WASTE-TO-RESOURCE MARKETPLACE TO PROMOTE CIRCULAR ECONOMY

CONTEXT

The challenge owner is a Singapore-based company that specialises in providing eco-friendly packaging solutions. They offer a wide range of packaging solutions, including food, retail and industrial packaging, and are committed to promoting sustainability and helping businesses reduce their carbon footprint.

In manufacturing, a high volume of waste is typically generated. Due to the rise in commodity prices and increased emphasis on sustainability, many manufacturing companies are looking into reusing waste materials to manage supply costs and meet net zero carbon targets. Industrial symbiosis is a form of exchange between industrial companies in which the waste or by-products of one company becomes raw materials for another, with the aim of promoting circular economy by reducing dependence on new raw materials and mitigating the environmental impact of waste generation. While such exchanges do take place in Singapore, they are often informal arrangements between companies and are not widespread as there is a general lack of information about where to find suitable waste materials.

To facilitate waste-to-resource exchanges more effectively, a centralised business-to-business (B2B) database and marketplace platform is needed. However, there are several potential challenges/considerations that may impede adoption, including:

- Waste quality. Waste products typically make up only less than 3% of the materials used in new products due to their inconsistent quality. Manufacturers would also need to know the exact properties/elements in the waste products before using them to ensure consistency in their final products.
- Waste supply and demand. Manufacturers require a constant regular supply of raw materials for production, hence they cannot rely solely on one company's waste stream, which may not be consistent or enough to meet their required volume. On the other hand, some companies' waste products might not be in demand.
- Commercial viability. To be sustainable in the long-term, waste materials must be lower in cost than new raw materials. Hence, the cost of waste materials must be managed to encourage take-up from companies.
- Trust and privacy. Details about a company's waste products can disclose information to competitors about their production. Companies might be reluctant to take part in waste-to-resource exchanges if it would mean compromising their competitiveness.

Hence, the challenge owner is looking for a solution that can help accelerate industrial symbiosis by making the process of exchanging and reusing waste resources more efficient, while addressing the above considerations to increase viability and encourage adoption.

This sector-wide challenge is supported by the Advanced Remanufacturing and Technology Centre (ARTC), as part of the A*STAR Advanced Manufacturing Startup Challenge 2023, focused on the theme of "Sustainability". ARTC is led by the Agency for Science, Technology and Research (A*STAR), in partnership with Nanyang Technological University Singapore. ARTC's expertise in advanced manufacturing and remanufacturing accelerates the transfer of innovation from applied research to industrial applications and solutions, building capabilities through collaboration with their industry members. A*STAR aims to catalyse startup challenge winners to co-innovate and co-deploy advanced manufacturing solutions through ARTC's consortium.

PROBLEM STATEMENT

How might we promote circular economy by facilitating the adoption of industry symbiosis and encouraging B2B exchange of waste materials for reuse?

WHAT ARE WE LOOKING FOR?

The challenge owner is looking for a startup with industry knowledge to leverage A*STAR capabilities to facilitate industry symbiosis in helping companies identify suitable buyers/sellers of waste materials for reuse. The solution should also help to reframe perceptions of "waste" from something meant for disposal into a valuable "resource".

The solution should meet the following criteria:

- Platform capabilities refinement and development
  - Refinement of existing platform features. Such as listing of waste/resources, geolocation, search, and categorisation to better fit to the requirements of the industry.
  - Additional features. Such as a review feature which would enable users to provide reviews about the quality of the waste materials; anonymise feature to allow company names to be masked/anonymised for privacy; communication system for buyers/sellers' interactions; following of listings or sellers to provide updates of listings/requests.
  - Recommendation engine. Make use of ASTAR's knowledge base to provide recommendations to users on potential matches for the resources they are looking to buy/sell, based on their needs and preferences.
  - Industry-specific resource criteria/properties. Understand and integrate industry-specific resource criteria/properties for successful resource exchange.

- Platform deployment and operation
  - Software integration. Software requirements gathering, software design, implementation, and testing.
  - Operation of marketplace platform. Provide capabilities to do platform hosting in the form of server design and development based on customer requirements. Leveraging on cloud technology, virtual private servers, etc. to provide high-performance hosting solutions with on-demand resource allocation to handle anticipated volumes of transactions.
  - Performance optimisation. Provide capabilities such as optimised server configurations to ensure fast-loading websites.
  - Maintain and ensure usability of platform. Provide operational support by resolving any issues that may arise in its operation.

OVERALL PERFORMANCE REQUIREMENTS

- Developer-friendly. Offer features and tools for easy deployment and testing of platform.
- Easy to use. Intuitive and user-friendly interface.
- Scalability. Solution should be scalable to mobile application.
- Secure and PDPA-compliant. The solution should have security measures in place to protect user data and production information, and access should be strictly limited to registered users.

There are no restrictions on the geographical location of the problem solvers who may choose to apply to this challenge. However, the prototype must be demonstrated in Singapore.

POSSIBLE USE CASES

1. Efficient sourcing for waste resources. William works for a food manufacturing company that is looking for ways to reduce its manufacturing costs, diversify its raw material sources, and reduce its carbon footprint. He registers his company on the solution and provides information about their resource requirements and the types of waste resources they would be able to utilise, which includes brewers' spent grain (BSG)[1] that can be used in flour production. The solution recommends several craft beer breweries that are selling their BSG waste, and William is able to view and compare the detailed specifications and prices of each option. To minimise transport costs, William further applies a geolocation search to identify the seller located closest to their production facility. After a successful exchange with the seller, William leaves a review on the solution to rate the quality of the BSG he had purchased, which helps to improve the solution's future recommendations.

2. Transforming waste into revenue. Ruth works for a craft beer brewery that produces a significant amount of BSG as a waste by-product, and is looking to reduce disposal costs. She registers her company on the solution and lists BSG as their primary waste product, detailing its quality, specifications, and nutritional value. The solution also requires her to provide information about her company's location and preferred modes of waste transport. After she completes the company profile, the solution suggests a match with William's company, which is looking to purchase BSG. The two companies negotiate offline on mutually agreeable costs, and the brewery manages to turn its disposal costs into a potential revenue stream.

WHAT'S IN IT FOR YOU

- SGD50,000 of prize money for each winner of this challenge (see Award Model)
- Access to IMDA's innovation consultancies (e.g. Design Thinking, Digital Storytelling, UI/UX) and PIXEL corporate innovation hub (e.g. hot-desking, project studios, ARVR, usability, 5G test labs) for prototyping and commercialisation
- SGD150,000 A*STAR Innovation Voucher and 2-year ARTC Membership
- Shortlisted 3 Grand Winners of the Startup Challenge 2023 to be fast tracked to ESG's SLINGSHOT Top 50 and can look forward to SGD30,000 Startup SG grant
- Opportunity to commercialise solution for deployment and adoption by ARTC members

EVALUATION CRITERIA

The evaluation process shall take place over two stages. Proposals shall be evaluated based on the evaluation criteria set out for the first stage. Thereafter, shortlisted proposals shall be subjected to a second stage evaluation in the form of an interview / pitch, and the scoring shall be based on a re-defined assessment criteria for the selection of the challenge finalist(s).

Solution Fit (20%)	Relevance: To what extent does the proposed solution address the problem statement effectively?
Solution Readiness (40%)	Maturity: How ready is the proposed solution to go to the market? Scalability: Is there any evidence to suggest capacity to scale?
Solution Advantage (20%)	Quality of Innovation: Is the solution cost effective and truly innovative? Does it make use of new technologies in the market, and can it potentially generate new IP?

[1] Brewers' spent grain (BSG) is a by-product of the brewing industry that makes up 85% of brewing waste. BSG is the solid residue left behind after barley is malted and mashed to extract the protein, sugar and nutrients during the beer brewing process.

Company Profile (20%)	Business Traction/Model: Does the product have user and revenue traction? Is the company able to demonstrate financial capabilities and resources to complete the prototype? Team Experience: Do the team members possess strong scientific/technical background?

AWARD MODEL

30% of the prize money will be awarded to each selected finalist at the start of the POC/prototype development process. The remaining 70% will be awarded after completion of the POC/prototype solution, based on milestones agreed between Problem Owner(s) and the solver. Prize money will be inclusive of any applicable taxes and duties that any of the parties may incur.

Note that a finalist who is selected to undertake the prototype development process will be required to:

- Enter into an agreement with Problem Owner(s) that will include more detailed conditions pertaining to the prototype development;
- Complete an application form with IMDA that will require more financial and other related documents for potential co-funding support.

Teams with public research performers are required to seek an endorsement from their respective Innovation and Enterprise Office (IEO) and submit the IEO form together with the proposal.

DEADLINE

All submissions must be made by **11 August 2023, 1600 hours (SGT/GMT +8)**. Problem Owner(s) and IMDA may extend the deadline of the submission at their discretion. Late submissions on the OIP, or submissions via GeBIZ, will not be considered.