

MEDAL: Medical Devices a New Life

Medical device returns demonstration project

Source: MedaCRM <https://medalcrm.com/>

Read About:

- **MEDAL focuses on the disposal of wearable medical electronic devices - examines current disposal methods and end-user attitudes, assesses automated de-manufacture, and explores the possibilities of rolling out a full-scale take-back programme through pharmacies.**
- **Wearable medical devices contain electronics including batteries - reusing electronic components and secondary raw materials is key in creating a circular economy model.**
- **No take-back program exists today in Ireland. Medical wearable devices are disposed of in household waste or sharps bins.**
- **There is a clear user demand and a willingness by pharmacies for a take-back program.**

Background

In Ireland there are approximately 230,000 people with diabetes. The estimated use of single-use continuous glucose diabetes sensors exceeds 1.4 million per year, used primarily by Type 1 diabetics.



Figure 1. Range of Medical devices

Demand is increasing amongst Type 2 diabetics. An estimated 2 million glucose monitoring sensors will be used annually by 2025. Sensors require the use of inserters (applicators), most of which are also single-use devices. Digital health devices such as the smart insulin pens and inhalers are being increasingly used, increasing the demand for a returns and re-cycle process.

These sensors fall within the WEEE classification and fall within the scope of the Restriction of Hazardous Substances (RoHS) within the EEE Directive 2011/65/EU). The WEEE Directive in Article 11 sets the WEEE recovery rate for Category 5 (including medical devices), at 70%, and the recycle rate at 50%. Ireland achieved a

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recovery of 38% for Category 5 devices against a target of 65%, in 2021. The WEEE dataset for Ireland however does not provide sufficient granularity specifying how this result relates to wearable medical devices.

Circular Demo Pilot

The key aim of the take-back pilot was to ascertain the level of consumer engagement and the level of support from pharmacies. The scope included assessing end-user practices, preferences, and attitudes, to identify opportunities for effective communication and incentivising of the end user. This work was performed by the University of Limerick. The scope also included the teardown and analysis of the dis-assembly of the ADC Libre Freestyle 2 sensor and applicator (inserter), and the assessment of an automated de-manufacturing process for these devices. This work was conducted by Peregrine Technologies.

Offerre led the project and setup and managed the take-back pilot. This involved the collection of user feedback and recommendations for improvement. Two-Hundred and Ninety-Six (296) devices were returned over a seven-week period, primarily from six pharmacies, out of a total of twelve pharmacies engaged in the demonstrator.



Figure 2. Pharmacy Take-Back programme

Impact

100% of Pharmacists contacted volunteered to participate in the take-back pilot. These pharmacists represent some of the primary Pharmacy chains in Ireland, including Lloyds, CarePlus, and O’Sullivan’s. The demonstrator established an estimated two-million device returns in Ireland by 2025, representing 34.4 tonnes of CO2 equivalent offset through recycling, with 715 tonnes of plastic and 12 tonnes of PCB’s and Li-ion batteries recycled. The development of an automated de-manufacturing process allowed for the development of a Design Guideline for Automated dis-assembly of these devices, which will influence future discussions with device producers. There are plans under discussion to expand this Pilot in Ireland also expand into the UK. The CIRCULÉIRE funding has been most beneficial in supporting the work of the Consortia

Key Lessons Learnt

- There are multiple benefits for implementing a medical device take-back program, including
- Improved customer service,
 - Re-use of critical raw minerals,
 - Risk mitigation associated with sharps material handling
 - Reduced environmental impact.

Experience to date supports the proposition that the volume of individual producer wearable medical devices is insufficient to cost justify standalone take-back, deposit, or send back schemes. The pharmacy take-back pilot demonstrates the competitiveness of this approach for managing returns logistics.

CIRCULÉIRE – The National Platform for Circular Manufacturing has a €1.5m ring-fenced innovation fund supporting circular innovation demonstration projects over 2020–2022. See www.circuleire.ie