TECH OFFER

AI-Powered Circular Economy Platform for Smart Recycling

KEY INFORMATION

TECHNOLOGY CATEGORY:
Sustainability - Circular Economy
Waste Management & Recycling - Automation & Productivity Enhancement Systems
Environment, Clean Air & Water - Mechanical Systems
Infocomm - Artificial Intelligence

TECHNOLOGY READINESS LEVEL (TRL): TRL9
COUNTRY: SOUTH KOREA
ID NUMBER: TO175432

OVERVIEW

Due to mixed collection and inadequate sorting, many recyclables cannot be effectively recovered and end up being landfilled or incinerated. While reverse vending machines address some of these issues, these solutions are often costly, provide limited brand-level data insights, and deliver a suboptimal consumer experience. This technology aims to significantly improve recycling rates by overcoming these limitations.

The technology on offer is an AI- and IT-enabled circular economy platform that integrates smart collection bots, digital product passports, and cloud-based traceability to achieve precise material separation and full resource transparency. Cost-effective and fully customizable, this technology enables the efficient management of diverse recyclable streams while ensuring a stable supply of high-quality recycled raw materials. This scalable platform is well-suited for local governments, retailers, and corporations

seeking to strengthen recycling infrastructure and advance environmental goals. The platform further enables data-driven waste management by improving transparency, traceability, and resource efficiency across recycling operations.

The technology owner is seeking co-development and test-bedding opportunities in Singapore to pilot its smart recycling and traceability platform, supporting the transition towards a circular economy.

TECHNOLOGY FEATURES & SPECIFICATIONS

The technology is an integrated solution that combines hardware (resource collection robot and IoT sensors) and software (AI-optimised lightweight image recognition and cloud-based integrated control system).

Key features include:

- Achieves 80% efficiency (4 times higher than conventional methods) of pre-sorting of plastics, metals, glass, paper and textiles
- Modular design that significantly cuts manufacturing costs by up to 50% over existing systems
- Provides real-time monitoring, remote control, and integrated features like waste discharge prediction and route optimisation (under development) to boost operational efficiency and reduce costs for collection vehicles
- Fully customisable to cater to different customers' requirements e.g., able to integrate digital passports for collected passports, gamification and in-app reward scheme, dashboarding for full visibility etc
- Affordable deployment which makes it scalable for large networks of collection points
- Low maintenance costs

POTENTIAL APPLICATIONS

This technology has been successfully demonstrated with retailers in South Korea through ongoing consumer recycling projects. It is applicable across diverse sectors, including environmental management, smart city development, retail operations, and sustainable manufacturing. Potential applications include (but not limited to):

- AI-based resource collection robots for accurate sorting of recyclables
- Reusable cup collection systems to support circular F&B operations
- Integrated control platforms with real-time monitoring and route optimization
- High-quality recycled resource distribution for processing and manufacturing
- Carbon credit trading platforms to support ESG and sustainability goals

MARKET TRENDS & OPPORTUNITIES

This technology is well-positioned to capitalise on the growth of recycling and smart city initiatives by addressing critical gaps in the recycling ecosystem. Its cost-efficient, AI-based pre-sorting capabilities overcome persistent inefficiencies in waste collection and sorting, while its flexible profit-sharing model lowers financial barriers for partners and accelerates adoption.

UNIQUE VALUE PROPOSITION

- Cost-efficient design enabled by modular hardware and lightweight AI models, reducing capital and operating costs.
- High sorting efficiency (up to 80%), ensuring a stable supply of high-quality recycled resources.

- Integrated IoT and cloud-based system for smart control, real-time monitoring, and optimisation within smart city ecosystem