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Comparative Review of Inhaler Return, Recycling & Recovery Schemes in the UK

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Contents

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Executive Summary

Inhalers contribute significantly to NHS carbon emissions. Pressurised metered dose inhalers (pMDIs) contain powerful greenhouse gases and are often discarded in household waste. Wales, like the rest of the UK, currently lacks a national inhaler return and recycling pathway. This review compares UK schemes to identify what works and what a scalable model for Wales would require.

Nine schemes were identified across the UK, including community-pharmacy drop-off models, hospital-based schemes, a postal model, and behaviour-change interventions, of which eight were reviewed. They varied in scale, maturity and environmental ambition, but together provide a clear evidence base on feasibility, environmental credibility and operational requirements.

What was compared

The review examined a range of UK inhaler return, recycling and recovery schemes, including specialist processing models with propellant recovery, partial-recycling approaches, postal return schemes, and behaviour-change interventions using the best available evidence. Findings were synthesised to identify common components, operational barriers, enablers, and features associated with scalability, environmental credibility and feasibility.

Key findings

- One waste management provider dominates - of those schemes where the waste management provider could be identified (n=7), six schemes used Grundon Waste Management and Recycling and one scheme Recycle UK.

- NHS-embedded delivery models scale best - Schemes that used existing NHS waste and pharmacy logistics (e.g., South East London, Re-Hale) were more resilient, easier to implement and more likely to continue beyond pilots. Stand-alone models struggled to sustain scale

- Segregated pMDI collection is essential for credible environmental benefit - Specialist processors can recover propellant, aluminium and some plastics. Dry Powder Inhalers (DPIs) usually still require standard medicines waste disposal.

- Convenience and simplicity drive participation - Accessible return points, clear messaging and minimal staff workload were critical. Patient awareness was consistently low, but willingness to participate was high when instructions were visible and simple.

- Behaviour change cannot be optional - Schemes with repeated, multi-channel prompts achieved better engagement. One-off communication was not enough to shift habits.

- Data reporting is inconsistent across schemes - Schemes reported totals, return rates and environmental outputs in different ways, and some relied on estimates. A minimum dataset is essential for national comparability.

- Several schemes extended beyond their planned pilots - Where logistics, governance and funding aligned with existing NHS processes, schemes were more likely to be continued or scaled.

Evidence quality varies. Some schemes published detailed evaluations, while others shared only headline numbers. Material-recovery data were not always available, and return rates were calculated using different methods and denominators. As a result, direct numerical comparisons between schemes are not reliable, and environmental figures should be interpreted with caution.

Implications for Wales

Improved inhaler disposal aligns with NHS Wales decarbonisation commitments and wider UK policy direction. Wales can build on the experience of other regions to design a practical, scalable model that delivers measurable environmental benefit. The evidence suggests that segregated pMDI recovery, embedded in existing NHS infrastructure and supported by ongoing behaviour-change activity, offers the strongest route forward.

What a scalable model requires

Taking into account the themes emerging from the review, this exercise identifies six components and suggests areas for consideration when developing an inhaler disposal pathway and service model.

Components for a future Welsh service model include:

- governance and commissioning,
- clear device scope,
- accessible return sites,
- integrated logistics and specialist processing,
- consistent communications and workforce support, and
- a robust national dataset.

A sustainable, scalable inhaler-disposal pathway for Wales should be designed according to the following conditions:

- Be NHS-embedded, using existing waste contracts and workflows.
- Focus on segregated pMDI collection for propellant recovery.
- Accept all inhalers but provide clear split-pathway messaging.
- Prioritise behaviour change through ongoing, visible prompts.
- Minimise operational burden for pharmacy and NHS staff.
- Collect and report data using a nationally agreed minimum dataset, supported by a monitoring and evaluation framework.
- Apply consistent governance and commissioning standards.
- Offer flexible access routes that do not widen inequalities.
- Be supported by long-term funding and national coordination.

Conclusion

A national approach to inhaler disposal in Wales is both feasible and timely. The evidence shows that sustainable inhaler disposal is achievable when models are simple, embedded into routine practice, and supported by clear governance and consistent communication. Wales now has a strong evidence base to design a scalable, credible system that reduces emissions, improves safe disposal, and aligns with wider NHS sustainability goals.

Summary of recommendations

For full details of recommendation see section 5.

Recommendation 1: Adopt an NHS-embedded delivery model as the default approach.

Recommendation 2: Be explicit about device scope and apply a split-pathway model.

Recommendation 3: Prioritise segregated pMDI collection where propellant recovery is an objective.

Recommendation 4: Treat behaviour change as a core pillar, not an add-on.

Recommendation 5: Reduce burden on pharmacy and NHS site staff.

Recommendation 6: Standardise monitoring and require a minimum auditable dataset.

Recommendation 7: Create a commissioning-ready national model for Wales.

Recommendation 8: Plan for equity and access in return pathways.

Recommendation 9: Build in sustainability from the start, including long term funding.

Recommendation 10: Support market development for specialist processing within the UK.

Comparative Review of Inhaler Return, Recycling & Recovery Schemes in the UK

1. Background

1.1 Why inhaler return/recycling matters

Medicines account for around 25% of the NHS carbon footprint, and inhalers alone contribute approximately 3%, a sizeable share driven largely by the fluorinated propellants used in pressurised metered-dose inhalers (pMDIs). Inhalers are also used at scale: around 70–73 million are prescribed in the UK each year[1], meaning that even small improvements in end-of-life handling can translate into meaningful environmental gains.

The NHS in Wales, like the other devolved administrations , has set out a clear direction to reduce inhaler-related emissions through better respiratory care, including cutting avoidable short-acting bronchodilator use and switching from pMDIs to lower-carbon dry powder inhalers (DPIs) that do not contain propellant gases where clinically appropriate.[2,3,4,5] But device switching will take time, and many patients will continue to need pMDIs. In the meantime, improving how inhalers are returned, handled, and treated at end of life remains an immediate opportunity to reduce environmental impact.[6,7]

How inhalers are disposed of matters because pMDIs can still contain residual propellant and medicine when thrown away. If discarded in domestic waste, these gases can be released, while plastic and aluminium components add to persistent waste streams. Dedicated recycling can reduce emissions by enabling recovery of propellant gases, recycling aluminium canisters and some plastics, and ensuring remaining materials are managed safely (e.g., through high-temperature incineration where recycling isn't possible). DPIs, however, are not yet widely recyclable at scale due to design complexity and material mix.

Return routes also matter. While community pharmacies are a key access point, many schemes also enable returns through other NHS sites such as GP practices, hospitals, and community clinics. Using multiple settings makes it easier for patients to return used or unwanted inhalers as part of routine

[1] Take Action for Inhaler Recycling (AIR) | Chiesi Limited
[2] Decarbonisation: inhaler prescribing, use and disposal 2023-2030. A national strategy for Wales
[3] Greener NHS » Improving health outcomes for respiratory patients while reducing carbon emissions
[4] Respiratory - Carbon Impact dashboard | NHSBSA
[5] CO2 emissions in Scotland | Right Decisions
[6] P46 How and when do patients dispose of old or unwanted inhalers? | Thorax
[7] Murphy, A.C., Carroll, W., Gotsell, M., Potter, C., Quint, J.K. and Malone, R. (2024) *How do patients determine when their inhaler is empty? Insights from an analysis of returned inhalers and a patient survey*. **BMJ Open Respiratory Research**, 11(1), e002579. Available at: https://bmjopenrespres.bmj.com/content/bmjresp/11/1/e002579.full.pd

care, increases participation, and supports consistent messages from prescribers, nurses, pharmacists, and wider clinical teams. However, most inhalers are still not returned through any route, and there is not yet a coordinated, nationally funded inhaler recycling scheme.

1.2 Objectives of the review

The objectives of the review were:

- To rapidly gather evidence from UK inhaler recycling pilots already known to the NHS Wales Task & Finish Group Decarbonisation – Inhaler use and disposal (hereafter as the Inhaler T&F group).
- To identify and review additional schemes across the UK and comparable international models, including any published evaluations or grey literature.
- To synthesise findings across pilots to identify common components, barriers, gaps, and behavioural insights.
- To develop emerging recommendations for service design and policy for sustainable inhaler disposal.
- To produce a clear evidence synthesis and identify core components for a scalable service model.

1.3 Definitions

To support consistent comparison across schemes, this report uses a number of definitions related to inhaler types, return pathways and end of life routes, recycling and recovery terms and scheme descriptors. These definitions are used throughout to ensure like-for-like comparison where schemes differ in design, maturity, and data availability.

Full definitions are available in Appendix 1.

2. Methodology

A number of schemes were identified and signposted to by members of the Inhaler T&F group.

A further search was undertaken using the following research question to structure a scoping-style review of UK inhaler return/recycling schemes:

> *What are the key components, barriers, and outcomes of inhaler recycling schemes in the UK, and how can these inform the development of a national service specification for sustainable inhaler disposal?*

The question was translated into concept blocks (inhalers; recycling/return/disposal; UK/NHS; components/barriers/outcomes), and searched across MEDLINE/Embase/CINAHL using controlled vocabulary and free-text terms. Grey literature searches were conducted via targeted web searching (including NHS/Integrated Care Boards (ICB)/Trust and professional body sources) and scheme-name searches. Backward and forward citation chasing was used to identify additional relevant material. Records were screened against predefined inclusion criteria, and data were charted using a standard extraction template capturing scheme components, implementation barriers/enablers, and reported outputs/outcomes.

Another approach was also taken using the PICO framework where the research question was structured using the PICO framework to guide the search strategy, screening, and data extraction. PICO was used to define the following:

- The Population of interest (people prescribed inhalers and the UK healthcare settings in which inhalers are used and returned),
- The Interventions being assessed (inhaler return, recycling and recovery schemes, including drop-off and postal models),
- Relevant Comparators (usual practice, pre-implementation baseline, or alternative scheme models), and
- The Outcomes of interest (scheme outputs such as inhalers returned, recycling/recovery outputs, and any reported environmental, operational, acceptability or cost outcomes).

This framework ensured the search terms captured both published and grey literature describing scheme design and evaluation and enabled consistent comparison across schemes with different delivery models and maturity.

A substantial proportion of the material identified for this topic sits outside the peer reviewed academic literature and was published online as grey literature. This included articles from independent professional and sector outlets, alongside pages, reports and announcements hosted on local NHS Trust, ICB websites or similar. These sources were included because they often provide timely detail on service design, implementation, and early learning that is not yet captured in journals. However, guidance on using news and online articles in academic work consistently notes that such sources can vary in reliability, may reflect editorial or organisational priorities, and often provide limited referencing, so they need to be handled with explicit critical judgement rather than treated as equivalent to research papers.

This was a rapid review and not all schemes were directly contacted for follow up. The review used the best available evidence. There is potential that full evaluation reports may be available for those where only high-level papers or abstracts were identified.

3. Findings

Nine schemes were identified, for one scheme no information could be located beyond its initial identification (Cornwall) and was excluded, eight schemes were therefore included in the review.

3.1 Typology

This section sets out a typology of the schemes included in the review, that is, a simple classification of schemes into distinct “types” based on how they operate (for example, drop-off collection, postal returns, and behaviour-change initiatives, with or without specialist recycling/propellant recovery).

Establishing this typology upfront ensures a like-for-like comparison across programmes that may differ in purpose, maturity, delivery setting, and available data. It also clarifies where differences in reported outcomes reflect underlying design choices (e.g., convenience versus depth of material/propellant recovery) rather than overall effectiveness and provides a consistent basis for interpreting findings across the schemes.

Scheme types identified are as follows:

a) Drop off models with specialist processing (including propellant recovery)
b) Drop-off model with partial component recycling and conventional disposal of canisters
c) Postal return model with specialist processing (including propellant recovery)
d) Behaviour-change/awareness intervention to increase returns for safe disposal (not a recycling/propellant-recovery scheme).
e) Hospital drop-off model with specialist processing

3.2 Why "types" of schemes matter

The schemes included in this review are not all trying to achieve the same thing, and they are not designed in the same way. Some models are built to maximise convenience and reach (for example, postal returns or widespread drop-off points). Others are designed to maximise depth of recovery (for example, schemes that prioritise segregated pMDI collection, dismantling, and propellant capture). Others are deliberately low-burden and low-cost, aiming primarily to increase appropriate returns to pharmacy or to prevent disposal in household waste, even if they do not deliver true recycling.

These design differences shape what "success" looks like and what is feasible to measure. A scheme optimised for convenience may achieve higher participation but generate higher contamination rates or provide less detailed recovery data. A scheme optimised for recovery may deliver higher-quality outputs (e.g., audited component and propellant recovery) but require more infrastructure, governance, and staff time, which can constrain scale. A low-cost behavioural prompt may deliver rapid improvements in return behaviour, but its environmental benefit depends on what downstream disposal/recovery route is available.

Because schemes differed in purpose, maturity, design and the type of outcomes they reported, no single headline metric, such as total inhalers collected, estimated CO_2e savings or number of participating sites, can act as a reliable measure of overall performance. Instead, the review interprets findings across a set of recurring themes that emerged from the evidence, including operational feasibility, environmental credibility, patient convenience, workforce impact and potential for scale. Considering these themes together provides a more balanced understanding of what each model can deliver, the trade-offs involved, and which elements are most relevant to different local contexts and policy objectives.

3.3 Scheme profiles: An overview

A summary of the types of schemes, the geographical areas covered, the return site, the device scope and the processing/end of life pathway can be found in Appendix 2.

a) Drop off models with specialist processing (including propellant recovery)

Upper Valleys Cluster/Swansea Bay University Health Board Inhaler Recycling Scheme Pilot

This was a community pharmacy led pilot in the Upper Valleys Cluster within Swansea Bay University Health Board, set up to test segregated inhaler returns for recycling and propellant recovery rather than routine medicines waste disposal. The funded pilot ran from November 2022, involving 8 of 10

community pharmacies in the cluster. Patients returned inhalers (including MDIs and DPIs) to pharmacies, where they were placed into dedicated UN-approved bins and collected by a specialist waste contractor (Grundon Waste Management) for processing, including propellant recovery and separation of materials for recycling routes. Early reporting (first 7.5 months) estimated approximately 6,800–8,427 inhalers returned, with the range reflecting reliance on weight/bin-capacity estimates rather than direct counting; returns were reported as roughly 23–28% of prescribed/dispensed inhaler items in the cluster over the period.

Re-Hale (East Kent inhaler recycling pilot)

Re-Hale was a 12-month collaborative pilot led by Kent and Medway ICB with Chiesi, a pharmaceutical company specialising in respiratory medicines and inhaler therapies, established to operationalise an inhaler drop-off recycling scheme in East Kent (live Nov 2023–Oct 2024). It used existing medicines distribution ("reverse logistics") via Alliance Healthcare to support drop-off points across community pharmacies, dispensing practices and hospital trusts, using small site bins (around 170 inhalers) that were consolidated at a wholesaler depot into larger containers for routine collection by Grundon Waste Management. In processing, inhalers were sorted (pMDIs vs DPIs), with aluminium recycled and residual propellant extracted for reuse, alongside plastics recovery where possible. The report states 41,650 inhalers were returned over the live period (a 5.5% return rate against 757,798 inhalers dispensed in East Kent in 2023, approximately 70% pMDIs) and presents a modelled estimate of 176 tonnes CO_2 avoided. The initial East Kent pilot ran for 12 months (November 2023–October 2024), but the programme has continued and scaled up, with partners reporting it has been expanded to the rest of Kent and Medway/wider Kent coverage beyond the pilot area.

South East London ICS inhaler return and recycling (SEL ICB/ICS pilot)

South East London ICS runs an ICS-wide inhaler return and recycling scheme that enables residents to return used inhalers at participating community pharmacies and NHS sites (including acute and mental health providers) across south east London. First implemented at King's College Hospital in February 2024 and rolled out wider from June 2024, it is described as England's first fully NHS-owned, system-wide inhaler recycling pilot delivered through a publicly commissioned pathway. The recycling route currently applies to pMDIs; other inhaler types are accepted for safe disposal via standard medicines waste routes. A key innovation is the embedded delivery model: two parallel pathways operate in primary and secondary care, with segregated pMDI bins collected through existing waste contracts (including routine pharmacy collections) and processed by specialist partners (Grundon Waste Management) for recovery of residual HFA gas (repurposed as coolant) and recycling of aluminium and plastic components (reported as up to 99.9% component recovery). The project is funded by NHS England via Greener NHS and is supported by patient-facing communications and a live public survey, with ongoing monthly site reporting to support a formal NHSE-led evaluation and wider replication.

GSK's Complete The Cycle (UK wide)

GSK's Complete the Cycle was a manufacturer-led, UK-wide inhaler take-back and recycling/recovery scheme delivered through community pharmacy drop-off points, first piloted in 2011 and later expanded nationally. Patients returned used inhalers to participating pharmacies (including inhalers from other manufacturers), which were then sent onward for recycling and recovery, including recovery of materials such as aluminium and management of residual propellant by Grundon Waste Management. GSK confirmed the programme closed at the end of September 2020, stating it could

not reach the necessary scale as a bespoke, standalone scheme; by that point, GSK reported more than 2 million inhalers had been recycled and recovered through the programme.

b) Drop-off model with partial component recycling and conventional disposal of canisters

INSPIRE (Black Country/Wolverhampton inhaler recovery and recycling scheme)

INSPIRE is a Wolverhampton-based inhaler return and recycling initiative within the Black Country ICS, led by The Royal Wolverhampton NHS Trust (RWT) in partnership with AstraZeneca, with support from the Black Country ICB and Wolverhampton LPC. It launched as a 12-month pilot from late July 2023, establishing return points across community pharmacies (reported as 19 at launch) and at New Cross Hospital and Cannock Chase Hospital. In participating pharmacies, staff separate the canister from the plastic casing: the canister is placed into the pharmacy's usual medicines/clinical waste route (with scheme materials noting incineration of harmful HFCs), while the outer plastic casing is placed into a dedicated, clear-bagged collection bin supplied and collected by RWT's waste team when it is three-quarters full, with contamination checks and annual Duty of Care documentation for onward recycling by Recycle UK. The implementation pack describes an evaluation approach based on baseline and follow-up return monitoring and weighing of collected material, alongside promotional materials for pharmacies and a one-off set-up payment subject to satisfactory segregation at first collection. Available documents explicitly describe this as a time-limited pilot: 13 Oct 2023 to 31 Oct 2024 but Trust planning documents show it being carried forward and scaled: the Trust's Green Plan describes INSPIRE as a key element of its inhaler strategy and includes an action to extend INSPIRE to 100% of Trust-controlled pharmacies and discharge points by 2027 (and reports over 16,800 inhalers collected).

c) Postal return model with specialist processing (including propellant recovery)

Take AIR (Leicestershire, Leicester and Rutland postal inhaler recycling pilot)

Take AIR was a postal inhaler recycling scheme piloted across Leicestershire, Leicester and Rutland, launched at the end of January 2021 as an initial 12-month programme with support from community pharmacy partners and University Hospitals of Leicester; it was later expanded (from October 2021) to include people discharged from UHL's hospitals. Patients collected pre-paid, pre-addressed envelopes from participating pharmacies and, in their own time, posted empty, unwanted or out-of-date inhalers of any brand or type directly to the waste management provider (Grundon Waste Management) via Royal Mail; each envelope held up to four inhalers, with guidance encouraging people to post when they had around three to four to maximise efficiency. At the recycling centre, inhalers were sorted, with pMDIs crushed to recover propellant gas for reuse (reported for uses such as refrigeration/air conditioning), plastics recycled where possible, and remaining non-recyclables routed to energy-from-waste. Reported outputs for the first 52 weeks (19 Feb 2021–18 Feb 2022) included around 20,050 inhalers returned in around 5,600 posted envelopes (an average of around 3.8 inhalers per envelope), equating to an estimated around 1.9% return rate against regional prescribing volumes, alongside a modelled carbon saving of around 119 tonnes CO_2e. The scheme ended in March 2023 and wasn't renewed, but Chiesi stated it would continue to process inhalers returned in the pre-paid envelopes already distributed during the pilot.

d) Behaviour-change/awareness intervention to increase returns for safe disposal (not a recycling/propellant-recovery scheme).

NHS Lothian community pharmacy "sticker prompt" initiative (Edinburgh area)

This was a behaviour-change pilot in community pharmacies across NHS Lothian, designed to increase the return of unwanted or expired inhalers to pharmacies for environmentally safe disposal through existing medicines waste routes. In February 2024, participating pharmacies completed a two-week baseline count of returned inhalers, then for around 10 weeks (late February to early May 2024) applied dispensing-bag stickers reading "Please return unwanted or expired inhalers to your pharmacy for environmentally safe disposal," before completing a two-week follow-up count in May 2024. Stickers were funded via NHS Lothian Charity, and the project aimed to test whether a simple prompt at the point of dispensing could shift disposal behaviour. Of seven pharmacies recruited, five submitted data: returns increased from 20 inhalers at baseline to 80 inhalers at follow-up, reported as a 300% increase, reinforcing the message that inhalers should be returned to pharmacies rather than placed in household waste or recycling. Details of the waste management provider were not available.

e) Hospital drop-off model with specialist processing

Hillingdon Hospitals (paediatric-led inhaler recycling initiative)

The Hillingdon Hospitals NHS Foundation Trust introduced a hospital-based inhaler recycling initiative as part of its Green Plan, led with direct clinical ownership from the paediatric respiratory team and delivered in partnership with the Trust's waste contractor Grundon. Collection points were set up using small, labelled tubs in key hospital locations (including A&E, paediatric ward and outpatient clinics), supported by a local awareness campaign (posters/presentations and named area leads); in paediatrics, children received stickers as an incentive, and community asthma nurses also engaged schools to gather expired inhalers. Filled tubs are emptied and stored in a waste compound until a larger collection is arranged through the clinical waste contractor; at the latest internal count shared (September), 162 inhalers had been sent for recycling, with the team noting that final figures were expected to increase and that, so far, reporting is limited to numbers and weight rather than a full recovery/treatment report. The Trust describes the scheme as recovering valuable materials and repurposing captured gases through its partnership model.

3.4 Status of schemes

Some of the schemes included in this review remain open and operational whilst others have closed or the pilot has been completed. A scheme-by-scheme status snapshot, based on the most recent sources available is provided below:

Open/ongoing (clearly active in public-facing sources, 2025–2026):

- South East London ICS inhaler return and recycling (SEL): ongoing/expanded beyond initial pilot phase; designed as an NHS-embedded model.
- Re-Hale: pilot completed; now expanded wider (Kent & Medway expansion).
- Hillingdon Hospitals: ongoing hospital scheme (no end date stated).
- INSPIRE (pilot phase ended Oct 2024; Trust documents suggest continued roll-out intentions).

Ended/closed:

- Swansea Bay/Upper Valleys: extended beyond planned 12 months but closed thereafter due to funding constraints.
- GSK Complete the Cycle: closed September 2020 due to inability to scale as a stand-alone scheme.
- NHS Lothian sticker intervention (ended after the planned Feb–May 2024 study window)
- Take AIR: ended/not renewed after extension.

Table 1 outlines the status of the schemes and the time periods they were operational if closed.

Table 1: Status of Scheme and Time period operational

Scheme	Status	Start date	End date	Total running time
Swansea Bay UHB/Upper Valleys Cluster inhaler recycling pilot	Closed	November 2022	It was planned as a 12-month pilot, but it did not end at 12 months—the report says it continued beyond the planned end date (because underspend "slippage" funding enabled additional activity) and it was still ongoing at the time of reporting (July 2024)	At least 20 months (about 1 year 8 months) by July 2024 — and longer thereafter because it hadn't ended at the time of reporting.
Re-Hale (East Kent inhaler recycling pilot)	Closed	November 2023	October 2024	The pilot year concluded Oct 2024; by 2025 the programme was continuing and expanding across Kent & Medway ICB (reported rollout beyond East Kent).
South East London ICS inhaler return and recycling (SEL ICB/ICS pilot)	Ongoing	February 2024	Present (at time of writing report January 2026)	Ongoing – at time of writing report has been active for 1 year and 11 months
GSK's Complete The Cycle	Closed	November 2011	September 2020	8 years and 10 months
Inspire	Ongoing	July 2023	Present (at time of writing report January 2026)	Ongoing – at time of writing report has been active for 2 years and 6 months
Take Air	Closed	January 2021	January 2023	2 years
NHS Lothian	Closed	February 2024	May 2024	10 weeks
Hillingdon Hospitals	Ongoing	May 2025	Present (at the time of writing report January 2026)	Ongoing – at time of writing report has been active for 8 months

Some schemes extended or continued beyond the original planned pilot duration:

- Swansea Bay/Upper Valleys Cluster: started Nov 2022, planned 12 months, continued beyond plan due to underspend, with additional collections noted (including Spring 2024).
- Take AIR: the postal scheme was extended by six months during its run (reported as being in response to positive feedback) but later ended and was not renewed.
- INSPIRE: the joint-working pilot ran Oct 2023–Oct 2024, but subsequent Trust communications and planning indicate continued intent to expand/maintain the approach.
- Re-Hale: the initial 12-month pilot completed (Nov 2023–Oct 2024), and the programme has since expanded beyond the pilot footprint (wider Kent and Medway coverage).

A pattern observed was that schemes were more likely to continue or scale when they could:

- Embed into existing NHS infrastructure (contracts, workflows, governance), rather than running as a stand-alone add-on. This is a defining feature of the SEL model, which is explicitly designed to be scalable and embedded as "business as usual".

- Use an existing operational route that avoids extra collections, reducing duplication, cost and travel emissions. The SEL approach integrates segregated pMDI collections into routine waste collections rather than adding new visits.

- Have "headroom" in funding/costs that enables an extension beyond the planned period. Swansea is the clearest example: it was planned for 12 months but continued beyond this because underspend ("slippage money") enabled additional activity and collections.

Where schemes ceased, the following themes and / or stated reasons were given:

- Scale and sustainability of a stand-alone model - The clearest documented "ceased because…" rationale is GSK Complete the Cycle, which closed because it could not reach the necessary scale as a bespoke, stand-alone scheme.

- Reliance on a manufacturer-led pilot (renewal decisions) - Take AIR is the clearest example: continuation depended on a manufacturer decision, and the scheme ended after the pilot/extension period was not renewed.

- Time-limited evaluation designs (ending is not "failure") - Some initiatives were explicitly designed as bounded interventions rather than ongoing services: NHS Lothian ran a baseline–intervention–follow-up design (Feb–May 2024) to test a prompt/sticker approach and ended when that study window concluded.

3.5 Inhaler return

Across the schemes reviewed, the reporting of inhalers returned varies with some schemes reporting the number of inhalers, others return rates and some both.

The overall volume of inhalers returned varies widely between schemes, reflecting differences in geography, duration, maturity, and delivery model (e.g., pharmacy drop-off versus postal returns, single-site versus system-wide pathways).
Generally, inhaler return/recycling schemes can achieve meaningful volumes, from tens of thousands in 12-month pilots to millions over multi-year national programmes but return rates are inconsistently available and should not be used as a single "league table" measure. Where rates are reported, they depend heavily on how schemes define the numerator (returned vs processed vs estimated) and the denominator (dispensed, prescribed, or other), and some schemes are not designed to calculate a return rate at all. The most defensible comparison, therefore, is to interpret return rates alongside the reported totals and time period, while recognising that several schemes are still building the data infrastructure needed for validated, comparable evaluation outputs.

Table 2 summarises the total number of inhalers reported as returned/recycled and the time period to

which those figures relate. In most cases, these totals come from operational monitoring (counts, weights, or contractor reports) rather than from a single standardised evaluation framework, so comparisons should be treated as indicative rather than definitive.

Table 2: Total number of inhalers reported as returned/recycled and the time period to which those figures relate

Scheme	Total number of inhalers recycled	Time period given	Return rate
Swansea Bay UHB/Upper Valleys Cluster inhaler recycling pilot	6800-8427 (estimated)	November 2022- June 2023 (6 months)	Approximately 23-28% of all inhalers prescribed in the cluster were returns
Re-Hale (East Kent inhaler recycling pilot)	41650	Nov 2023–Oct 2024	5.5%
South East London ICS inhaler return and recycling (SEL ICB/ICS pilot)	More than 18,000	February 2024 up to 8 October 2025	Unknown
GSK's Complete The Cycle	More than 2 million overall. 112,536	Nov 2011- Sept 2020 Phase 1; November 2011- March 2013 (1 year and 4 months)	10%
Inspire	16833	October 2023-October 2024	Unknown
Take Air	20,049	In a 12 month period (Pilot ran for two years)	1.9%
NHS Lothian	80	Before stickers (baseline, 2 weeks): 20 inhalers After stickers (post-intervention, 2 weeks): 80 inhalers	The report does not mention a calculated return rate—it only provides raw counts (20 inhalers before vs. 80 after the intervention) and notes a 300% increase.
Hillingdon Hospitals	162	May 2025-Nov 2025 (6 months)	Not given

Issues to highlight include:

- The wide spread in both the scale of activity (total inhalers recycled/returned) and the availability and comparability of return-rate figures across schemes.
    - At one end of the spectrum, the long-running manufacturer-led programme GSK Complete the Cycle reported more than 2 million inhalers recycled across its lifespan (Nov 2011–Sept 2020), with an earlier Phase 1 figure of 112,536 (Nov 2011–Mar 2013).
    - At the other end, several schemes show smaller totals that reflect either a shorter operating window, a narrower footprint, or limited availability of validated output data (e.g., Hillingdon Hospitals reported 162 inhalers over around six months; NHS Lothian reported a post-intervention count of 80 inhalers over a two-week follow-up period).
    - Among the current NHS-led pilots, totals sit in the mid-range but are still substantial for their operating periods. South East London ICS (SEL) reports more than 18,000 inhalers collected between February 2024 and 8 October 2025, while INSPIRE (Wolverhampton) reported 16,833 over its October 2023–October 2024 pilot window. Re-Hale reported 41,650 inhalers over its 12-month pilot period (Nov 2023–Oct 2024). Take AIR reported 20,049 returned within a 12-month period, noting that the wider pilot ran for two years.

- Return-rate figures are available for only some schemes, and where present they are not always derived in the same way.
    - Swansea Bay/Upper Valleys reports an estimated return rate of around 23–28% for the cluster, but the total returned is explicitly an estimate (6,800–8,427) and therefore carries

additional uncertainty.
  - Re-Hale reports a return rate of 5.5%, and Take AIR reports 1.9%, indicating lower capture relative to their denominators (which may reflect differences in scheme design, accessibility, intensity of promotion, and how "eligible" devices are defined and counted).
  - For Complete the Cycle, a 10% return rate for Phase 1 is reported, but later totals are presented without a comparable rate.
  - Several schemes (including SEL, INSPIRE, and Hillingdon) do not yet report a return rate in the table, typically because return-rate calculation depends on consistent denominators (e.g., dispensing data) and/or reconciliation with recycler processing cycles and evaluation outputs.

- Some schemes are not designed to produce a conventional "return rate" at all.
  - NHS Lothian is presented as a pre/post behaviour change intervention (baseline count vs follow-up count) and reports a 300% increase rather than a calculated return rate. This reinforces that not all activity in this space is strictly comparable on a single percentage metric, some interventions primarily test whether simple prompts increase safe returns, while others aim to establish system-wide recovery pathways and quantify environmental benefits.

- Return rates are the most challenging metric to compare because schemes use different denominators and, in some cases, different definitions of "returned" or "recycled". A small number of schemes report a return rate (or a proxy), but these figures should be interpreted with caution because:
  - Denominators differ. Some schemes calculate a "recoupment" style rate using pMDIs returned divided by pMDIs dispensed in the same period (and often at site level). Others report only changes in returns (e.g., pre/post interventions), or use population surveys about disposal behaviours rather than a dispensing-based denominator.
  - Numerator definitions vary. In some schemes, the reported total is the number of inhalers collected at sites; in others it is the number processed by a recycler; and in some cases it is an estimate from weight, not a count. These are not equivalent measures.
  - Scope is not always consistent. Several schemes accept multiple inhaler types but only recycle a subset (commonly pMDIs). If a denominator includes "all inhalers dispensed" but the numerator includes "pMDIs recycled", the calculated rate may understate capture (or misrepresent the scheme's true scope).
  - Timing misalignment can bias rates. Returns in a given month may reflect inhalers dispensed months earlier, stockpiled devices, or a clear-out of unused medicines (particularly where families return large quantities after a bereavement). Using a same-month dispensing denominator can therefore under- or over-estimate true "return propensity".
  - Participation and coverage change over time. Expansions in the number of sites, collection points, or communications activity can create step-changes in returns that are not directly related to underlying behaviour change.

- Missing or incomplete data is common. Several schemes highlight that detailed recovery data (and the final validated numbers for return-rate calculations) may only be available after contractor processing cycles and end-of-project reconciliation.

Further detail of above, the corresponding schemes and the return rate caveats can be found in Appendix 3.

3.6 What was recycled

Across the schemes reviewed, "what was recycled" was driven less by local ambition and more by what is technically and contractually feasible. In practice, most programmes focused on pressurised metered dose inhalers (pMDIs) because these contain propellant gas and an aluminium canister, creating both a strong environmental rationale and a clear recovery route. Where schemes accepted all inhaler types, they commonly still applied a split pathway: pMDIs to specialist recycling/recovery, and non-pMDIs (e.g., many dry powder inhalers) to standard medicines waste disposal routes.

Most common pattern: pMDI recovery plus materials recycling

The majority of the "recycling" schemes described specialist processing of pMDIs with three core outputs:

- Propellant gas capture/reuse (often described as being repurposed for cooling/refrigeration applications),
- Aluminium recycling from the canister, and
- Plastic recycling from device components where feasible.

This "propellant + aluminium + plastic" recovery model is described in the system-wide SEL pathway and supporting materials and is also reflected in the Swansea Bay pilot reporting and Re-Hale's processing description.

Split treatment when schemes accept more than pMDIs

Some schemes encouraged people to return any inhaler, but only a subset entered a true recycling/recovery route:

- SEL ICS explicitly operates a pMDI-only recycling pathway, while non-pMDI inhalers returned via participating sites are routed through usual medicines waste disposal.
- Take AIR accepted inhalers by post and then applied a mixed end-of-life approach, with pMDIs going through recovery steps (including propellant handling) and residual/non-recyclable fractions routed via energy-from-waste.
- Swansea Bay collected both MDIs and DPIs in the same return system, but the reporting emphasises recovery outputs (gas/metal/plastic) without providing a device-by-device breakdown, so it is best described as a scheme with mixed-device returns and specialist processing, without clear public data on the share of DPIs that were recycled.

Partial recycling models: recycling only selected components

Not all schemes recycled the full device. INSPIRE (Wolverhampton/Black Country) is the clearest example of a partial component recycling model, where the process focused on recovering plastic casings, while the canisters followed clinical/medicines waste routes and some returns were incinerated due to contamination.

"Safe disposal" interventions: increasing returns without a recycling route

A separate category of work aimed to improve appropriate returns for safe disposal, rather than create a specialist recycling stream. The NHS Lothian sticker intervention is best understood in these terms: it was designed to increase pharmacy returns, but it did not introduce a specialist recycling/recovery pathway or report recycling outputs.

What this means for interpreting "recycled" in the comparison

Across schemes, the word "recycling" can refer to quite different outcomes, from full pMDI recovery (gas + aluminium + plastics), to recycling only selected plastics, to improved return rates for compliant disposal. A consistent gap is that many schemes describe the intended recovery route clearly, but do not routinely publish quantified totals for gas recovered, aluminium/plastic recycled, or verified carbon impact; where those figures exist, they are often held for later evaluation or in contractor reports.

What was processed

Most of the UK schemes with specialist processing are designed to divert pressurised MDIs (pMDIs) into a route that recovers the HFA propellant (for reuse or safe treatment) and recycles aluminium canisters and selected plastics. Where schemes publish material outputs, Swansea Bay is the clearest example: from its first collection (covering inhalers returned over around 7.5 months), Grundon reported recovering 23.8 kg of gas, 93.2 kg of metal, and 58.9 kg of plastic, with the total number of inhalers returned estimated between 6,800 and 8,427 (modelled from weight and including both MDIs and DPIs placed in the bins).

By contrast, several other schemes report outcomes mainly as device counts and/or modelled carbon, without publishing gas/metal/plastic weights (and often without a clear device-type split). For example, Re-Hale reports 41,650 inhalers recycled (November 2023 to October 2024) and an estimated around 176 tonnes of CO_2 avoided, but does not routinely publish material tonnages. Take AIR reports an estimated around 119.3 tonnes of CO_2 emissions avoided, again without accompanying mass breakdowns of gas/metal/plastic. South East London has reported collecting around 18,000 MDIs to date (around 13,000 via community pharmacy and 5,000 via acute sites), but public-facing reporting is currently stronger on pathway design and participation than on published recovery tonnages. Finally, GSK's Complete the Cycle reported 112,536 inhalers returned by end of March 2013 with an estimated around 790 tonnes CO_2e saved, again using carbon metrics rather than published material tonnages.

3.7 Key themes emerging from the review

Theme 1: Barriers and facilitators

To make the comparison fair, the barriers and facilitators have been synthesised within scheme "types" (typologies), because different delivery models face different operational constraints. A summary of the various barriers and facilitators is provided in Table 3.

Table 3: Barriers and facilitators by type

Type/model of scheme	Barriers	Facilitators
Drop-off models with specialist processing (including propellant recovery)	• Regulatory and compliance complexity (front-loaded effort) • Secure storage and space constraints at return sites • Workforce capacity and competing priorities in pharmacies • Logistics and service performance dependencies (collections and feedback loops) • Behavioural barriers persist even when a recycling route exists • Scale/volume threshold problems	• Embedding into existing infrastructure (contracts, workflows, reverse logistics) • Convenience and fit with routine care • Strong governance and cross-stakeholder collaboration • Prompts and communications that sustain behaviour change • Visible cues and reinforcement in practice
Postal return model	• High regulatory/logistical burden for set-up • Operational fragility (materials and participation variability) • Awareness gaps still matter:	• Maximum convenience (especially for remote/vulnerable patients) • Lower burden on pharmacies than intensive drop-off models • Positive staff engagement when the system is simple
Behaviour-change/awareness intervention to increase returns for safe disposal	• Information governance/acceptability concerns • Implementation fidelity challenges • Attrition/incomplete participation	• Low complexity and easy adoption • Awareness-raising and conversation starter

Drop-off models with specialist processing (including propellant recovery)

Schemes included: Swansea Bay/Upper Valleys Cluster, Re-Hale, South East London ICB (SEL), GSK "Complete the Cycle"

Barriers - Drop-off models with specialist processing

- Regulatory and compliance complexity (front-loaded effort): These models frequently encounter challenges with waste classification, interpretation of legislation, and meeting administrative requirements such as Waste Transfer Notes and controlled-handling rules. This was particularly evident in the South East London scheme, which required extensive investigative work to clarify regulatory obligations, and in Re-Hale, which set out explicit compliance steps from the outset. Similar issues appeared in Swansea, where market scoping, licensing constraints and the wider complexities of the waste-management landscape were highlighted as early hurdles.

- Secure storage and space constraints at return sites: Re-Hale highlights secure storage requirements because inhalers are prescription-only medicines and must be stored with controlled access. Swansea and SEL also point to capacity/space pressures (including large bin

storage and workforce "headroom" to run the process consistently).

- Workforce capacity and competing priorities in pharmacies: Swansea notes workload capacity, competing priorities, and that funded work tends to get attention first (particularly relevant where no contractual incentive exists). SEL similarly frames delivery as requiring capacity/resilience and multi-domain coordination.

- Logistics and service performance dependencies (collections and feedback loops): Swansea describes issues like unclear collection schedules, slow turnaround, and limited quality/utility of retrospective metrics; Re-Hale flags logistical challenges (prompt collection, bin management, and follow-up where engagement is low). Across models, a limited provider market and reliance on specialist processors can reduce flexibility and leverage.

- Behavioural barriers persist even when a recycling route exists: Swansea and GSK both reflected with ongoing challenges with awareness, habit, and remembering to return inhalers; Swansea also notes reluctance to approach busy staff and uncertainty about "what parts" to recycle (driving preference for pharmacy-managed processes).

- Scale/volume threshold problems: GSK is explicit that the scheme struggled to reach the necessary scale as a stand-alone programme. Swansea also highlights how low volumes can delay collections and limit wider circular-economy ambitions.

Facilitators - Drop-off models with specialist processing

- Embedding into existing infrastructure (contracts, workflows, reverse logistics): This is a defining enabler in SEL (positioned as "business as usual") and Re-Hale (reverse logistics via existing wholesaler routes). GSK similarly emphasised using existing distribution infrastructure to avoid extra transport.

- Convenience and fit with routine care: A consistent facilitator is reducing friction by aligning returns with routine visits, strongly reflected in Swansea (returns feel simple during normal pharmacy trips) and GSK (drop-off during prescription collection). Where the process feels "normal" and easy, uptake is more feasible.

- Strong governance and cross-stakeholder collaboration: Re-Hale and SEL both emphasise structured implementation (clear roles, onboarding materials, formal documentation/toolkits, and active engagement). Swansea also points to the importance of a local champion and cluster engagement to get the model designed, tested, and adopted.

- Prompts and communications that sustain behaviour change: Re-Hale emphasises that one-off communications are insufficient and ongoing engagement is needed; Swansea highlights the value of opportunistic patient education plus visual cues; SEL explicitly links success to behavioural science and patient perspective.

- Visible cues and reinforcement in practice: Swansea notes that posters, prompts, praising returners, and "social proof" (seeing others participate) strengthen delivery and normalise returns.

Postal return model

Schemes included: Take AIR

Barriers - Postal return model

- High regulatory/logistical burden for set-up: Postal models introduce additional regulatory interfaces (medicines legislation, waste regulations, carriage rules), creating complex planning and approvals.
- Operational fragility (materials and participation variability): Take AIR notes practical issues like envelope supply/ordering problems, envelope capacity limits, and variable engagement across pharmacies, made harder during pandemic pressures.
- Awareness gaps still matter: Even with the convenience of post, the worksheet reflects limited awareness among both healthcare professionals and patients about proper disposal routes.

Facilitators - Postal return model

- Maximum convenience (especially for remote/vulnerable patients): Postal return is explicitly positioned as suitable for patients who are isolated or less able to travel.
- Lower burden on pharmacies than intensive drop-off models: The worksheet reflects that the scheme can have a relatively low time footprint in pharmacies when well supported with clear packs and instructions.
- Positive staff engagement when the system is simple: Where materials are clear and the process is straightforward; staff are more likely to raise it proactively with patients.

Behaviour-change/awareness intervention to increase returns for safe disposal

Schemes included: Scotland (sticker intervention in community pharmacies).

Barriers – behaviour change/awareness interventions

- Information governance/acceptability concerns: The worksheet notes a confidentiality concern where an external sticker might reveal dispensing contents.
- Implementation fidelity challenges: Sticker visibility mattered (black-and-white stickers not noticeable on similar-coloured bags), plus extra workload for applying stickers and counting returns without funding.
- Attrition/incomplete participation: Some pharmacies dropped out or did not complete counts, common for low-resource, add-on interventions.

Facilitators – behaviour change/awareness interventions

- Low complexity and easy adoption: Stickers are simple and require minimal system change

compared with full recycling pathways.

- Awareness-raising and conversation starter: The intervention helped prompt patient and staff conversations about safe disposal and environmental impact.

For a small number of schemes, the available sources did not provide enough detail to describe barriers and facilitators in a consistent way. In particular, INSPIRE (Wolverhampton) and the Hillingdon Hospitals initiative have limited published implementation learning, so they are referenced elsewhere in the report but are not included in the thematic barriers/facilitators synthesis.

Theme 2: Patient awareness

Across the schemes that reported patient-awareness findings, a consistent message is that baseline awareness of "return to pharmacy/recycle" is low, but willingness to participate is high once people are told what to do and why. For example, Swansea's baseline survey found most respondents were not aware that returning inhalers could reduce environmental impact, yet almost all said they would be willing to return inhalers, and only a small minority reported already doing so; qualitative feedback also highlighted that people often receive limited information and may be reluctant to approach busy pharmacy staff.

Schemes that appeared to build awareness most actively used multi-channel prompts rather than relying on passive messaging alone. Re-Hale combined direct patient messaging (including text outreach) with social media and an online map of locations, while South East London used a public-facing website, posters, and a short survey to reinforce core messages (do not put inhalers in household waste; "empty" inhalers may still contain greenhouse gases; where and what to return). Take AIR similarly suggests that awareness was low before the scheme, but willingness increased after hearing about it. Earlier models (for example GSK's Complete the Cycle) also treated awareness as an active issue, using public survey work and clear poster messaging to address disposal habits.

Theme 3: Replicating and scaling up

Across the landscape of inhaler return/recycling schemes, only a small number go beyond describing what they did and provide practical assets that another system can lift and adapt. In this review, South East London (SEL), Take AIR, and Re-Hale stand out because they each publish "implementation-ready" resources (e.g., comms packs, operational steps, templates/checklists), alongside a clearly described service model that can be reproduced elsewhere. Taking these three schemes as the better examples of scaling up, they are not, however, without their limitations that are detailed below.

Elements common to resources that genuinely enable replication and scaling up

- A clear, transferable operating model (process steps, roles, workflow, and interfaces with existing medicines returns/waste routes).

- Governance and regulatory considerations (who holds duty of care, waste classification/handling requirements, and any transport constraints).

- A communications and engagement pack (materials for pharmacies, patients and wider

stakeholders that can be locally branded).
- An evaluation approach and minimum dataset (so new areas can evidence activity and impact consistently).

Cross-cutting limitations (apply to all three schemes)

- Transferability vs local reality: Toolkits tend to reflect how it worked in one place, with specific partners, waste routes, estates constraints, and relationships. Replication usually means adapting rather than copying, especially around governance, site footprint, collection frequency, and communications channels.

- Regulatory and duty-of-care complexity: Even well-described models can understate how much local effort is needed to get clarity on waste classification, ownership, duty of care, and documentation, plus agreement on who holds liabilities through the chain. Take AIR explicitly flags these as key considerations for implementation.

- Operational workload and sustainability: Schemes can be deceptively "simple" on paper but require ongoing: staff time, training, storage space, collections coordination, troubleshooting, and comms refresh. Without a funded operating model, uptake often depends on goodwill (which is fragile).

- Data and evaluation aren't automatic: Toolkits may provide templates, but consistent data capture (device mix, weights/tonnages, end-destination, CO_2 methodology) is hard to embed without clear ownership and reporting expectations.

- Equity and access: Drop-off vs postal vs mixed models will perform differently across rurality, deprivation, mobility, language, and digital access. If a scheme offers only one main way for people to return inhalers (the "default channel"), some groups will find that route much easier than others, so uptake can become uneven, and existing inequalities in access/participation can get worse.

Details and features of each of the three schemes that supports and enables replication and scaling up are provided below:

Take AIR: a structured replication toolkit

Take AIR provides one of the most explicit "design for spread" toolkits. It is framed to help NHS organisations independently set up local recycling schemes, drawing on learning from the Leicestershire, Leicester and Rutland pilot, and is structured around: why recycling matters; pilot insights and methods; guidance for local replication/implementation; evaluation overview; and supporting templates for local adaptation.

Key features that support scale-up include:

- Stepwise implementation guidance, supported by practical improvement tools (e.g., a driver diagram) to help areas plan delivery and adapt to local context.
- Regulatory "known issues" made explicit including medicines legislation, waste legislation, and

mail carriage constraints, so new implementers can anticipate approvals, duty of care questions, and transport requirements (e.g., avoiding air transit).
- Defined process mechanics (e.g., pre-paid, pre-addressed envelopes obtained via community pharmacy; patients returning inhalers by post; and practical constraints such as envelope capacity).
- Ready-to-adapt materials (e.g., project charter, pharmacy letters, HCP checklist, posters, stickers, patient leaflet), with explicit cues on what should be localised—helping areas launch quickly without designing everything from scratch.
- An embedded evaluation component, combining qualitative feedback (pharmacy/patient) with quantitative monitoring and satisfaction metrics - useful both for improvement and for building a scalable evidence base.
- Overall, Take AIR demonstrates what a "replication pack" can look like when it covers operations, governance, communications and evaluation in one place.

South East London (SEL): "Embedding inhaler recycling into the NHS" as a deployment pack

SEL's contribution is closest to a implementation-ready resource pack, available as a zip file online[8]. Rather than only describing a collection scheme, it lays out the components needed to embed inhaler returns as routine NHS business (across community pharmacy and acute sites), and it backs that up with practical appendices/templates (e.g., pathway documents, SOPs, service specification, MoU, comms assets, and a monthly data sheet).

What makes this valuable for replication and scale is that it reduces the "design burden" on a new system. A replicating site can use tools and documents including:

- a pathway for end-to-end flows (patient → site → storage → collection → onward handling),
- an acute-site SOP for safe handling and internal responsibilities,
- an agreement framework (e.g., MoU/service specification) to clarify roles, liabilities and operational expectations, and
- ready-to-use comms materials (launch toolkits, posters, social assets) to drive uptake and consistency.

Why it scales well:

- Standardisation and adaptability: the materials are inherently portable (most systems need the same core structure: pathway, SOP, comms, data), but can be locally branded or slotted into existing waste/medicines processes.
- Commissioning-ready components: having a service specification/MoU-type pack supports scale because it converts a "nice-to-have initiative" into something that can be commissioned, governed and performance-managed.
- Operational realism: inclusion of acute-site support materials, go-live comms, and data collection implies SEL is tackling the real blockers to spread (training, responsibilities, storage arrangements, collection cadence, reporting).
- What a replicating system still needs to lock down: waste contractor arrangements, internal ownership (who holds the operational lead), and local decisions on data standards (minimum

[8] Silver award winner - Embedding Inhaler Recycling into the NHS (2025) – membership required

dataset, reporting frequency, whether to publish mass flows vs carbon metrics), plus resourcing for comms and onboarding.

Re-Hale: a replication guide grounded in a real-world collaborative project

Re-Hale's strength is that it functions as a replication-oriented recommendations guide, explicitly framed for NHS organisations that want to design and implement a local/regional scheme based on the East Kent experience (delivered as a collaborative working project). That orientation matters: it shifts the document from "project report" to implementation guidance, which is exactly what adopters need when scaling.

Where Re-Hale adds value for replication is typically in three ways:

- A replicable service model (not just a description of activities) - The materials support translating the scheme into a set of defined building blocks (collection points; secure storage; contracted collections; onward processing; communications; and monitoring). That helps other systems rapidly decide: what is the minimum viable model we can run safely, then expand?

- Clear recommendations shaped by delivery realities - A "recommendations guide" is especially useful for spread because it tends to surface the things pilots learn the hard way: what took time, what needed governance sign-off, where process friction occurred (e.g., storage arrangements, site engagement, contractor interface), and what levers improved uptake (public-facing comms, staff prompts, agreed scripts).

- A bridge between operational delivery and decision-making - Re-Hale sits well as a tool for people who need to make scale decisions: it can support business case development, partner conversations, and policy/service design recommendations (e.g., how to standardise collection routes, how to report outcomes, and what "good" looks like).

Why it scales well:

- NHS-facing framing: explicitly written for NHS replication, not just as a case study.
- Transferable "lessons learned": these are often the difference between a scheme that works in one place and one that can spread across multiple settings.
- Design guidance (not just comms assets): many schemes have posters; fewer have a structured "how to set up" narrative that decision-makers can use to implement consistently.

What a replicating system still needs to put in place: local governance ownership, contracting and commercial arrangements, and the local reporting approach (mass, CO_2e, device mix, cost per inhaler, etc.).

4. Conclusions

This review compared inhaler return, recycling and recovery schemes across the UK to understand what works, what does not, and what a sustainable model could look like for Wales. The schemes varied in scope, maturity and ambition, but together they offer a clear set of insights. Most successful models were those embedded into existing NHS systems. These used established waste contracts, medicines workflows and operational governance. Schemes also worked best when they were simple for patients and staff, used a clear split between pMDIs and other inhalers, and treated behaviour change as an essential part of delivery rather than an optional extra.

Across the schemes, three ideas consistently emerged. First, pMDIs require specialist processing because of their propellant content. This means segregated collection is necessary if Wales wants to achieve measurable environmental benefit. Second, public awareness of appropriate inhaler disposal is low, but willingness to participate is high when instructions are clear and visible. Third, schemes need to be designed so they do not add unrealistic workload or storage burdens to community pharmacies or NHS sites. These points together indicate that an NHS-embedded model offers the best balance of feasibility, reach and environmental impact.

What a future Welsh model should look like

A sustainable, scalable inhaler-disposal pathway for Wales should:

- Be NHS-embedded, using existing waste contracts and workflows.
- Focus on segregated pMDI collection for propellant recovery.
- Accept all inhalers but provide clear split-pathway messaging.
- Prioritise behaviour change through ongoing, visible prompts.
- Minimise operational burden for pharmacy and NHS staff.
- Collect and report data using a nationally agreed minimum dataset, supported by a consistent monitoring and evaluation framework.
- Apply consistent governance and commissioning standards.
- Offer flexible access routes that do not widen inequalities.
- Be supported by long-term funding and national coordination.

This provides a clear, evidence-based foundation for policy development and service design in Wales.

Core components for a scalable service model

One of the objectives of the project was to identify core components for a scalable service model.

A. Governance and commissioning

- Named system lead and multi-partner working group (medicines optimisation, waste, sustainability, providers).
- Written agreements setting roles/responsibilities (service specification, SOPs, data-sharing approach where required).
- Clear duty of care and waste classification guidance; This is where many schemes struggled during implementation.
- Funding model or commissioning mechanism (E.g., whether this sits in a sustainability budget,

medicines optimisation, or a shared resource.)

B. Clear scope and pathway design
- Defined in-scope devices (at minimum: pMDIs for recovery), and an explicit route for non-pMDIs (safe disposal via medicines waste).
- Standard "decision point" process at return sites (separate pMDI vs non-pMDI).
- Simple clinical messaging for prescribers. (Not about switching, but ensuring clinical teams know how disposal aligns with the inhaler strategy.)

C. Return sites and collection infrastructure
- Accessible return points (community pharmacies as default; add NHS sites where appropriate).
- Segregated containers with clear labelling and safe storage arrangements.
- Equity/access consideration. (E.g., rural areas, low-mobility groups, or areas with few pharmacies.)

D. Logistics and processing
- A defined logistics chain that minimises additional journeys (ideally integrated into existing collection routes).
- Specialist processing capability for propellant handling and component recovery, plus clear description of end-of-life routes (recycling, energy-from-waste, incineration).
- Contingency planning and service resilience; given the UK's reliance on a small number of specialist processors.

E. Communications and workforce enablement
- A consistent communications pack (public-facing messages and staff prompts) that is refreshed over time.
- Practical training and quick guides for pharmacy/NHS-site teams.
- Behavioural-science testing of messaging.

F. Data and evaluation (built in from day one)
- Standard monthly reporting template and clear definitions (what counts as "collected" vs "processed").
- Denominator approach for return rates (where used) and agreed method for estimating CO_2e impacts.
- Plan for validation using waste contractor outputs where available.
- Requirement for transparent reporting of end-of-life outcomes (e.g., % recycled vs EfW vs incinerated) to avoid overstated environmental benefit and improve public trust.

Caveats and limitations

This review is based on a rapid evidence-gathering approach, combining published evaluations, grey literature and publicly available operational data. It was carried out using the best available evidence. Some schemes reported high-level summaries rather than full evaluation findings, and several did not provide validated returns, material-recovery data or consistent denominators for return-rate calculations. In some cases, inhaler totals were estimates rather than counts. As a result, direct numerical comparison between schemes is not always possible, and return rates should not be treated as a league table or definitive measure of performance.

The evidence does allow us to identify common design features, barriers and enablers. It cannot determine the exact carbon benefit of any scheme without full datasets from waste processors, nor can it determine the precise cost-effectiveness of different models. Behaviour-change outcomes are also context-specific, and may differ in Wales depending on local engagement, pharmacy capacity and population needs.

Returning to the wider context

Inhaler disposal matters because pMDIs remain a significant contributor to NHS carbon emissions. Until prescribing shifts away from propellant-based devices where clinically appropriate, improved end-of-life management is one of the most immediate ways to reduce environmental impact. This review shows that practical, scalable routes already exist within the NHS, and that other regions have demonstrated that system-wide schemes can be delivered safely, at scale and with measurable outcomes.

For Wales, this evidence means inhaler disposal can move beyond small pilots and towards a consistent national model aligned with broader sustainability commitments. Current policy developments across the NHS emphasise the need for low-carbon care pathways, circular-economy thinking and reduced reliance on incineration. The findings here suggest that Wales can align with these ambitions by focusing on segregated pMDI recovery, NHS-embedded logistics, and consistent behaviour-change activity.

The main message is that sustainable inhaler disposal is achievable, but only when designed around real-world operational constraints. The strongest schemes are simple for patients, realistic for staff and aligned with existing NHS systems. Wales now has the evidence needed to make informed decisions about how to implement a scalable, high-credibility model. A national, standardised approach, with clear device scope, segregated pMDI collection, strong behavioural prompts and a minimum dataset, offers the most practical and environmentally robust path forward.

5. Recommendations for service design and policy for sustainable inhaler disposal

Recommendation 1: Adopt an NHS-embedded delivery model as the default approach

Schemes that integrate into existing NHS waste, medicines, and logistics contracts (e.g., SEL, Re-Hale) are more scalable, resilient, and cost-effective than stand-alone models. Stand-alone schemes (e.g., Complete the Cycle, Take AIR after funding lapsed) struggle to sustain scale or secure long-term continuation.

What this means for Wales:

- Build pathways that run through current NHS waste contracts, pharmacy workflows, and established governance structures.
- Avoid creating new collection routes where existing ones can be adapted.
- Ensure inhaler disposal becomes business-as-usual, not a pilot dependent on short-term goodwill or external partners.

Recommendation 2: Be explicit about device scope and apply a split-pathway model

Most recycling and propellant-recovery capability exists for pMDIs. Non-pMDIs (many DPIs/SMIs) often cannot be recycled and require safe disposal. Lack of clarity leads to operational inconsistency, staff confusion, and incorrect public messaging.

Recommended policy position:

- pMDIs: Segregated collection for specialist processing (propellant recovery and materials recycling).
- Non-pMDIs: Standard medicines waste disposal unless future recycling routes develop.
- Public messaging: “Return all inhalers, but recycling applies mostly to pMDIs.”

Recommendation 3: Prioritise segregated pMDI collection where propellant recovery is an objective

To prevent release of greenhouse gases, pMDIs must be kept separate from mixed medicines waste and handled via specialist contractors. Schemes without segregation (e.g., behaviour-change only models) cannot credibly demonstrate environmental benefit.

Actions:

- Provide clear, labelled pMDI-only bins/drums.
- Ensure secure storage aligned with medicines legislation.
- Establish safe internal workflows in pharmacies and NHS sites.

Recommendation 4: Treat behaviour change as a core pillar, not an add-on

Across schemes, baseline awareness is low but willingness to participate is high once people understand what to do. Behaviour change is essential to delivering meaningful volumes.

Core components:

- Highly visible prompts (posters, stickers, bag labels, digital messaging).
- Staff scripts and cues that fit within normal conversations.
- Refresh campaigns at intervals; one-off messages do not maintain engagement.
- Use behavioural insight principles: simplicity, social proof, timely prompts.

Recommendation 5: Reduce burden on pharmacy and NHS site staff

Workforce capacity and competing priorities were consistent barriers. The simplest, lowest-burden models (SEL, Re-Hale) achieved sustained uptake.

Implementation requirements:

- Provide clear SOPs, decision trees, and quick-reference guides.
- Use containers that are easy to manage within limited space.
- Align collections with existing waste-contract schedules.
- Avoid models that require staff to dismantle devices unless necessary for safety.

Recommendation 6: Standardise monitoring and require a minimum auditable dataset.

Schemes report inconsistent outcome metrics, making comparison difficult and reducing confidence in environmental claims. Policy decisions need comparable, transparent data.

Minimum dataset should include:

- Number of inhalers collected vs processed (clear definitions).
- Split by device type (pMDI, DPI, SMI).
- Material outputs (gas, aluminium, plastics) where available from contractors.
- Return-rate methodology (aligned to national definitions).
- Contamination rates/rejected tonnage.
- CO_2e calculation method and underlying assumptions.
- Site participation and coverage.

Policy recommendation:

- Mandate these indicators in any commissioned service specification.

Recommendation 7: Create a commissioning-ready national model for Wales

Schemes are easier to adopt when a clear blueprint exists. SEL, Re-Hale and Take AIR all demonstrated that replication materials accelerate operational readiness.

Components of a Welsh national model:

- A national pathway for how inhalers flow from patient → site → storage → collection → processing.
- National SOPs for community pharmacy and NHS sites (including acute settings).
- Governance pack: service specification, MoU, duty-of-care guidance, waste-classification advice.
- Communications toolkit: posters, social assets, consistent public messaging.
- Evaluation pack: standard templates, reporting definitions, minimum dataset.

Recommendation 8: Plan for equity and access in return pathways

Different models perform differently across rurality, deprivation, mobility and language needs. Postal schemes maximise access but carry regulatory complexity and cost; drop-off models may disadvantage people who seldom attend pharmacies.

Actions:

- Ensure multiple return routes where feasible (e.g., pharmacy and hospital outpatient clinics).
- Provide materials in multiple languages.
- Consider targeted support in areas with lower pharmacy density or higher mobility barriers.
- Use patient insight data to inform local tailoring.

Recommendation 9: Build in sustainability from the start, including long term funding.

Many schemes ended because they relied on short-term funding or industry provision. Long-term viability requires predictable commissioning and cost-sharing.

Policy options:

- Embed inhaler disposal within broader medicines optimisation or sustainability budgets.
- Explore system-wide commissioning rather than isolated pilots.
- UK wide: Work with multiple Health Boards in Wales, Integrated Care Boards in England, Health and Social Care Partnerships in Scotland, and Health and Social Care Trusts in Northern Ireland to set consistent expectations for waste-management contractors and strengthen negotiating power.

Recommendation 10: Support market development for specialist processing within the UK

The UK currently relies on a small number of specialist processors. Limited market capacity creates fragility, cost pressures, and dependency.

Actions:

- Engage with waste-processing providers to understand capacity and future needs.
- Explore opportunities for national frameworks to improve affordability and consistency.
- Support innovation in recycling routes for DPIs and mixed plastics where feasible.

Appendix 1: Definitions

Inhaler types

- **pMDI (pressurised metered dose inhaler):** An inhaler that uses a propellant gas to deliver medicine as an aerosol. pMDIs are a key focus for environmental action because the propellant can have a high global warming potential.
- **DPI/SMI (dry powder inhaler/soft mist inhaler):** Inhalers that do not rely on a propellant gas. They may still generate plastic/metal waste, but the climate impact profile differs from pMDIs.

Return pathways and end-of-life routes

- **Return (to pharmacy/clinical setting):** Any process where a patient brings used or unwanted inhalers back to a designated point (e.g., community pharmacy, GP practice, hospital clinic). Returned inhalers may then be routed to different disposal or recovery processes.
- **Safe disposal:** Disposal in line with medicines waste requirements (typically via the clinical waste stream) to prevent inappropriate disposal (e.g., household waste, littering) and reduce risk from residual medicines/pressurised canisters. Safe disposal does not necessarily involve recycling or material recovery.
- **Segregated collection:** A collection approach where inhalers are kept separate from other medicines waste (e.g., via dedicated bins, drums, or envelopes) to enable onward sorting, recycling and/or propellant recovery.

Recycling and recovery terms

- **Recycling (materials recycling):** Processing that recovers materials (e.g., aluminium, plastics) for reuse in new products. Depending on the scheme and contractor, not all components may be recyclable.
- **Component recovery:** A broader term covering dismantling and separation of parts so that multiple outputs are recovered (e.g., metals recycled, plastics recycled where possible, residuals routed to energy-from-waste). Component recovery may include propellant capture where available.
- **Propellant capture/propellant recovery:** Extraction of residual propellant from returned pMDIs to prevent release to the atmosphere. In some schemes this recovered propellant is purified for reuse (e.g., the captured propellant can be purified and reused as a raw material for other industrial uses). This is distinct from incinerating the device.
- **Energy-from-waste (EfW):** Treatment in which non-recyclable fractions are incinerated in a controlled facility that generates energy. EfW may be used for components that cannot be recycled (commonly some mixed plastics or certain device types). EfW is not the same as recycling but may be preferable to landfill for some waste streams.
- **Incineration (clinical waste):** High-temperature destruction of waste, typically in the clinical waste stream. Depending on the facility and process, there may or may not be energy recovery. Incineration ensures safe destruction but does not aim to recover materials.

Scheme descriptors used in this report

- **Drop-off model:** A scheme where patients return inhalers to physical sites (e.g., pharmacies, GP practices, hospitals) using bins or drums, with onward collection arranged by the scheme.
- **Postal model:** A scheme where patients return inhalers using a mail-back system (e.g., pre-paid envelopes) rather than attending a dedicated drop-off point.
- **Behaviour-change model:** A scheme primarily designed to increase appropriate returns or reduce inappropriate disposal (e.g., prompts such as bag stickers or staff advice). These schemes may not include a dedicated recycling/recovery route.

Appendix 2: Details of schemes reviewed

Table 4: Geographical area, typology, return site, device scope and pathway/end of life processing

Name of Scheme or 'other'	Geography	Type of Scheme (Typology)	Return sites	The device scope	The processing/ end of life pathway	Waste contractor
Swansea Bay UHB/Upper Valleys Cluster inhaler recycling pilot	Upper Valleys Cluster	Drop-off with specialist processing (materials + propellant recovery reported))	Participating community pharmacies in the Upper Valleys Cluster	MDI and DPI inhalers	Stored in UN-approved drums; collected for recycling of plastic and metal; residual gases processed and reused in refrigeration	Grundon Waste Management & Recycling
Re-Hale (East Kent inhaler recycling pilot)	East Kent pilot; developed with NHS Kent & Medway and partners.	Drop-off with specialist processing (materials + propellant recovery reported)	Participating community pharmacies and dispensing GP practices and hospital pharmacies	All brands and all inhaler types accepted	• Propellant gas capture for reuse in refrigeration/AC, • Aluminium recovered and recycled, • Plastics processed (pelletised) for recycling, • Any non-recyclables incinerated with energy recovery.	Grundon Waste Management & Recycling
South East London ICS inhaler return and recycling (SEL ICB/ICS pilot)	Participating pharmacies and hospitals in south east London, i.e., SEL ICS' six boroughs: Bexley, Bromley, Greenwich, Lambeth, Lewisham, Southwark. A map of sites hosted on the SEL page.	Drop-off with specialist processing (materials + propellant recovery reported)	Participating community pharmacies and participating NHS sites (acute/mental health).	Pressurised metered dose inhalers (pMDIs)	Segregated pMDIs sent to Grundon specialist facilities for very high component recovery (including residual HFA gas, aluminium, plastic).	Grundon Waste Management & Recycling
GSK's Complete The Cycle	UK wide network	Drop-off (pharmacy-led) with specialist recycling/recovery	Community pharmacy return points (used by NHS sites in some areas).	Covered inhalers from other manufacturers as well as GSK; described by NHS sites as covering "all inhaler devices".	Specialist recycling/recovery model; publicly available technical detail is limited, but widely reported as a recycling/recovery scheme	Grundon Waste Management & Recycling
Inspire	Black Country/Wolverhampton	Drop-off with partial recovery (plastic recycled; canister incinerated)	Participating community pharmacies in Wolverhampton and New Cross and Cannock Chase Hospitals.	Specifically described as pMDIs in local governance documents.	Hard plastic components recycled; canister incinerated (and some inhalers fully incinerated if contaminated)	Recycle UK (recycling contractor for the Trust)

Name of Scheme or 'other'	Geography	Type of Scheme (Typology)	Return sites	The device scope	The processing/ end of life pathway	Waste contractor
Take Air	Leicester, Leicestershire & Rutland	Postal return model with specialist processing	Patients post inhalers using pre-paid envelopes supplied via participating sites (community pharmacies and hospitals involved).	All inhalers accepted in the pilot.	Returned inhalers sent for specialist processing; evaluation reports high recovery of components and safe handling of residual propellant as part of the scheme's model.	Grundon Waste Management & Recycling
NHS Lothian	NHS Lothian (5 pharmacies in/around Edinburgh for the intervention period)	Behaviour-change prompt to increase standard returns (not a specialist recycling pathway)	Normal return-to-pharmacy route; intervention delivered via dispensing-bag stickers in participating pharmacies.	Inhalers (scope not restricted in the intervention description).	Returned for safe disposal via pharmacy medicines-waste pathway (commonly incineration that destroys residual gases; no component recovery reported as part of this intervention).	No information available
Hillingdon Hospitals	Hillingdon Hospital (with outreach via local schools mentioned).	Hospital collection points with specialist processing (propellant recovery)	Blue recycling bins in Children's A&E, Bumblebee Ward, and outpatients; school collections supported by community asthma nurses.	Type with a gas cannister, not the powder version (i.e., pMDIs).	Partnership with Grundon to recover materials and repurpose captured gases.	Grundon Waste Management & Recycling

Appendix 3: Return rate caveats for the schemes reviewed

Table 5: Caveats regarding return rates of the various schemes

Return-rate caveat	Schemes
Denominators differ	Schemes using different "denominators" (or none at all): • SEL ICS (uses a dispensing-linked denominator in its interim "recoupment" approach: returned pMDIs vs pMDIs dispensed that month). • INSPIRE (reports change in returns in a small sub-sample and survey-based behaviour change, not a dispensing denominator). • NHS Lothian (pre/post counts only; no dispensing denominator). • Re-Hale, Swansea Bay, Take AIR, Hillingdon, Complete the Cycle (in what we've used, they mainly report totals returned/processed rather than a consistent dispensing-based rate).
Numerator definitions vary	Schemes where the "returned" number means different things: • Swansea Bay (estimated from weight, not counted inhalers). • SEL ICS (counts "collected" MDIs through the pathway; contractor processing cycles may lag behind collection). • INSPIRE (reports returns, but a portion is incinerated due to contamination; "returned" and "recycled" may not mean the same). • Hillingdon (internal counts/weights only at present; not a full recovery report). • Re-Hale/Take AIR/Complete the Cycle (figures are typically framed as "returned" or "recycled" totals, but not always clear whether these are collected vs processed at the point reported).
Scope is not always consistent	Schemes where the numerator/denominator (or the public messaging vs processing route) can be misaligned because not all inhaler types are recyclable: • SEL ICS (recycling route is pMDI-focused; other inhalers go via medicines waste). • Hillingdon (explicitly pMDI-type "gas canister" inhalers, not powder). • Swansea Bay (reports returns including MDIs and DPIs, but processing detail isn't device-by-device). • Take AIR (accepts all inhalers but applies different end-of-life routes by type). • INSPIRE (component-focused approach with contamination/incineration pathway; not all returns end up "recycled"). • Complete the Cycle/Re-Hale (accept broad returns in practice, but the recycling/recovery pathway is most clearly defined for pMDI-type devices).
Timing misalignment can bias rates	Schemes where returns in a given month (or period) may not match the dispensing period used for the denominator, or where stockpiling/clear-outs can distort rates: • SEL ICS (monthly return reporting vs same-month dispensing is particularly vulnerable to timing mismatch). • Re-Hale (explicit examples of stockpiled unused inhalers being returned). • Complete the Cycle (long-running scheme where returns likely reflect older dispensing and stockpiling). • Swansea Bay (returns collected in cycles; people may store inhalers and return later). • Take AIR (postal model encourages accumulation before sending). • INSPIRE/Hillingdon (also likely, but less explicitly quantified in what we've used).
Participation and coverage change over time	Schemes where scaling up/down makes return numbers/rates hard to compare across time windows: • SEL ICS (expanded from initial live site(s) to system-wide sites; site mix changes the denominator and numerator). • Re-Hale (expanded beyond the East Kent pilot footprint). • Swansea Bay (extended beyond planned timeframe and had multiple collection cycles). • Complete the Cycle (expanded nationally over time, then closed).

	• INSPIRE (pilot ended, but continuation/scale-up intentions are described). • Take AIR (pilot extended mid-run). • Hillingdon (counts expected to increase over time as scheme matures).
Missing or incomplete data is common	Schemes where we don't (yet) have a complete, validated "return rate + environmental outputs" dataset: • Swansea Bay (no direct counts; relies on estimation; limited recovery outputs published). • SEL ICS (return-rate calculation and environmental outputs are still being finalised/validated for the formal evaluation) • Hillingdon (numbers/weight only so far; not a full recovery/treatment report yet). • Complete the Cycle (headline totals exist, but no accessible full evaluation with methods, rates, and material recovery breakdown). • INSPIRE (good project totals, but not a dispensing-based return-rate dataset across all sites). • Re-Hale (strong totals, but a consistent dispensing-based return-rate method isn't published in what we've used). • NHS Lothian (good for pre/post disposal behaviour, but not designed to produce recycling recovery metrics). • Take AIR is the exception — it has the strongest published evaluation detail among the schemes, so fewer "unknowns" (though it still won't perfectly match how SEL defines "recoupment").

Appendix 4: Evidence Map

Name of Scheme	Resources identified and used for review
Swansea Bay UHB/Upper Valleys Cluster inhaler recycling pilot	Wooldridge, A. & Evans, S. (2024) *Upper Valleys Cluster and Swansea Bay University Health Board Inhaler Recycling Scheme Pilot: End of project report.* Public Health Wales, Primary Care Division Seage, C.H., Caffoor, A., Harrop, A., Wooldridge, A., Thomas, H., Evans, S., Brown, S. and James, D.H. (2025) *Behavioural insights about barriers and facilitators to returning inhalers to the community pharmacy in Wales for safe disposal: patient and community pharmacy perspectives*. International Journal of Pharmacy Practice, 33(4), pp. 393–400. https://doi.org/10.1093/ijpp/riaf037 Swansea Bay leads the way with inhaler recycling project - Swansea Bay University Health Board UK-wide inhaler recycling scheme launched in push to reduce NHS emissions - Hospital Times
Re-Hale (East Kent inhaler recycling pilot)	https://rehale.co.uk/ https://www.chiesi.uk.com/collaboration/our-projects/re-hale https://cipppa.org/re-hale-inhaler-recycling/ East Kent Hospitals University NHS Foundation Trust (2024) Re-Hale project allows patients to recycle inhalers. 8 January. Burns, C. (2024) *More than 20,000 inhalers returned since November 2023 through recycling pilot.* The Pharmaceutical Journal, 29 July. NHS Kent and Medway Integrated Care Board (2024) *How we recycled over 20,000 inhalers so far in East Kent.* The Pharmaceutical Journal, 29 July. Chiesi and NHS Kent & Medway (April 2025)Re-Hale Report and Recommendations https://www.alliance-healthcare.co.uk/re-hale
South East London ICS inhaler return and recycling (SEL ICB/ICS pilot)	South East London Integrated Care System (2024) *New inhaler recycling project launched to combat climate change in South East London*. 8 July South East London Integrated Care System (n.d.) *Inhaler return and recycling.* Lambeth Climate Partnership (n.d.) *Inhaler recycling pilot in South-east London.* Southwark News (2024) *South London pharmacies become inhaler recycling depots in NHS first*. 13 July.

	The Pharmacist (2024) *South-east London pharmacies launch inhaler recycling pilot*. 16 July Pharmacy Business (2024*) South East London ICS launches new inhaler recycling project to combat climate change*. 16 July. Pharmacy Magazine (2024) *London pharmacies take part in first NHS-funded inhaler recycling scheme*. 17 July. South Londoner (2024) *First ever inhaler recycling pilot launched in south east London has sustainability drive at its heart.* 30 July PrescQIPP C.I.C. (2025) *Silver award winner – Embedding inhaler recycling into the NHS.* Documents accessible via log in. Nixon, J. (2025) *Inhaler return and recycling – an award-winning project in London.* Sustainable Healthcare Networks Hub, 18 October.
GSK's Complete The Cycle	GlaxoSmithKline plc (2012) Corporate responsibility report 2012. London: GlaxoSmithKline. P.67. Available at: https://www.gsk.com/media/krnblt2t/cr-report-2012.pdf GlaxoSmithKline plc (2013) Corporate responsibility report 2013. London: GlaxoSmithKline. p. 66. Available at: https://www.gsk.com/media/lvfdihev/cr-report-2013.pdf GlaxoSmithKline plc (2014) Responsible business supplement 2014. London: GlaxoSmithKline. p. 44. Available at: https://www.gsk.com/media/s0gb1mxz/gsk-responsible-business-supplement-2014.pdf GlaxoSmithKline plc (2015) Responsible business supplement 2015. London: GlaxoSmithKline. p. 51. Available at: https://www.gsk.com/media/4o2jvw2o/gsk_responsible_business_supplement_2015.pdf GlaxoSmithKline plc (2016) Responsible business supplement 2016. London: GlaxoSmithKline. p. 25. Available at: https://www.gsk.com/media/ijcag5sc/responsible-business-supplement-2016.pdf GSK (2016) Complete the Cycle – recycling inhalers [Video]. YouTube. Available at: https://www.youtube.com/watch?v=oI9Y18KeHPk GlaxoSmithKline plc (2018) Annual report 2018. P. 35 London: GlaxoSmithKline. Available at:

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Inspire	AstraZeneca UK Ltd (n.d.) INSPIRE – Inhaler recovery and recycling scheme: executive summary. AstraZeneca UK Ltd. Available at: https://www.astrazeneca.co.uk/content/dam/intelligentcontent/unbranded/astrazeneca/uk/en/pdf/work-with-nhs-uk/ExecSummTemplate22.pdf Black Country Integrated Care System (2023) *First-of-its-kind inhaler recycling scheme launches in the Black Country*. 1 August 2023 INSPIRE inhaler recycling scheme: expression of interest letter. Available at: https://blackcountry.communitypharmacy.org.uk/wp-content/uploads/sites/149/2025/04/Expression-of-Interest-Letter.pdf Letter to GP Practices Available at: Letter-to-GP-practice.pdf NHS Black Country Integrated Care Board (2025) *'INSPIRE' Inhaler Recycling Scheme Information Pack* The Royal Wolverhampton NHS Trust Collection of Plastic Inhaler Casings from Community Pharmacies: Standard Operating Procedures. Accessed here AstraZeneca UK Ltd (n.d.) Executive summary of joint working outputs: Royal Wolverhampton NHS Trust. Cambridge: AstraZeneca UK Ltd. Available at: https://www.astrazeneca.co.uk/content/dam/intelligentcontent/unbranded/astrazeneca/uk/en/pdf/work-with-nhs-uk/Executive_Summary_of_Joint_Working_Outputs_Royal_Wolverhampton_NHS_Trust.pdf
Take Air	Chiesi Limited (n.d.) Take Action for Inhaler Recycling (Take AIR). Available at: https://www.chiesi.uk.com/collaboration/our-projects/take-action-for-inhaler-recycling Murphy, A., Howlett, D., Gowson, A. and Lewis, H. (2022*)* *S62: Exploring the environmental impact of inhaler disposal and the feasibility of postal inhaler recycling in the UK: results from the Take AIR pilot postal inhaler recycling scheme.* Conference Paper. Thorax, 77(Suppl 1), A40. Chiesi Limited (2023) Inhaler recycling scheme toolkit. Available at:

	https://www.chiesimedical.co.uk/wp-content/uploads/2023/05/Inhaler-Recycling-Toolkit-Interactive-PDF-with-downloadable-content.-1.pdf Murphy, A., Howlett, D., Gowson, A. and Lewis, H. (2023) *Understanding the feasibility and environmental effectiveness of a pilot postal inhaler recovery and recycling scheme*. npj Primary Care Respiratory Medicine, 33(1), Article 5.
NHS Lothian	Email correspondence from team including the report 'Reducing Carbon Footprint of Inhalers in Community Pharmacies in Lothian' (June 2024).
Hillingdon Hospitals	The Hillingdon Hospitals NHS Foundation Trust (2025) *Recycling inhalers as part of our Green Plan.* May 2025 Email correspondence from team.