

Towards a Circular Economy in NHS Wales - Mobility Equipment Repair and Reconditioning



Summary

An estimated 80% of NHS Wales' carbon footprint is directly linked to the goods and services they purchase.

As part of a drive to shift the NHS towards more sustainable consumption, and cut carbon and waste, it is essential that items such as wheelchairs are maintained and used to their full potential. A circular economy is an alternative to the traditional make-use-dispose linear economy which damages our environment. Instead, the aim is to keep resources in use for as long as possible, extracting the maximum value while in use, and recovering and regenerating products and materials at the end of each service life.

Service models where items are repaired, maintained, and refurbished ensure that products achieve their maximum utility and are kept in use longer. This helps reduce the environmental carbon footprint of the goods we use.

This case study outlines the success of the NHS Posture and Mobility Service (PAMS) for Wales as an exemplary model of circularity in the healthcare sector. The PAMS approach aligns with the [NHS Wales Decarbonisation Strategic Delivery Plan](#), the goal for a net zero public sector in Wales by 2030, and the [Welsh Government's Beyond Recycling Strategy](#), all of which emphasize the role public sector procurement will play in delivering a low-carbon circular economy in Wales.

Key Facts

- Approximately 60,000 individuals in Wales use wheelchair equipment provided by the NHS.
- Maintaining and reconditioning a standard wheelchair extends its life by keeping the product in circulation longer.
- The carbon footprint of a typical standard self-propelled wheelchair is 107 kg CO₂e and based on the current level of refurbishment activity performed by PAMS, their service model represents a carbon saving of approximately 94,429 kgs CO₂e per year - or alternatively, the equivalent of 885 new wheelchairs.
- This also represents a financial savings for NHS Wales as they can perform lower-cost maintenance and refurbishment activities to avoid the purchase of new wheelchairs.
- The PAMS model is an exemplar of following the [Sustainable Procurement Hierarchy](#), which prioritises refurbishment and repair over the purchase of new items, and demonstrates the environmental and financial benefits of doing so.

Introduction

Across Wales, there are approximately 60,000 individuals who are served by the Artificial Limb & Appliance Service (ALAS). Since the First World War, when limb services were established to support war-wounded amputees, ALAS has been providing, maintaining, and reconditioning wheelchair equipment across the UK, and in Wales through services based in Cardiff and Wrexham.

Today, ALAS is commissioned by the Welsh Health Specialised Services Committee (WHSSC).

Service model

ALAS delivers the Posture and Mobility Service (PAMS) for Wales. This includes the provision of services to clients who require the long-term use of a wheelchair.

The service includes:

- clinical assessment
- delivery and collection of equipment
- repair and reconditioning of equipment
- adjustment/ replacement of equipment
- disposal of equipment.

Services are delivered by a multidisciplinary team of clinicians, including occupational therapists, technicians, and engineers.

NHS clients can either be issued with equipment directly from local stores, or, in the case of more complex referrals, require assessment to identify the most appropriate equipment for their posture and mobility needs. The ongoing and timely maintenance of equipment is critical to meet the needs of clients.

What are Circular Economy Business Models?

A circular economy approach is where we keep resources in use and avoid waste. Circular economy business models embody this through maximising the value of products and materials, which often results in environmental and financial benefits. Examples include:

- Products designed for long life, supported by guarantees and trusted repair services.
- Hire or leasing of products as an alternative to purchasing.
- Rental or sharing of products between public sector, private sector, or direct to members of the public.
- Asset management approaches which maximise product utilisation through re-use, repair, and deployment.

Purchasing for re-use, repair, and durability

PAMS apply circular principles to the tendering process for new equipment. Decisions taken during the procurement and commissioning of wheelchairs represents a significant factor in reducing the whole life cost of equipment.

These include:

- Durability - how long is the equipment expected to last under normal operating conditions? This includes guarantees of the availability of spare parts from suppliers for a fixed time period (e.g., 5

years) to protect against product obsolescence.

- Reusability - when it is returned, what is the likelihood it will be able to be reconditioned "as new" and re-issued?
- Prudent healthcare provision - what is the most suitable product to support client needs?
- Can core equipment be purchased to enable modularity, adaptability, and upgrades to avoid early wheelchair replacement?

Adopting these principles during the procurement process extends the life and use of equipment.

Product life extension

PAMS use a systematic approach to the repair, maintenance, and redeployment of wheelchairs in line with the Medicines and Healthcare Products Regulatory Agency (MHRA) guidance. This provides all clients with the same quality of service as they would if they were receiving an entirely new product.

Experienced technicians ensure that each wheelchair product is carefully serviced and configured, tested, and supplemented with replacement parts if needed. Service centres operate in line with international quality standards.

Ongoing preventative maintenance schedules, including an aftercare service, consider how and how long each item is going to be used. These maintenance schedules are essential in not only getting the best out of the equipment for the client, but also in extending product life and optimizing the overall stock value of wheelchair equipment for the NHS.

Asset management to facilitate re-use

Barcodes are attached to every wheelchair sourced and supplied by PAMS, providing an accurate record of maintenance history such as when the equipment was bought and put into use, who used it, when it was repaired, and when it is due to be decommissioned.

Image 1: Wheelchair barcode and serial number



This method of asset management also allows PAMS to monitor equipment re-use cycles, product reliability, and facilitates product recalls, in instances of product failure.

To maximise wheelchair return rates in the community, guidance is provided, including a helpline about the free collection of equipment.

Carbon benefits

The carbon footprint of a 'typical' self-propelled wheelchair is approximately 107 kg CO₂e emissions per item.* While the carbon footprint of a single wheelchair is relatively small, when taking into account PAMS' volume of refurbishment activities, their service model represents a savings of approximately 94,429 kg CO₂e emissions per year, the equivalent of 885 new wheelchairs.

While not included in this modelling, it is estimated the reconditioning of more complex powered wheelchairs results in even greater unit carbon savings.

Lessons Learned

The PAMS approach demonstrates the benefits to organisations that adopt circular economy business models. Focussing on maintaining and maximising the value of existing products and assets saves money, reduces carbon emissions, and aligns your organisation with the ambitious environmental goals for the Welsh public sector.

This work is proof that:

- Incorporating circular economy criteria such as requirements for durability and repairability within tenders for publicly procured assets and equipment can extend the life of products and reduce their carbon footprint and in turn, your **organisation's emissions**.
- Taking a circular economy approach to the asset management of equipment can improve operational efficiency and reduce maintenance costs, resulting in financial savings.
- Incorporating the service user into service design ensures that products are used to their maximum benefit and avoids unnecessary waste.
- Service models which reduce the need to purchase new products align with the [Sustainable Procurement Hierarchy](#) and prioritise the maintenance and refurbishment of existing assets. The PAMS model emphasises that organisations that adopt the hierarchy approach can benefit from meaningful carbon and cost reductions.
- These service models also support the goals set out in Beyond Recycling, the NHS Wales Strategic Decarbonisation Plan, and will be a critical component of achieving a net zero public sector in Wales by 2030.

Further information

[Beyond Recycling: A strategy to make the circular economy in Wales a reality \(March 2021\).](#)

[Net zero carbon status by 2030: A route map for decarbonization across the Welsh public sector \(July 2021\).](#)

[NHS Wales Decarbonisation Strategic Delivery Plan \(March 2021\).](#)

[All Wales Posture and Mobility Services: Service Specification \(April 2020\)](#)

[Managing Medical Devices - Guidance for healthcare and social services organisations \(April 2015\)](#)

** Based on material composition analysis for different self-propelled wheelchairs. Carbon footprint of items will vary depending on product weights and material composition.*

** Modelling represents a relatively conservative estimate of the benefit, with assumption based on one round of re-use. Hence, where wheelchairs are refurbished and receive multiple re-uses, associated carbon benefits will be higher.*

Savings are calculated based on applied carbon emission factors and assumed waste management routes in the event of no refurbishment activity taking place.

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