

## CIRCULAR ECONOMY BUSINESS CASE STUDIES IN SOUTHEAST ASIA

## Global Action for Environmental Awareness (GAEA)

- Siem Reap, Cambodia
- Waste collection and management
- [www.gaea.com.kh](http://www.gaea.com.kh)
- Analysis period: 2007-2024

## From Waste Management to Materials Recovery

### Business Spotlight

Since its establishment in 2007, GAEA (Global Action for Environmental Awareness) has led the way in improving the collection and management of (municipal) solid waste in Cambodia, particularly in Siem Reap, Kampong Thom and Banteay Meanchey provinces. GAEA works on material recovery and waste diversion from landfills to minimise the consumption of natural resources. To date, GAEA is the only company operating a glass-to-sand recycling project in Cambodia.

From a business standpoint, GAEA's primary revenue comes from waste collection and management, and city cleaning contracts. The success of its waste segregation and materials recovery activities also relies on better awareness, community education and enforcement of source segregation rules and requirements. Despite these challenges, GAEA is actively seeking new solutions and partnerships with private companies to increase its impact by expanding recycling efforts and exploring innovative waste management technologies. In this respect, forging strong partnerships with local government entities as well as Non-Governmental Organisations (NGOs) and development partners is vital for promoting a more circular waste collection and management system in Cambodia.

### Keywords

Glass recycling, Waste collection, Waste management

### Innovation

End-of-life management, Resource circularity



## Context and baseline

Cambodia faces significant challenges in developing the infrastructure and systems for effective, environmentally-sound management of municipal solid and other wastes, as evidenced by incomplete waste collection services, limited recycling facilities, and insufficient and uncontrolled disposal sites. The lack of a comprehensive waste management system hampers the transition to a circular economy. The issue is of considerable magnitude: only 14% of the cities and districts have access to waste collection services with the total waste generation estimated at approximately 5 million metric tonnes annually<sup>1</sup>, of which 44% is landfilled and 10% is composted, recycled or incinerated. The remaining 46% is indiscriminately disposed of on roadsides, in low lying areas and in nature, causing environmental degradation and public health issues.

GAEA, a leading waste collection and management services company in Cambodia, is pioneering circular solutions to address the growing problem of solid waste management, especially in urban areas like Phnom Penh, Siem Reap and provinces such as Kampong Thom and Banteay Meanchey. The company has launched several recycling pilot projects, including its glass bottle to sand initiative. Previously, GAEA also managed a compost pilot project using organic waste from markets and restaurants in Kampot. GAEA is also developing a segregation project aimed at recycling plastic bottles and foils. GAEA is recognised as a key partner for recycling initiatives, frequently exploring new technologies for companies looking to enter the market. Through partnerships and collaborations with key stakeholders, including local government authorities, NGOs focusing on environmental sustainability, and international organisations advocating waste management reforms, GAEA strives to pair global best environmental practices and techniques with Cambodia's waste management needs.

## Innovation

GAEA is dedicated to incorporating circular solutions such as materials recovery, recycling and composting, and the necessary sorting, to substitute for the currently prevailing uncontrolled landfill practices in Cambodia. GAEA stands out with its proactiveness in the Cambodian waste collection and management sector, as it promotes a comprehensive strategy and collaborates flexibly with various partners. This collaborative effort

aims to overcome the existing barriers to the implementation of solutions that enable a circular economy transition.

GAEA is not only known for its expertise in waste management but is also unique in holding a license for establishing and operating landfill operations in Siem Reap, Banteay Meanchey and Kampong Thom. This positions GAEA well as a partner for environmentally-focused companies seeking entry into the Cambodian market. GAEA is open and on the lookout for innovative partnerships not only to implement but also pilot new solutions. GAEA collaborates with technology firms on advanced recycling pilot projects. As an example, a recent initiative in Siem Reap involved the use of Japanese waste-to-fuel technology capable of autonomously sorting waste and converting mixed materials, including resin and mud, into fuel through high-temperature vaporisation.

## Circular Economy impact

The waste collection, separation, material recovery and recycling activities of GAEA are instrumental in the circular recovery and reuse of materials, or resource circularity, as one of the key circular economy strategies.

The glass-to-sand recycling project implemented by GAEA in 2018 was the first glass bottle recycling project and was implemented with financial contributions from industry partners, particularly Celliers d'Asie (wine supplier), Dragon Capital (environment fund), and NGO (Exo Foundation) as well as GAEA itself. The machine used can transform glass bottles into cullets or a finer sand-like glass fraction, and has a capacity of 5 metric tonnes per day. After an interruption in 2020 and 2021 during the COVID-19 pandemic, operations started again. GAEA collects the glass from hotels and companies in Siem Reap that are paying for this segregated collection and recycling. They also partner with Only One Planet on its Pay It Forward Glass Recycling project. Launched in 2021, by the end of 2023 the project had diverted 47.5 metric tonnes of glass collected in Phnom Penh to Siem Reap facilities. Since 2022, the high-quality beer bottles (5-15%) are returned for reuse by breweries, the rest are transformed into sand or glass cullets and sent to Thailand for glass-to-glass recycling.

The proposed GAEA waste segregation project is promising but is currently delayed due to financing issues. The goal is to segregate the waste at the household level into two fractions, organic and

<sup>1</sup> Challenges and Priorities of Municipal Solid Waste Management in Cambodia, see: [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9322170/#:~:text=In%20Cambodia%2C%20about%204.78%20million,reliance%20on%20landfill%20\(44%25\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9322170/#:~:text=In%20Cambodia%2C%20about%204.78%20million,reliance%20on%20landfill%20(44%25).).



recyclable items. By having access to the valuable waste, GAEA would be able to deploy solutions for several types of waste, such as selling the PET plastic bottles to existing recycling companies, and implementing partnerships already envisioned with potential international partners to recycle batteries and aluminium.

GAEA also had a compost project in Kampot that recycled 3.5 metric tonnes of waste per day using two distinct containers for this purpose. Despite its initial success, the project was discontinued due to challenges in maintaining consistent waste separation and dumping practices by the sellers.

GAEA is cooperating actively with the government and with NGOs to raise environmental awareness in the community through education programs, cleaning activities and training, targeting companies, public schools and villages and also temples. Alternative solutions to single-use plastic are proposed, training is provided on how to sort waste for recycling and how to pack waste properly into garbage bins. Paid visits are also organised to the landfills.

GAEA is exploring further collaborations with recycling partners, focusing on plastics and on the conversion of metal scraps into finished steel or aluminium bars for export.

## Business and market impact

GAEA's revenues primarily come from their waste collection services, which extend beyond provincial cities to include Phnom Penh since 2021. This expansion was facilitated through a joint venture with 800 Super, a Singaporean company, allowing GAEA to collect municipal solid waste under a shared service contract. Additionally, GAEA offers supplementary services, such as city cleaning, maintenance of public gardens, and providing environment-related training.

Currently, circular activities contribute a negligible portion to GAEA's overall revenue, highlighting that transitioning to circularity is an extensive process as incentives for circularity are not yet in place. The glass-to-sand initiative, for instance, faces challenges in achieving long-term sustainability. In 2019, GAEA had 40 partners and collected 50 metric tonnes, all of which was recycled and sent to Thailand for glass-to-glass recycling process, but in 2022 and 2023, only around 10 metric tonnes was collected because of the drop in tourism and its slow recovery following the COVID-19 pandemic. In addition, despite the operational capacity of the sand machine, GAEA struggles to find enough buyers willing to pay a premium to cover the higher

operational costs. Furthermore, the market price of glass is fluctuating and there is greater demand for cheaper products like glass cullets.

Plastic recycling is anticipated to be viable. GAEA's current priority is securing the financing needed to launch its waste segregation project, which entails updating the existing fleet of trucks and purchasing new ones for collecting and transporting recyclable waste. GAEA plans further expansion within Cambodia, for which it is exploring a combination of equity and debt financing from investors and development financing institutions.

## Stakeholders

Stakeholder involvement is crucial for the success of GAEA's waste collection and management business. Local communities and the private sector play a vital role, particularly in source segregation of waste to enable efficient collection and recycling.

GAEA provides favorable conditions for its 1,150 employees, offering them secure incomes and safe working conditions in a pleasant environment. Some level of segregation is already happening informally through "tail-gating" as waste workers are picking out recyclables but selling them directly to aggregators or recyclers. GAEA is considering introducing an incentive fee to motivate employees to "officially" segregate waste during collection for onward recycling by GAEA.

Collaboration with local authorities and the government at large is essential to ensure compliance with applicable waste management and other regulations and policy. Implementing circular solutions is impossible without strong collaboration among various stakeholders, including NGOs and development partners, to raise awareness about the importance of these initiatives.



## Implementation

Various policies and sub-decrees have been issued for environmentally sound waste management, focusing on priority actions such as developing separation and recycling facilities for both solid inert and organic waste, and upgrading existing landfills to mitigate environmental impact and public health risks. However, implementing these measures on the ground presents significant challenges, even for environmentally conscious companies like GAEA. A notable development is the upcoming total ban on the import of plastic waste by Vietnam by 2025, a major processor of plastic waste, which will significantly impact the waste management landscape in Cambodia.

Accessing valuable waste poses a major challenge for GAEA, as it is often collected through informal channels: directly at the source by “Edjai”, that is, street waste pickers, and at landfills by scavengers. Notwithstanding their valuable collection and recovery services, organising these informal waste pickers is complex as they are part of existing, often opaque, waste value chains. GAEA has made several attempts to formally incorporate them into its recycling processes, with only limited success thus far. Finding suitable solutions for this vulnerable group, which includes individuals from impoverished backgrounds and children, will require time and government support. In the meantime, GAEA aids the scavengers by providing basic safety equipment, like gloves, free of charge to minimise accidents at the landfilling sites it operates.

Financial constraints represent another significant barrier, particularly in terms of investing in recycling infrastructure and technology. GAEA has sought

funding and investments from environment-focused organisations and has taken advantage of government incentives for sustainable initiatives.

## Takeaways

The challenge of waste management in Cambodia is multifaceted, requiring sustainable solutions to be implemented in accordance with clear regulatory requirements with predictable implementation through collaboration of national and local government, private sector and civil society, and participation of development partners. The government has developed various comprehensive strategies and action plans, but a critical factor for success lies in enhancing the participation of the networks of informal scavengers, recyclers and other waste workers within formal waste value chains.

GAEA has launched various recycling pilot projects that demonstrate environmental and social benefits and some business potential. Yet, scalable solutions, such as waste-to-energy projects, will only be feasible at significant scale, which is currently possible only in Phnom Penh. Despite these challenges, GAEA's comprehensive approach fosters innovation, collaboration, and a dedication to sustainable development, driving a positive environmental impact in its operations.



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