Sustainable F&B market in Indonesia

- Knowledge Product -
Business Model Case Study

RE:harvest-ASEIC

April 2025

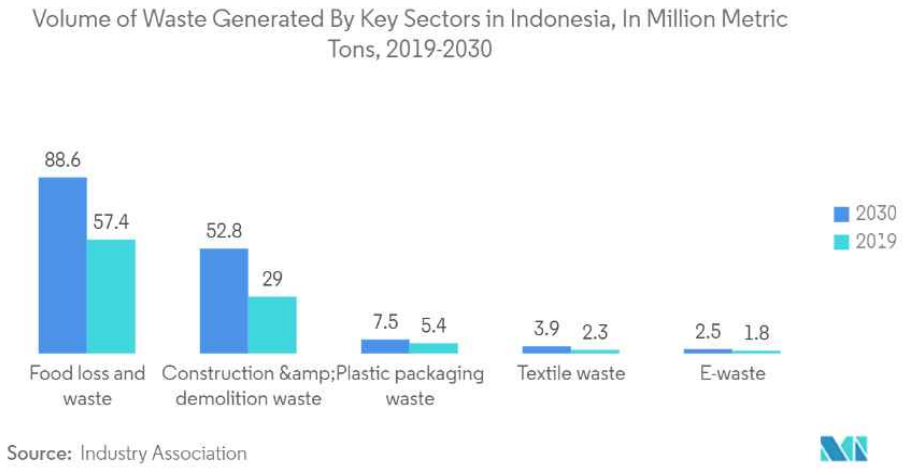
I. Food Loss & Waste(FLW) in Indonesia

1. Background and Problem analysis

□ Defining Indonesia's Food Loss and Waste

❍ **(Food Loss and Waste)** FAO defines the "food loss" as the decrease in the quantity of food resulting from decisions and actions by food suppliers in the chain. On the other hand, the "food waste" refers to the decrease in the quantity of food resulting from decisions and actions by retailers, food service providers and consumers.

❍ **(FLW in Indonesia)** As the world's fourth-largest population, the high demand for food supply in Indonesia leads to the volume of waste generated. Attributing more than half of the total waste generation from key sectors, the Food Loss and Waste is still expected to increase, reaching more than 88 percent of the total, intensifying the concerns in Indonesia.



<Volume of Waste Generated By Key Sectors in Indonesia>

- Within Southeast Asia, Indonesia is the largest FLW contributor, averaging 20.94 million tonnes annually with estimated ranging from 23-48 million tonne, potentially feeding 29-47% of its population[1]. Indonesia's per capita FLW was 115-184kg per year during the period of 2000-2019[2], and is projected to increase by 54% between 2019 and 2030[3].
- **(Economic loss)** The economic losses attributed to FLW in Indonesia are substantial, ranging from IDR 213 to 551 trillion(approximately USD 14-35 billion) per year. This represents about 4-5% of Indonesia's GDP[4].
- **(Environmental threat)** FLW in Indonesia contributes significantly to GHGs emissions, releasing roughly 85.14 million tonnes of CO^2 equivalent annuall

1) Government of Indonesia, Ministry of National Development Planning/Bappenas (2024)
2) PAGE. (2024). Food Loss and Waste Regional Study Report: West Java, Central Java, Bali.
3) Government of Indonesia, Ministry of National Development Planning/Bappenas (2021)
4) LCDI. (2021). Report Kajian FLW (Food Loss and Waste Study). Low Carbon Development Initiative.

y[5]. With an average emission of 2,324.24 kg CO^2-eq per ton of FLW, the total global warming potential of Indonesia's FLW over the past 20 years is estimated at 1,702.9 Mton CO^2-eq, representing 7.3% of the country's average GHGs emissions[6].

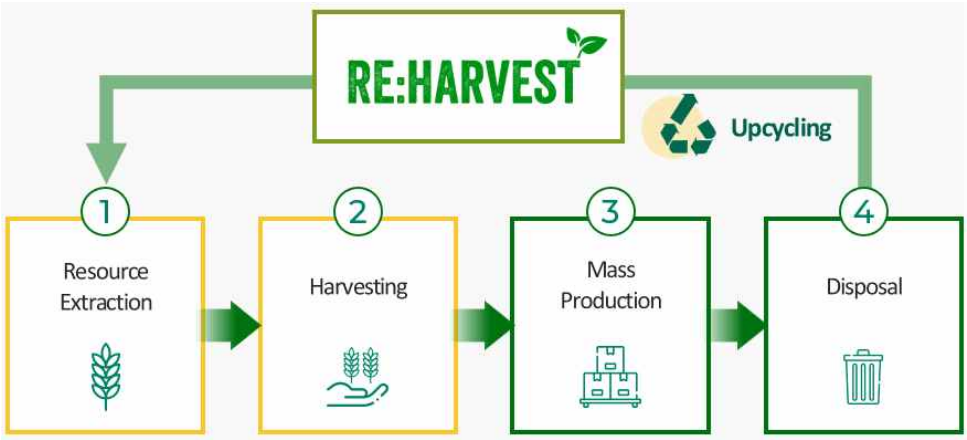
❍ Projections indicated that under a business-as-usual scenario, Indonesia's annual FLW could exceed 100 million tonnes within 2024, leading to severe economic and environmental repercussions[7].

2. Solution - Food Upcycling

□ Food Upcycling

❍ **(Definition)** Food Upcycling stands as an innovative approach to sustainability, transforming food by-products going to waste into valuable resources.

❍ The solution RE:harvest provides is to re-purpose food by-products into diverse range of innovative product lineups. By 're-harvesting' the food by-products being thrown away, Food Upcycling can recirculate the current F&B industry structure.



<Closing the loop of F&B industry structure>

❍ **(RE:nergy Powder)** As part of the Food Upcycling solution, RE:harvest has developed the 'RE:nergy Powder', an innovative alternative raw material derived from by-products like spent grains, malt and rice bran.

- RE:nergy Powder connotes, "return the energy to the environment", and is the key ingredient developed by Upcycling the by-products.

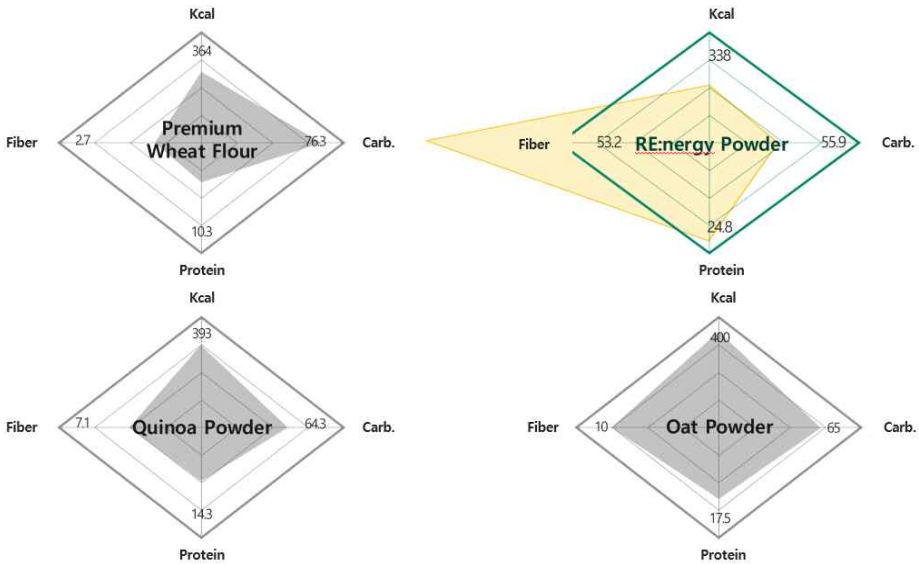
❍ This alternative flour is an eco-friendly raw material that can replace existing flour, providing consumers with higher nutritional contents and added value of good consumption.

5) Government of Indonesia, Ministry of National Development Planning/Bappenas (2024)
6) LCDI. (2021). Report Kajian FLW (Food Loss and Waste Study). Low Carbon Development Initiative.
7) Aaron, R. A., & Budiman, I. (2025). Scaling up Food Loss and Waste Reduction Programs in Indonesia. Center for Indonesian Policy Studies

<Beer Spent Grain to RE:nergy Powder>

❍ RE:nergy Powder can secure the sustainability as it utilizes low value products or to-be-disposed products as it's raw material, using less resources in production compared to the traditional flour, but has similar taste and texture with them.

❍ Most by-products are discarded after the natural sugars and carbohydrates are extracted. However, RE:harvest's Food Upcycling can maintain the nutritional and functional values of these by-products, revitalizing them into eco-friendly foods such as cereals, dough and snacks.



<Average Dietary Fiber and Protein Content Comparison>

(Sales Price: $/KG; Calories: Kcal/100g; Other nutrients g/100g)

- RE:nergy Powder maintains good nutrients with 20 times more dietary fiber and twice more protein compared to the traditional wheat flour.[8)]

❍ **(Revenue Structure)** One of the key advantage of RE:nergy powder is its low cost structure. Most of the by-products are either supplied at no cost or at significantly reduced prices, as they are often considered as waste by the original producers. These materials would otherwise be discarded or sent to

8) Manufacturer Interview(The Bread blue); www.verywellfit.com; www.eathismuch.com; Based on imported quinoa powder standards

landfills, incurring additional disposal costs.

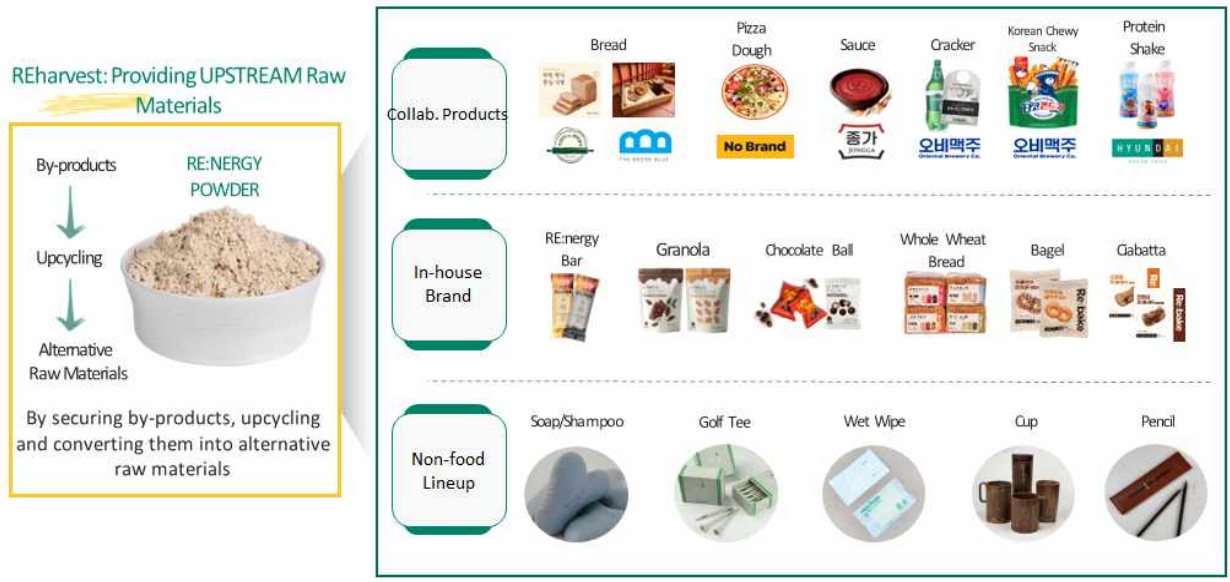
❍ By re-purposing these resources, RE:harvest is able to offer RE:nergy powder at a much lower price point than conventional premium flours such as quinoa or oat powder, while delivering superior nutritional value.

❍ **(Market applications)** RE:harvest operates a diverse business model centered around its core innovation, RE:nergy Powder, generating revenue through 3 primary channels.

① **(B2B)** In the B2B model, RE:harvest supplies RE:nergy powder directly to other enterprises for use in their food or non-food product lines.

② **(B2C)** In the B2C model, RE:harvest sells finished products through its in-house brand RE:bake, offering items such as baked goods and snacks.

③ **(B2B2C)** The B2B2C model involves co-developing products with partners that are marketed under joint or private labels.



<Product lines of RE:harvest>

❍ **(Additionality to the Country[9])** South Korea is facing disproportionate generation of food by-products compared to recycling capacity. Approximately 74% of South Korea's raw ingredients used in the F&B industry are being imported, highlighting the country's heavy dependence on global supply chains[10]. This reliance not only increases the production costs, but it also creates vulnerabilities in the supply chain.

❍ This import dependency underscores the importance of Food Upcycling as a mean of reducing waste and creating value-added products from locally available by-products. By re-purposing by-products, it can reduce the reliance on imported raw materials while mitigating environmental impacts. Fostering a robust domestic Food Upcycling industry could enhance the country's food

9) RE:harvest, *Advancing food upcycling in Korea: Market dynamics and commercialization strategies* (Food Preservation and Processing Industry, 2024)

10) Korea Agro-Fisheries & Food Trade Corporation, 2024a

security by diversifying supply sources and promoting sustainability within the supply chain.

☐ **RE:harvest-ASEIC P4G project**

❍ **(Sustainable F&B market in Indonesia)** Our Partnership of RE:harvest-ASEIC has aimed to contribute to the reduction of food waste in Indonesia by pioneering the Food Upcycling market. The main objectives of the project include the establishment of local operation system with setup of local manufacturing system and improvement in citizen awareness for FLW & Food Upcycling.

Project Title	Sustainable F&B market in Indonesia; Alternative powder by Food-Upcycling
Project Country	Indonesia
Duration	2024.4.1.-2025.3.31.
Objectives	Sub-Goal 1: Set the local operation system Sub-Goal 2: Set the local manufacturing system Sub-Goal 3: Improve awareness

❍ **Progress & Outcomes**

- **(Sub-Goal 1: Set the local operation System)** After analyzing various conditions of entering the Indonesian market, RE:harvest has decided to establish a local corporation in Indonesia. To hedge the barriers* of the local incorporation in Indonesia, RE:harvest has partnered with local partner to establish and operate the local corporation. In result, PT.REH Jaya was established as the local corporation of RE:harvest in Indonesia, creating 30 new jobs locally as of April 2025.

  * Various options considering minimum share capital, time frame, corporate tax for each routes including: the foreign investment, limited liability with foreign ownership, local company, registering as distributor or restaurant business(TDUP).

- In order to maximize the impact in Indonesia, the partnership has targeted to collaborate with PT.Multi Bintang Indonesia(MBI), the largest beer producer in Indonesia and a part of Global Heineken Group. RE:harvest has settled an agreement with MBI for the BSG collection in small scale test productions for 5 years.

- **(Sub-Goal 2: Set the local manufacturing system)** To showcase the Food Upcycled products, Partnership has held the 'Food Upcycling Seminar' in Jakarta in collaboration with local restaurant. Introductions of newly developed menu utilizing RE:nergy powder were made to at least 60 people

including the attendees from government officials, international organizations, private sectors including VCs.

			
Yakisoba noodle	**Cookie**	**Tempura Moriawase**	**Dumpling**
			
Tuna Pizza	**Salad sauce**	**Gochujang sauce**	**Tofu Nabe**

<RE:nergy Powder based menu>

- Based on the customer survey result from the event, the upcycled cookie was officially launched at the local restaurant, holding significant value as Indonesia's first upcycled food product, marking an important milestone in promoting food upcycling in the region.
  - For the details of customer experience from the event, refer to the attached Annex 2.
- The event has successfully raised awareness of the food upcycling while strengthening the institutional interest and alignment, laying a foundation for future policy engagement and regulatory pathway development for food upcycling in Indonesia.

- **(Sub-Goal 3: Improve awareness)** To improve the awareness with the Food Upcycling, RE:harvest has established local marketing channels including the launch of new website opening in local domain(http://www.reharvest.co.id/). Meanwhile, the partnership continued its multi-channel marketing efforts to promote the concept of food upcycling and the upcycled products.
- As part of achieving ESG goals through campaigns that promote valuable consumption, RE:harvest has conducted targeted digital marketing and PR activities to raise awareness about the environment and social impact of food upcycling. Rather than distributing products, the campaign focused on encouraging value driven consumption behaviors through storytelling and SNS influencer engagement.

II. Case Study

1. Challenges & Solutions

□ Challenges with facility scale up and investment decision making

❍ **(Needs for full scale production facility)** One of the key challenges faced by the commercial partner emerged during discussions with potential clients regarding the quality of RE:nergy powder. Several clients expressed reluctance to proceed with product development unless the powder was produced in a facility that met strict quality and regulatory standards. Specifically, clients expected certifications such as GMP, HACCP, and Halal to be in place, standards that typically require a full scale production facility similar to the one operated in Korea. A small scale or pilot plant would not be sufficient to acquire these certifications, making it unsuitable for commercial scale client needs.

❍ **(Prolonged Investment decision making)** However, scaling up production to build a full capacity facility in Indonesia would require significant capital investment and raise complaints. Due to uncertainties in market readiness and the absence of secured long term clients, RE:harvest's investors were hesitant to commit to such high capital expenditure.

❍ After a prolonged internal decision making process, including shareholder meetings to assess the feasibility of this investment, the shareholders ultimately decided not to proceed. The high financial risk, coupled with insufficient market validation at this stage, led RE:harvest to suspend plans for both a pilot scale and full scale production facility in Indonesia.

□ Solution: Alternatives for pilot production

❍ After careful consideration, RE:harvest decided to upcycle the by-products collected from MBI at the RE:harvest facility in Korea only for the pilot period. Considering the condition* with MBI that only small amount of the by-product can be collected during the pilot period, it has been determined that it would be more appropriate to bring the byproduct to the RE:harvest facility in Korea, where all the necessary equipment is already in place, and proceed with pilot production, including various compliance tests. This production setup will be maintained in this way only for the duration of the pilot phase, which is expected to last about one year.

* In order to collect a large amount, MBI also needs to link it with sales as well as consider only the sustainability. Therefore, they can no longer provide the byproduct for free, and the approach needs to shift towards purchasing the byproduct.

❍ During the pilot phase, RE:harvest will simultaneously be working on securing market readiness and long-term clients within Indonesia. Following the pilot phase, RE:harvest will be targeting the establishment of a full-scale

production facility in Indonesia. The upcycled ingredients produced in Korea will be brought back to Indonesia, and the company has decided to pursue two strategic directions. One that do not require the need for BPOM certification and one that incorporates it.

① First, RE:Harvest has been collaborating with local restaurant partner to quickly introduce the Ready-to-Eat(RTE) version of the products, such as pre-mixes, which do not require BPOM approval. This approach enables faster market entry and immediate access to consumer feedback.

② At the same time, RE:Harvest is working with a potential OEM partners in Indonesia to develop and produce packaged snack products that feature its core food upcycling ingredient, RE:NERGY Powder. Once the product quality and taste meet the company's internal standards, the products will initially be launched in Korea and the United States as those market require less regulatory requirements.

❍ Meanwhile, RE:Harvest will begin the BPOM approval process to bring these products to the Indonesian market in the long term. By following these two paths, RE:Harvest aims to effectively penetrate the local market through bakery cafés with pre-mix products, while also preparing for large-scale retail distribution in Indonesia through major outlets such as 99 Ranch Market, Sour Sally Group, FoodHall, and others.

❍ The decision to establish a scale up facility, as mentioned above, will be reconsidered once the company is able to demonstrate clear revenue generation and market growth potential in Indonesia. After successfully entering the market and showing tangible financial performance, RE:Harvest will be in a stronger position to re-engage with shareholders and evaluate whether CAPEX investment is justified or if continuing with the current approach remains more viable.

2. Key takeaways

□ Lessons learned

❍ Given the circumstances of RE:Harvest to transport by-products to Korea for pilot processing, carbon emissions from logistics emerged as an immediate and visible challenge. This brought sustainability to the forefront of our operational decision making and facilitated us to examine the carbon impact of the business model. We would like to highlight the the key takeaways in the perspective of carbon emission management.

❍ In alignment with our commitment to sustainability, we engaged a specialized carbon consulting firm in Korea to conduct an in-depth analysis and on-site assessment. This was intended to help us better understand the sources of our emissions, identify reduction opportunities and prepare for future scalability.

❍ Although our current footprint reflects the realities of an early-stage operation, it has helped us establish a clear baseline, from which we can now

measure progress. By grounding our decisions in data and aligning with long-term sustainability goals, we've laid the foundation for measurable and meaningful impact as we grow.

- In fact, these early insights are already shaping our future roadmap. RE:Harvest is targeting the integration of carbon emission management systems, including renewable energy sourcing and data-driven monitoring as a part of the plan when establishing the full scale production facility in Indonesia after the pilot phase.
- Through this experience, we've learned that investing in responsible systems early is not only feasible, but necessary for scalable and resilient growth in the market.

☐ Recommendations

- The carbon emission management has become one of the major factor to be considered with the business. Carbon emissions management is becoming a strategic differentiator, especially for startups aiming to scale. Demonstrating clear sustainability metrics can enhance credibility with investors who are increasingly prioritizing ESG criteria, as well as opening the doors to impact-focused funding and green financing.
- To other companies, especially for startups, our recommendation is for them to incorporate carbon management system from the very beginning of the project life cycle. Sophisticated methodologies like LCA may not be feasible early on, but structured internal tracking and decision-based offsets can still lead to impactful results.
- To share some examples from our consulting result, if energy consumption(electricity, LPG, etc.) is only measured at the facility level, it's difficult to isolate high-emission processes. Process-level data collection must be built into system design as accurate GHGs reduction estimates rely heavily on process-specific data.
- Certain emissions, such as wastewater discharge, cannot be reliably estimated without direct measurement, while retrofitting the equipment later is costly and disruptive to the operations. Plan for facility monitoring infrastructure like flow meters or sub-metering systems during the setup phase. It can ensure data reliability from the beginning.
- In conclusion, integrating carbon emission management from the earliest stages is not just about compliance, rather it's about building a future-proof business. For startups, the opportunity lies as a strategic asset that will separate them in the emerging sustainable economy.

III. Annex

☐ Annex 1. Data comparison

<Financial Metrics Comparison Chart>

Financial Metrics	Before(2023)	After(2024)	Notes
Revenue	$1,112,162	$1,842,662	Total Revenue
Gross Profit	-$144,956	-$31,606	Reveune – COGS(Cost of goods sold)
EBITDA	-$1,725,397	-$1,980,689	Earnings before interest, taxes, depreciation and amortization
Net Income	-$2,225,197	-$1,992,591	Profit after all expenses and taxes
Operating Expenses	$2,054,184	$1,935,316	Total expenses for operations
Cash Flow	$876,718	-$1,705,400	Net amount of Cash inflow/outflow
Number of Consumers	N/A	N/A	Number of clients
Number of Offtake Agreements	7	19	Number of purchase agreements signed
Client Growth Ratio YoY	N/A	N/A	Increase of clients in the last year
Gross Margin Ratio	-13.03%	-1.72%	Gross Profit / Revenue * 100
Gross EBITDA Ratio	-702%	332%	EBITDA / Gross Profit * 100
Debt-to-Equity Ratio	41.1%	70.8%	Describe financial leverage in the last FY
Customer Acquisition Cost(CAC)	N/A	N/A	Cost of acquiring a new customer
Lifetime Value(LTV)	N/A	N/A	Total revenue expected from a customer
Investment Achieved	$3,000,000	$0	Investment achieved through equity, debt and mixed instruments

<ESG Metrics Comparison Chart>

ESG Metrics	Before(2023)	After(2024)	Notes
Carbon Emissions(tonnes CO2e)	2,447 tonnes	4,054 tonnes	Total CO2 Emissions in the last FY
People positively affected	28	60	Individuals directly and indirectly positively affected
Jobs created	-	36	Jobs created outside of the commercial partner
Gender Diversity (% female employees)	41% (13 of 31)	55% (22 of 40)	Percentage of Female Employees
Compliance and Risk Management	The compliance and risk management are conducted with the followings: 1. External Audit 2. Articles of Incorporation 3. Internal Risk Management Process and R&R(Identification, Mitigation, and Control)		
ESG Reporting and Transparency	N/A		Clear Governance Structure Integration with Financial Reporting
Board Diversity	33.30%	40%	% of Women of the Board Members

☐ Annex 2. Beneficiary Surveys

- (REharvest-ASEIC) Annex_Food Seminar Survey.pdf
- Please refer to the attached file.

☐ Annex 3. Carbon reduction Impact Report

- (REharvest-ASEIC) Annex_Carbon reduction Impact Report.pdf
- Please refer to the attached file.