthcare.¹⁶

Carbon savings from medicine optimisation initiatives

It is estimated that every pound spent on pharmaceuticals generates greenhouse gas (GHG) emissions of 0.621kgCO₂e.¹⁷ By reducing the prescribed items and associated spend, it can be estimated that for every £1 saved on drug spend, approximately 0.621kgCO₂e would be saved annually.

This information has been used in the [PrescQIPP scorecards](#). The scorecards incorporate a wide range of indicators which are derived from PrescQIPP evidence based bulletins and resources. These allow organisations to see where they are outliers or have significant opportunity. Once organisations select the indicators to implement, the scorecards allow for monitoring progress against the targets set. The scorecard data allows NHS organisations to review the estimated cost and carbon footprint savings from implementing medicine optimisation projects and achieving the same prescribing as either the top 10% or 25% (depending on which value is selected) of organisations for that measure. The data can be filtered at ICB/HB, PCN, place and practice level. The PrescQIPP scorecards 12 months carbon avoidance data supports prioritisation of sustainability medicine optimisation initiatives and monitoring progress against objectives. These priorities can also be viewed in the [PrescQIPP practice planning report and practice visit and progress reports](#). These reports can be saved as pdfs and downloaded by practices or emailed to them.

The annual spend on NHS prescriptions across England, Wales, and Isle of Man was £10,670,282,143 from Nov 22 to Oct 23 (NHSBSA). This equates to a total carbon footprint of 6,626,245,211kgCO₂e. A 10% reduction in NHS prescription spend arising from a number of medicine optimisation carbon reduction initiatives resulting in deprescribing could result in a carbon avoidance of approximately 662,624,521kgCO₂e or 0.66MtCO₂e annually.

It has been estimated that approximately £1 in every £25 spent on primary care and community pharmaceutical and allied products is wasted per year.¹⁸ This equates to approximately £426.8million medicine wastage for England, Wales and Isle of Man per year based on spend from Nov 22 to Oct 23 (NHSBSA). Using the figure for pharmaceuticals GHG emission per £ spend of 0.621kgCO₂e, this would equate to a carbon impact of 265,049,808kgCO₂e or 0.26MtCO₂e per year for wasted NHS prescribed medicines. Reducing medicine waste by 10% could produce carbon avoidance savings for NHS prescribed medicines of approximately 26,504,981kgCO₂e or 0.027MtCO₂e annually.

The Sustainability in Quality Improvement (SusQI) framework is an approach to improving healthcare in a holistic way. Sustainability is considered within a quality improvement project either by applying a sustainability approach at different stages within the project or choosing a project that relates closely to sustainability, e.g.:

- Prevention, patient empowerment.
- Reducing pharmaceutical waste.
- Reducing over-investigation/over-treatment.

Health outcomes of a service are measured against its environmental, social and economic costs and impacts (the 'triple bottom line') to determine its sustainable value. The carbon footprint of the activity is measured before and after the quality initiative to produce a carbon saving figure.

Open access learning resources are available that contain templates, for example for measuring the carbon footprint, which may be useful when introducing a SusQI project. These are available at: <https://www.susqi.org/step-by-step-guide>

These data will support the development of medicine optimisation carbon reduction strategies by allowing organisations to see the cost and carbon impact of medicine optimisation initiatives they are considering.

The [PrescQIPP maximising prescribing resources](#) and invest to save health outcome data may be used to support identifying preventative medicine optimisation interventions which aim to improve health outcomes and prevent harmful outcomes which have high carbon treatment requirements. For example the use of sodium glucose cotransporter 2 (SGLT2) inhibitors in type 2 diabetes in reducing new end stage renal disease.

Strategies to reduce the medicines carbon footprint

A number of strategies can be deployed to support a reduction in the medicine carbon footprint. They involve reducing inappropriate prescribing, recycling or using recycled materials, reducing waste, improving adherence and making sustainability part of routine practice. Some practical examples with potential sustainable outcomes are provided in table 1. In addition, a number of national guidance and other initiatives may also contribute to a reduction in the medicines carbon footprint. These are described under each initiative. Organisations can look at each of these areas and decide which would be most acceptable and workable in their area. These do not need to be completed all at once, they can be phased in over time in a way to suit the local situation. A carbon footprint lowering strategy should be discussed, agreed, monitored and regularly reviewed across the health system. Within the strategy, organisations should ensure that they take account of their other medicine optimisation initiatives already underway which also support reductions in the medicines carbon footprint.

Table 1. Medicine carbon footprint reduction initiatives and sustainable outcome examples

Medicine carbon footprint reduction initiative	Sustainable outcome
Encourage patients to recycle medicine packet outer cardboard carton and paper based patient information leaflets	Recycle
Encourage patients to return empty blister strips for recycling where this is available, e.g. to a community pharmacy	Recycle
Encourage GP practices to recycle	Recycle
Review the use of liquid specials, which are individually prepared medicines and so will inevitably have higher preparation and transport costs than medicines produced in bulk. Aim to reduce liquid specials, by for example, transferring liquid specials to 'off the shelf' licensed preparations including tablets if the person can take them	Reduce energy consumption Reduce pharmaceutical waste
Encourage all to turn off electrical equipment when not in use.	Reduce energy consumption

Medicine carbon footprint reduction initiative	Sustainable outcome
Use interactions with patients as an opportunity to highlight the benefits of managing their own repeat prescription ordering, with an emphasis on online ordering where appropriate using the GP practice online ordering process, NHS app (England, Isle of Man), My Health Online (Wales) or other effective app or website for those who have internet access. Ensure there are still options in place for patients unable to use online ordering	Reduce pharmaceutical waste
Ensure all GP practice staff in England and the Isle of Man are aware of the benefits of the NHS app and encourage patients to sign up for an NHS account if they are able to	Reduce pharmaceutical waste
Use patient resources, e.g. patient guides or leaflets to support people setting up with online accounts and ordering repeat prescriptions	Reduce pharmaceutical waste
Run regular campaigns to encourage patients to only order what they need each time, to avoid wastage and stockpiling, whilst providing reassurance that it is not necessary to order medication every month for it to stay on a repeat prescription	Reduce pharmaceutical waste
Work together across the whole system to support adherence to medicines. Patients who are not taking their medicine(s), or not taking them as prescribed, should be encouraged to discuss the reasons why with a qualified healthcare professional (e.g. doctor, nurse, community pharmacist or GP practice pharmacist) to try to come up with a suitable solution	Reduce pharmaceutical waste
Consider the use of Electronic Prescription Service (EPS), electronic Repeat Dispensing (eRD) or Serial Prescriptions (NHS Scotland) to support the reduction of medicines waste	Reduce pharmaceutical waste
Engage with GP receptionists and prescription clerks for support and training and upskilling to improve knowledge when issuing repeat prescriptions	Reduce pharmaceutical waste
Encourage adherence to medicines	Reduce pharmaceutical waste
Run a local waste reduction campaign	Reduce pharmaceutical waste
Encourage patients to check their prescription is correct before leaving the pharmacy as medication returned before the patients leaves the pharmacy can be reused, but if medicines are taken home they have to be destroyed	Reduce pharmaceutical waste
Encourage engagement and partnership working with other third sector organisations such as Age UK, Healthwatch, voluntary groups and local councils to support waste reduction campaigns.	Reduce pharmaceutical waste
Use combination tablets where appropriate for the individual	Reduce pharmaceutical waste Improve quality of life
Advise on self care where appropriate	Reduce pharmaceutical waste Improve quality of life
The community pharmacist or dispenser in GP surgery asks the patient/carer if a new medicine spoon/oral syringe is needed rather than automatically providing a new one with each repeat prescription. Advise patients to wash and reuse medicine spoons and oral syringes either until they break or the measurements can no longer be read or seen	Reduce use of plastic

Medicine carbon footprint reduction initiative	Sustainable outcome
Encourage community pharmacists and GP surgery dispensaries to purchase medicine spoons for dispensing which can be recycled or which are made from recycled materials. Medicine spoons and oral syringes are classed as medical devices ¹⁹ and so check the medicine spoons are CE marked or UKCA marked ²⁰ and comply with the standards outlined in the Drug Tariff ²¹	Reduce use of plastic
Use the Kidzmed e-learning resource to teach children to swallow pills so they do not need to be prescribed a liquid medicine and associated plastic medicine spoon or oral syringe. Also avoids the need for potential refrigeration of liquid medicines, potential waste from residual medicine and inappropriate disposal in the sewage system and contribution to antimicrobial resistance. For adults, refer people to the ' Problems swallowing pills ' NHS webpage to get help to make it easier to swallow pills	Reduce use of plastic Reduce energy consumption Reduce antimicrobial resistance risk Reduce pharmaceutical waste
Reduce the use of injectable products which use plastic syringes or cartridges for administration where oral alternatives are available and suitable for the patient. For example, semaglutide tablets used in preference to injectable GLP-1s where suitable for the individual; vitamin B12 tablets used instead of the injection where suitable for the individual	Reduce use of plastic Improve patient quality of life
In hospitals, reduce the delay in moving from intravenous preparations to oral preparations when the patient is able to take oral medicines. This will support a reduction in the use of single use plastics such as plastic syringes, intravenous giving sets. For example, changing from an intravenous antibiotic to an oral antibiotic when the patient is able to take solid food again after surgery or changing from intravenous paracetamol to oral paracetamol	Reduce use of plastic Improve patient quality of life Reduce antimicrobial resistance risk
Use food fortification instead of oral nutritional supplements (ONS), which are packaged in single use plastic containers or Tetra Paks. Not all councils accept Tetra Paks for recycling as part of the kerbside recycling service, plus some people will discard ONS containers in the general waste rather than recycling waste. Throwing unused ONS into the sink can also contaminate the water supply. Refer to the PrescQIPP oral nutritional supplements resources for food fortification alternatives, such as homemade milkshakes	Reduce use of plastic Improve patient quality of life
Use Reusable clinical waste containers from NHS supply chain or other provider where available	Reduce use of plastic
Avoid use of plastic carrier bags for completed prescriptions, use paper bags if needed	Reduce use of plastic
Use a reusable cup rather than a plastic cup when taking a medicine with a glass of water	Reduce use of plastic
Buy in bulk to reduce packaging and transport, otherwise this might create additional waste or energy use if extra storage space is needed	Reduce use of plastic Reduce energy consumption
Encourage sign up from community pharmacists and patients to the recycle scheme (PenCycle) for NovoNordisk insulin and GLP-1 pens	Reduce use of plastic Recycle
Use a waste bin made from recycled materials	Reduce use of plastic
Use a waste bin which is reusable rather than single use	Reduce use of plastic

Medicine carbon footprint reduction initiative	Sustainable outcome
Use multidose eye drops rather than single use (preservative free) eye drops where suitable for the individual patient	Reduce use of plastic
Use extended release injectables where appropriate for the individual	Reduce use of plastic Improve quality of life
Use text messages and emails to patients rather than letters or leaflets or other paper based messages where possible	Reduce waste
Refrain from printing, go paperless	Reduce waste
Ensure that pharmaceutical waste bins are full before being disposed of. Collections from waste companies may need to be scheduled accordingly to allow for this	Reduce waste

National guidance supporting sustainability in medicines optimisation initiatives

The following national guidance, if implemented, would support one or more of the principles of sustainable clinical practice. This in turn would support reductions in the medicine carbon footprint.

NHS Long Term Plan

The NHS Long Term Plan promotes medicines optimisation to reduce:²²

- Inappropriate prescribing of antimicrobials.
- Medicines that can cause dependency.
- The overuse of short acting bronchodilator (SABA) inhalers.
- Overall use of pressurised metered dose inhalers (pMDIs) and increase switches to dry powder inhalers in appropriate patients.
- Nationally identified medicines of low priority.
- Overmedication of people with a learning disability, autism or both, through Stopping over medication of people with a learning disability autism and Supporting Treatment and Appropriate Medication in Paediatrics (STOMP-STAMP) programmes.

NICE guideline on medicine optimisation [NG5]

It is estimated that as many as 7% of UK hospital admissions are due to adverse drug reactions.²³ The, now retired, NICE environmental impact report: Medicines optimisation. Implementing the NICE guideline on medicines optimisation [NG5] estimates that avoiding 75% of the 374,710 hospital admissions for avoidable adverse medicine events would result in the following environmental benefits:

- Avoid 110,910 tonnes of greenhouse gas emissions.
- Avoid the use of 179,133 million litres of fresh water.
- Prevent the creation of 13,300 tonnes of waste.²⁴

NG5 covers the safe and effective use of medicines for people taking one or more medicines and aims to ensure that medicines provide the greatest possible benefit to people by encouraging medicines reconciliation, medication review and the use of patient decision aids.²⁵ NHS organisations should implement the recommendations set out in NG5 to support both medicine safety and carbon reduction strategies.

Good for you, good for us, good for everybody

When drugs are overprescribed, carbon emissions are expended unnecessarily. When drugs are prescribed as needed, carbon emissions are contained.¹⁶ Reducing overprescribing will help the NHS fulfil the commitment to become carbon net zero.²⁶ The NHS England National Overprescribing Review publication, 'Good for you, good for us, good for everybody' makes recommendations on reducing overprescribing. It describes overprescribing as where people are given medicines they don't need or want, or where harm outweighs benefits. It occurs in numerous ways including:²⁶

- When there would have been a better alternative.
- The medicine is not appropriate for the individual patient.
- The medicine is no longer appropriate as it has not been reviewed.
- The patient no longer needs or benefits from the medicine, but continues to be prescribed it.

The review estimates that at least 10% of the current volume of medicines may be overprescribed. This would be equivalent to a reduction of around 110 million items a year.²⁶ A reduction in prescribed items would have an additional benefit of reducing the medicines carbon footprint.

Network Contract Directed Enhance Services (DES) Guidance for 2022/23 in England

Medication reviews and medicines optimisation are included as service requirements in the Network Contract DES. This remains in place until at least 31 March 2024.²⁷ Undertaking structured medication reviews (SMRs) in primary care will reduce the number of people who are overprescribed medication, reducing the risk of an adverse drug reaction, hospitalisation or addiction to prescription medicines. Improved medicines use will also improve patient outcomes, ensure better value for money, and reduce waste and improve its environmental sustainability.²⁸ When problems are identified during a medication review, one of the options considered is stopping a medicine.²⁶

Items which should not routinely be prescribed in primary care: policy guidance

The NHS England guidance, 'Items which should not routinely be prescribed in primary care: policy guidance' provides recommendations to support review and deprescribing of certain items because they are unsafe, ineffective for some or all patients, or are not cost-effective.²⁹ When medicines are prescribed which are of limited clinical value they are expending a carbon footprint with no or little clinical value.¹⁶ Deprescribing these medicines in appropriate individuals will provide savings in the carbon footprint. Using alternative effective management strategies will improve the efficiency of the carbon expended and also be of benefit to patients.

NHS England - Conditions for which over the counter items should not routinely be prescribed in primary care

The NHS England guidance for conditions for which over the counter items should not routinely be prescribed in primary care lists 35 conditions, plus probiotics and vitamins and minerals, as areas where self care may be more appropriate.³⁰ Advising that the condition does not need treatment as it will get better on its own, or self care, will support reductions in the medicine carbon footprint through reductions in such things as travel or GP consultations, as well as potentially reducing overprescribing and medicines waste.

Medicines associated with dependence or withdrawal symptoms

Dependence forming medications (DFMs) are primarily opioids, Z-drugs (zopiclone and zolpidem), benzodiazepines, gabapentin and pregabalin.³¹ Antidepressants are not addictive but may be associated with withdrawal symptoms.³² The NICE guideline on Medicines associated with dependence or withdrawal symptoms: safe prescribing and withdrawal management for adults [NG215] recommends to discuss withdrawing a DFM with the person if:³³

- It is no longer benefiting the person.
- Problems associated with dependence have developed.
- The condition for which the medicine was prescribed has resolved.
- The harms of the medicine outweigh the benefits.
- The person wants to stop taking the medicine.

Reducing and/or deprescribing DFM's will support medicines sustainability as long as they are not replaced by equally high carbon alternative treatments.¹⁶

Antimicrobial resistance (AMR)

The National Overprescribing Review included tackling AMR in their examples of medicine optimisation initiatives for tackling overprescribing for specific classes of medicine. The UK five-year national action plan on AMR has shown that a significant reduction in the prescribing of antibiotics in primary care can be achieved.²⁶ Initiatives which tackle AMR will also support reductions in the medicines carbon footprint.

Items less suitable for prescribing

The British National Formulary (BNF) list some medicines as 'less suitable for prescribing'.³⁴ Attachment 1 lists medicines where the BNF classifies them as 'less suitable for prescribing' and suggests actions when deprescribing is considered. The [PrescQIPP strategic activity report 'items less suitable for prescribing'](#) provides NHS organisations with data to support identification of which medicines should be prioritised for review locally.

Other medicine optimisation initiatives supporting a reduction in the medicine carbon footprint

Reducing the use of baby milk products

By encouraging and supporting breast feeding wherever possible, this should help to reduce the initiation of, and use of baby milk products. The breastfeeding awareness campaign outlines how breastfeeding supports sustainable practices. The campaign materials are available here: <https://waba.org.my/>

The PrescQIPP bulletin on [appropriate prescribing of specialist infant formula \(foods for special medical purposes\)](#) aims to support the appropriate use of prescribed and over-the-counter (OTC) specialist infant formula.

Reusable devices

Identifying where medicines and medical equipment can safely be reused will support reductions in the medicine carbon footprint. Using reusable or refillable devices are examples of reuse. These devices support the use of refills rather than having to replace the whole product. Examples are included in Attachment 2, examples of reusable devices and how often to change them.

Advice when prescribing reusable devices and refills:

- Advise the patient on how to use the reusable device including how to load the device or prime the device if needed, and when to replace the device. Table 1 in attachment 2 provides information on how long the reusable devices should last for.
- Initial prescriptions should include the device and the refill as an acute issue.
- Issue refills only on repeat prescription. Make a note in the patient notes of how many prescriptions should be issued before a new device is needed.

- Ensure the patient is aware of the time frame for when they should request a prescription for a new device and refill.

For medical devices requiring batteries, encourage the use of rechargeable batteries wherever possible.

Reducing pharmaceutical waste

Pharmaceutical waste occurs during manufacturing and at the user end when unused medicines are discarded or medicine byproducts are excreted into sewage system. [A UK system map](#) which follows the flow of pharmaceuticals through their life cycle from design to environmental contamination has been produced. It shows the complexity of the lifecycle of a pharmaceutical and opportunities to improve cross-sectoral interconnectivity, for example it highlights the scarcity of feedback from the environmental sector into areas such as in procurement of pharmaceuticals, prescribing and international manufacturing pollution and global supply chains.³⁵ As pharmaceuticals have a carbon footprint regardless of whether they are used or not, careful management and distribution of pharmaceuticals can minimise unnecessary carbon impact.¹⁶ Addressing medicine waste to support reductions in carbon emissions is supported by all UK health services.^{3,7-10}

Improving adherence

People do not always remember to take their medicines exactly as prescribed and healthcare professionals are often unaware of how patients take their medicines. Asking an open question at each consultation, 'how are you getting on with your medicines', opens up a conversation. Non-adherence may limit the benefits of medicines, resulting in lack of improvement, or deterioration in health.³⁶ When medicines are not taken, the carbon expended in their manufacture and dispensing does not result in clinical benefit.¹⁶ NICE discusses interventions to improve adherence, though no specific intervention can be recommended for all patients. Any interventions should be tailored to the individual, involve the patient in the decision (shared decision making) and address the specific difficulties with adherence the patient is experiencing. Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Examples of interventions include:³⁶

- Suggesting that patients record their medicine-taking, e.g. recommend an app or AccuRx text template.
- Encouraging patients to monitor their condition.
- Simplifying the dosing regimen.
- Deprescribe the medicine where appropriate for the individual.
- Using alternative packaging for the medicine, e.g. where packaging is causing difficulty, health care professionals should respond to individual problems.

NICE have a template patient information poster on '[Getting the best from your medicines](#)' which can be displayed in health care settings or on healthcare organisation websites.³⁶

Making sustainability part of routine medicines optimisation

Including consideration of sustainability in medicines optimisation into routine everyday practice should support improvements in medicines sustainability. For example, an Area Prescribing Committee can incorporate a discussion around sustainability as part of the application process or incorporating sustainability as a routine item for discussion at team meetings. Making sustainability and carbon footprint discussions as part of routine practice will ensure that they are kept on the agenda and that progress is monitored. Also, consider adding sustainability on the organisation risk register due to the impact of climate change upon health.

Healthcare professionals, where appropriate, should work towards making discussions on sustainability issues routine during contacts with patients and during consultations. For example, the Greener Practice

has produced information on how to introduce the topic of the environmental impact of inhalers when undertaking asthma reviews in their '[Optimising Asthma Reviews: Right Medicine to Right Place](#)' one page visual guide.

Summary

Climate change impacts health both directly and indirectly and reducing greenhouse gases can result in improved health. All UK health services have committed to net zero carbon emissions. NHS organisations should locally agree medicine optimisation initiatives which support reductions in the medicines carbon footprint. The [PrescQIPP inhaler carbon footprint](#) resources should be used alongside this resource to support reductions in the inhaler carbon footprint. Addressing the medicines carbon footprint now aims to prevent the approximately 250,000 additional deaths per year from malnutrition, malaria, diarrhoea and heat stress that the WHO expects climate change to cause between 2030 and 2050.

Further resources

Attachment 3 provides a summary of pharmaceutical manufacturer medicine sustainability initiatives and contact details should NHS organisation wish to find out further information.

Attachment 4 Top 10 tips for improving medicines sustainability is a slide set presentation.

Attachment 5 Sustainability in medicines optimisation project planning tool may be used to support selection of medicines sustainability projects locally. Projects should be communicated widely to all key stakeholders.

The [PrescQIPP polypharmacy and deprescribing webkit](#) can be used to support medicine optimisation projects to address overprescribing.

The [PrescQIPP Low priority prescribing webkit](#) contains resources and data to support medicines optimisation projects for these low priority treatments.

The [PrescQIPP resources on DFMs](#) can be used to support medicines optimisation projects to reduce dosage of or deprescribe DFMs.

The [PrescQIPP AMR webkit](#) provides links to resources and data which support medicine optimisation projects to tackle AMR.

The [PrescQIPP adherence and waste webkit](#) brings together all the PrescQIPP medicines adherence and waste resources and examples of projects focusing on reducing medicine waste such as the 'Don't tick it' campaigns for inhalers, insulin and oral nutritional supplements (ONS). The campaign materials can be used to implement a number of different local campaigns to reduce overordering, encourage appropriate waste disposal and recycling.

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Additional PrescQIPP resources

Briefing	https://www.prescqipp.info/our-resources/bulletins/bulletin-340-sustainability-in-medicines-optimisation/
Implementation tools	

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