

CIRCULAR ECONOMY BUSINESS CASE STUDIES IN SOUTHEAST ASIA



RECYCOEX
from waste to WOW

Recycoex

- Bangkok, Thailand
- Waste management
- www.recycoex.com
- Analysis period: 2021-2024

Segregated Recyclables Collection for Materials Recovery

Business Spotlight

Recycoex has pioneered a user-friendly online platform for picking up source-segregated recyclable waste at the doorstep of schools, universities, hotels, shopping malls and businesses to achieve efficient and effective collection of clean plastics and other recyclables in the greater Bangkok area. Recycoex has also enabled direct trading of recyclable waste between waste generators and recyclers. The company operates its own materials recovery facility as well in order to recover commercially recyclable materials from the waste it collects. Recycoex supplies good-quality recyclable waste to recyclers, such as recyclable UHT cartons to Datapack (producer of plastic boxes and zipper bags), gypsum waste to Saint-Gobain Southeast Asia¹ (producer of gypsum board and related products), and used cooking oil to Bangchak Petroleum Thanachok Oil² (producer of sustainable aviation fuel (SAF)).

Keywords

Materials recovery, Waste trading platform

Innovation

End-of-life management, Resource circularity



¹ <https://www.saint-gobain.co.th/en/our-brands/saint-gobain-gyproc>

² <https://www.bangchak.co.th/en/newsroom/bangchak-news/948/bangchak-group-to-produce-thailand-s-first-and-only-saf-from-used-cooking-oil>

Context and baseline

Of the 27 million metric tonnes (MMT) of waste collected in 2016 in Thailand, only 5 MMT were recycled in some form while the remaining 22 MMT were sent to landfill.³ Only around 8 MMT that were disposed in landfills that met environmental standards; the remaining 14 MMT ended up in insufficiently controlled landfills, causing soil, water and air pollution, which are threats to public health.

Sompop Majiswala, the Managing Director of Recycoex Company Ltd., is an architect by profession who worked in the construction sector for 15 years. He became increasingly interested in environment management and recycling, and sought ways to combine architecture and sustainability. He set out to establish a comprehensive recycling system and raise awareness about the importance of recycling among households, enterprises, and communities. He pioneered the Recycoex platform to facilitate recyclable waste collection and recovery, and to create a supply of good-quality recyclables for recycling enterprises. The company aims to collect and sort recyclable waste, facilitate its reuse and recycling and thereby avoid its disposal.

Mismanaged recyclable waste, also called 'orphan waste', has escaped from the controlled waste-management system, instead of being segregated at source, collected, sorted, and potentially pre-processed to improve its characteristics so that these can be properly recycled and recovered. Even when collected from the environment, this mismanaged recyclable waste can generally no longer be commercially and/or technically recycled due to contamination. In addition, for some recyclable waste no market or technology is available, or it lacks the marketable collection scale needed to make recycling commercially viable. Most of the mismanaged recyclable waste is single-use plastic and foam from food or other packaging, or used disposable products such as cutlery and personal protective equipment (PPE).⁴

Innovation

Recycoex has developed a user-friendly online platform for the doorstep collection of segregated recyclable waste.⁵ The Recycoex platform thus facilitates the collection of recyclable waste from consumers, businesses and other organisations, and then trading it to recyclers. The recyclers buy the recyclable waste through the platform from the waste

suppliers, and Recycoex earns revenue by taking a share of these sales transactions. The platform currently accommodates 12 categories of recyclables segregated by the waste generators as follows:

- PET bottles
- aluminium cans
- other plastics and related materials
- cartons including UHT cartons
- multilayered plastic packaging
- glass
- HDPE plastic
- paper
- clothing and cloth (seasonal items)
- steel
- steel cans
- used vegetable/cooking oil

Recycoex is the recyclable waste supplier to recyclers for each of these waste categories. For example, Datapack, a plastic packaging manufacturer, has been buying waste UHT cartons since 2021. Saint-Gobain Gyproc, which produces gypsum board, ceiling tiles, gypsum for walls and ceilings, and gypsum plaster, has bought gypsum waste since 2023. Since 2024, Bangchak Petroleum Thanachok Oil has been buying used cooking oil for production of SAF. Recycoex has been developing its processes and facilities to efficiently buy, collect and transport waste for further sorting at its own material recovery facility for selling the recyclable waste fractions to recycling companies.

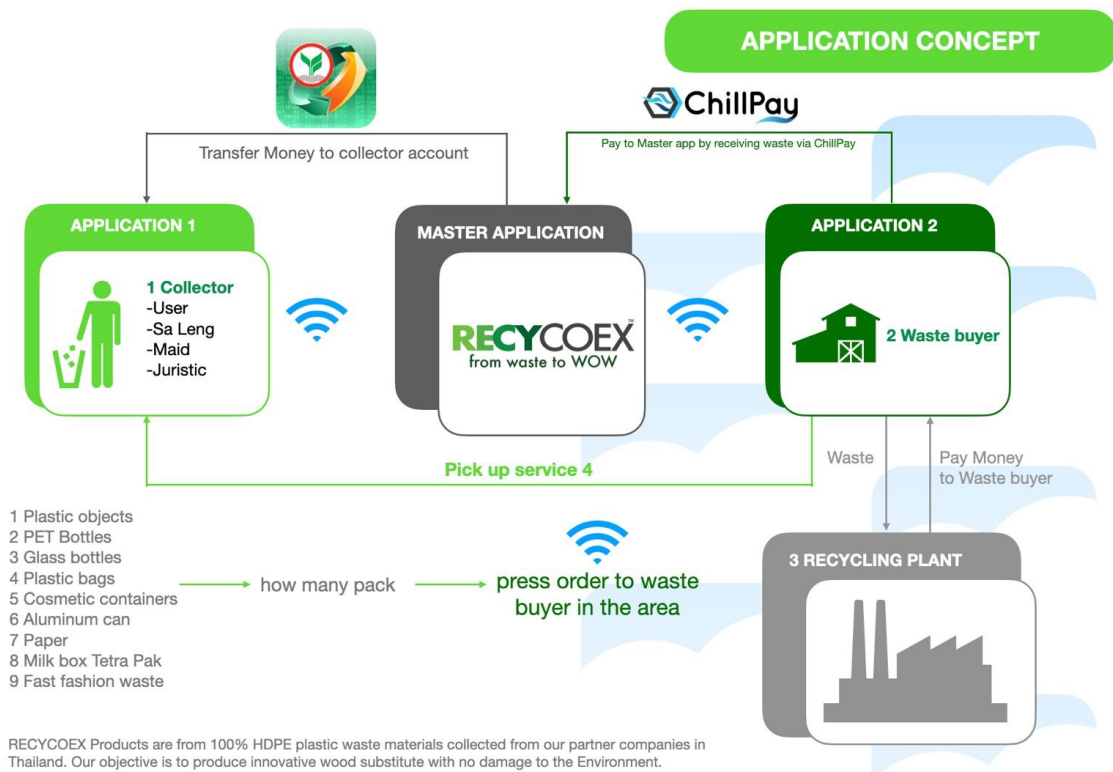
To trade recyclable waste via the online Recycoex platform, sellers or subscribers first download the Recycoex App, then register and create an account. Upon having collected a significant volume of recyclable waste, the seller schedules a pickup time and date with the Recycoex company (typically every 1–3 months) and sells the waste to a recycler through the Recycoex platform.

By mid-2024 some 30,000 subscribers were on the Recycoex platform. About 35 schools are regular recyclable waste collectors, specifically of drinking cartons. For transparency and accountability, the platform records various data, including the seller's location on Google Maps, the type of recyclable waste, and the weight of all the recyclable waste they have supplied to Recycoex. Recycoex also established a Drive-Thru system for individual households and tri-cycle small garbage collectors to bring their recyclables and sell to Recycoex.

3 https://en.wikipedia.org/wiki/Waste_management_in_Thailand

4 <https://www.trueplookpanya.com/knowledge/content/89269/-env->

5 <https://www.recycoex.com/>

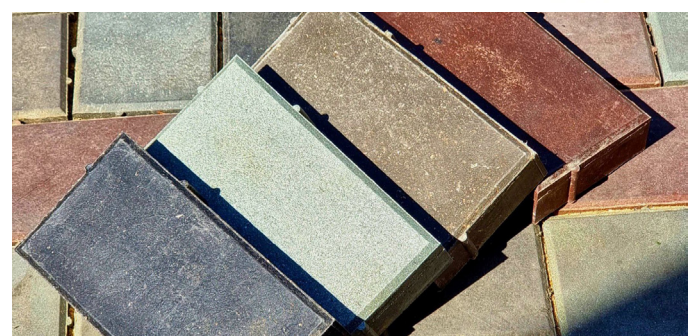
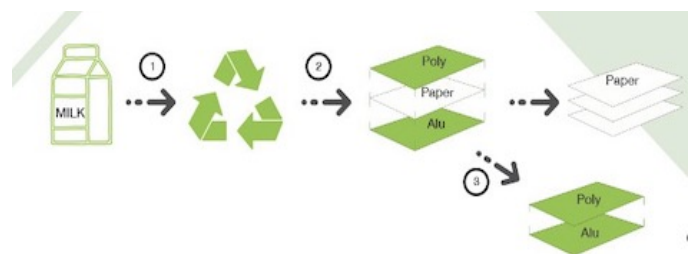


In 2023, the company established a system to collect gypsum waste from construction and renovation sites, recycling it into new gypsum boards with the ambitious goal of achieving net-zero waste gypsum board production by 2030. Saint-Gobain Southeast Asia has signed a Memorandum of Understanding (MoU) with Recycoex for an initial 2-year period, following the example of Saint-Gobain Gyproc in Belgium. This latter company plans to sort gypsum waste from several building renovation projects, for example 20,000–30,000 m² of Central Plaza Department Store, and ship it to the Saint-Gobain Southeast Asia factory in Saraburi province. Recycoex estimates that it will collect about 2 metric tonnes of gypsum waste from building renovations such as the Central Plaza Department Stores.

After collecting recyclable waste from schools, households, and other collectors, Recycoex stores, sorts, size-reduces and compresses the recyclable waste at its materials recovery facility. It is then supplied to recycling enterprises which are appropriately registered as waste management factories with the Department of Industrial Works, e.g. Fiber Pattana Co. Ltd., Advance Mat Solution Co. Ltd. and M.B.J. Enterprise Co., Ltd.

In 2024 Recycoex signed an MoU to collect and supply used cooking oil for production of SAF by Bangchak Petroleum Thanachok Oil. The Recycoex platform will be in use throughout the country, and users can drop off their used cooking oil at any of the petroleum stations of the Bangchak Corporation Public Company. The collection hubs and shipments are being arranged by firms contracted by Bangchak Petroleum Thanachok Oil.

In cooperation with Datapack Company Ltd., Recycoex developed the prototype for production of paver bricks from recycling UHT cartons by separating the paper content from the inner aluminium and outer plastic layers. The aluminium and plastic remain after dissolving the UHT cartons in water, and this sediment is drained and dried, resulting in a powder-like substance. This dry processed mixture is then heated and fused together to form a malleable mixture, which is weighed and then pressed into a mould to create poly-alu bricks, which are immediately placed in water to be solidified into the final poly-alu bricks. The wastewater produced during this paver manufacturing is treated in Datapack’s effluent treatment plant. The dissolved paper is collected, dried and packed in large bags by Datapack, for onward use as an alternative fuel in the cement sector.



Circular Economy impact

Recyclable waste collection and sorting via the Recycoex platform facilitates the recovery and reuse of these materials, illustrating resource circularity that contributes to the circular economy transition.

From April to December 2023, a total of 42,600 kg (equivalent to 5,300 kg per month) of UHT packaging waste was collected and sold to Datapack. Other recyclable wastes are sold to various recycling facilities, such as PET bottle for plastic pellets, aluminium cans for reuse by secondary aluminium smelters, high density polyethylene (HDPE) for production of recycled bags and products, paper for recycled paper and steel, and steel cans for steel recycling. Other types of non-commercially recyclable wastes, such as multilayered plastic packaging, and clothing and textiles are collected and donated to other recycling platforms or resold in the second-hand markets of non-governmental organisations (NGOs) such as The Mirror Foundation, Baan Nokkamin Foundation, and UNHCR, when these organisations occasionally accept reusable items for their initiatives.

Business and market impact

Recycoex platform has not yet broken even on its investment because of the still limited volume of recyclable waste transactions, due both to a low level of activity among subscribers (only 20% are actively trading) and the small quantities of recyclable waste supplied by the participating schools and individuals. On the other hand, Recycoex is currently already recovering operation and maintenance costs.

Recycoex charges the recycling firms a transaction fee for traded recyclable waste at a rate of 5%–20% of the sales value. The company expects to be able to break even either with collection and sales of at least 10 metric tonnes/ month or 100,000 subscribers, including through the Bangchak petroleum stations – a situation the company expects to reach in 2025. But achieving this goal will mean the active recruitment of waste providers, e.g. schools, enterprises such as Berli Jucker Public Co. Ltd (BJP), BEC, gas stations such as Bangchak, department stores such as Central Pattana, hospitals & Thai Red Cross, and others.

About 1,000 units of paver bricks have been made from waste UHT cartons by separating the paper content from the inner aluminium and outer plastic layers, with the recovery of the dissolved paper for use by cement factories. Most clients are large-scale construction firms that are interested in environmentally friendly products. At present, the eco-pavers are not marketable because the unit cost of paver bricks is about 20% higher than traditional paver bricks.

Stakeholders

The company already actively partners with 35 local schools to purchase their recyclable waste products (e.g. milk and drink cartons, plastic water bottles, bottle caps, etc.), while simultaneously promoting sustainable recycling practices to and educating the young generation. By engaging with schools, Recycoex creates awareness about the importance of recycling and sustainable practices among youth.

By purchasing waste materials from schools, Recycoex is incentivising recycling as well as providing a practical example of how waste can be transformed into valuable resources. This partnership not only promotes sustainable living but also instills a sense of responsibility and environmental consciousness among young students.

The company supplies recycled waste to recycling plants that are registered with the Department of Industrial Works, such as Fiber Pattana Co. Ltd., Advance Mat Solution Co. Ltd., and M.B.J. Enterprise Co., Ltd.

Implementation

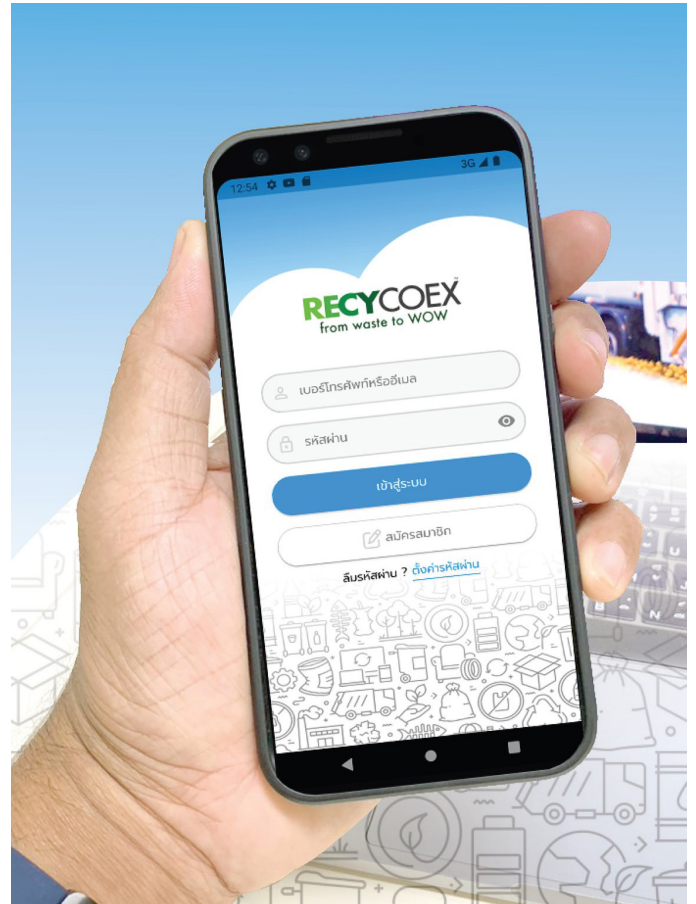
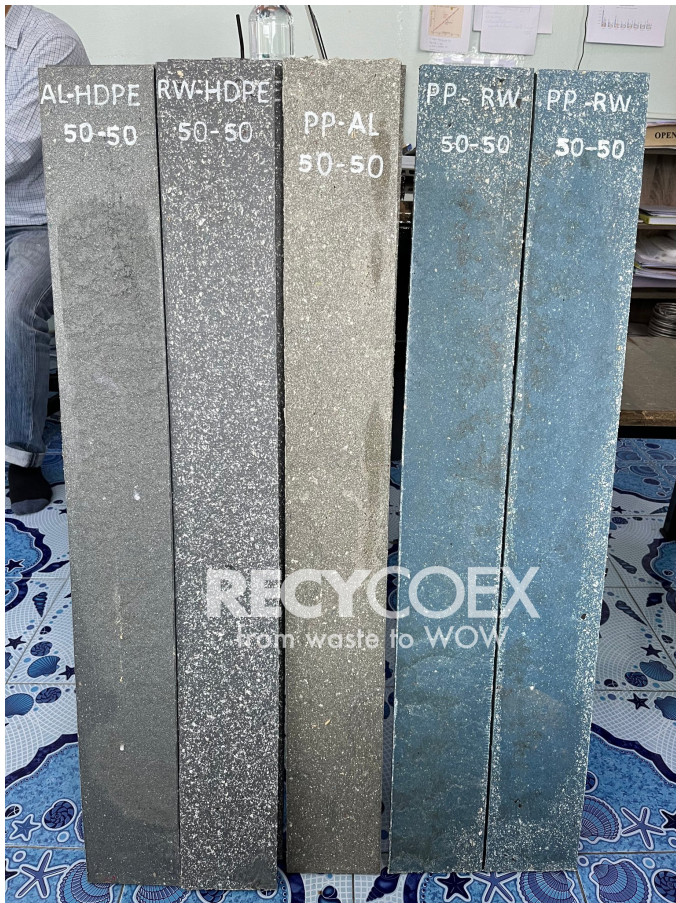
Recycoex Company Ltd. promotes recycling and a more sustainable lifestyle among its subscribers. For the recycling firms using the Recycoex platform, access to quality recyclable materials is facilitated, reducing the cost of their own collection systems as well as the necessity of maintaining a separate online collection platform. At the same time, the Recycoex platform is facilitating trading of diverse recyclable waste fractions that are serving multiple recyclers; the intention of the company is to add more types of recyclable waste, e.g. foam.

One challenge is the cost and profitability of the Recycoex platform. Waste collection and management operations require significant investments in facilities, equipment, technology, and labour. The company must carefully balance the costs of collection, sorting, processing, and transportation against the revenue generated from selling its sorted recyclable waste materials. Fluctuating market prices for recyclables do affect profitability, and it is essential for the company to continuously monitor market trends and adapt its strategies accordingly. In addition, the company still cannot afford to commercialise a prototype of the paver bricks made from recycling UHT cartons because of the high production price per unit, added to the high cost of investment for machinery, so this product remains in a challenging earlier stage in terms of commercialisation.

Additionally, regulatory compliance and adherence to environmental standards poses challenges. The company must stay up-to-date with changing regulations as well as invest in sustainable practices to minimise environmental liabilities. This situation may involve implementing advanced waste treatment technologies and ensuring the proper identification and disposal of hazardous materials.

Takeaways

Financial or fiscal incentives could be considered for recycling firms, along with subsidies for shipping recyclable wastes, based on the volume of waste, to minimise the barriers of economies of scale, for reuse and recycling of recyclable waste.



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