Autonomous solution to sort and recover recyclable waste materials at Sembcorp's Material Recovery Facilities (MRF)

Challenge Owner	**Sembcorp Industries**
Opening date for proposal submission	**12 November 2019**
Closing date for proposal submission	**14 February 2020, 12 pm (UTC+8)** Proposals and all accompanying attachments must be submitted through the Sustainability Open Innovation Challenge portal.

BACKGROUND

Sembcorp currently operates a materials recovery facility (MRF) in Singapore, which recovers and recycles plastics, cans, and glass, from municipal solid waste materials. The waste materials are collected from recycling bins via Sembwaste's collection network. At the MRF, the waste materials are transferred onto the conveyor belt where operators identify, sort and recover the recyclable materials. Each conveyor belt moves at a speed of around 0.2 m/s and has a throughput of 50 tonnes/day. This highly labor-intensive process also exposes workers to pathogens and dioxins, etc. from the waste materials.

An autonomous sorting solution (possibly with AI and advanced sensors) is sought, to use materials, shape and type recognition capabilities to identify and sort various waste materials accurately. The solution should not require much manual intervention required for the recyclables recovery process, be resource efficient and potentially recover more recyclables.

DESIRED OUTCOMES

The desired outcome is a full-scale commercial autonomous sorting system, backed by machine vision and AI technologies, that can extract and recover recyclable materials including glass, metal, plastics from a conveyor belt carrying a continuous stream of municipal waste material (e.g. by using robotics arm).

TECHNICAL SPECIFICATIONS AND REQUIREMENTS

- The solution should:
  - Automatically recover at least 70% of the recyclable materials, and sort them accordingly, at the constant operational stage. Unsorted waste can be sorted manually downstream.
  - Handle a throughput of 50 tonnes daily.
  - Work for soiled and moist waste.
- Recyclables to be recovered include: ferrous and non-ferrous metals, glass, and plastics (such as the PET, or polyethylene terephthalate, bottles)

- Proposals should include information on any proof-of-concept (POC)/minimum viable product (MVP) that is non-sensitive.
- Applicant should indicate estimated commercial price of solution, cost of operation/maintenance and cost-benefit analysis of the solution in the proposal.

Besides addressing the above requirements, the proposed solution should also fulfil the following criteria:

- Not be readily or commercially available in the market.
- Wherever applicable, aim to:
  - Enhance safety of operations; and/or
  - Reduce reliance of manpower; and/or
  - Improve quality, consistency and service delivery; and/or
  - Achieve cost-effectiveness; and/or
  - Improve efficiency/productivity.

BUSINESS OPPORTUNITY

Sembcorp may be the first customer of this autonomous recyclable wastes sorting system. There are also other material recovery facilities in Singapore that may require this solution.

DEVELOPMENT TIMELINE

The project can be implemented in 2 phases:

Phase 1: deploy a minimum viable product (e.g. 1 robotic arm) at the conveyor belt of the MRF for proof of concept in 6 – 12 months.

Phase 2: Implement an integrated complete solution (e.g. a series of robotic arms) in an assembly line setup to recover 70-80% of waste material within 2 years.

THE RULES AND REGULATIONS ON THE CHALLENGE WEBSITE APPLIES, WITH ADDITIONAL INFORMATION BELOW.

FUNDING SUPPORT

Enterprise Singapore may support shortlisted local SMEs/startups with funding of up to 70% of the qualifying project cost, capped at $250,000. Sembcorp may also provide additional funding support.

Foreign solution providers are encouraged to work with local SMEs/startups for solution development.

ADDITIONAL RESOURCES

Sembcorp will allow access to its MRF in Singapore for the installation and trial of this robotic arm setup. If the trial is successful, Sembcorp may scale up the solution for full commercial deployment, and work with the selected applicant to automate the entire MRF process.

EVALUATION CRITERIA

Proposals will be evaluated against the following criteria:

- Technical feasibility of solution [35%]:
  - Effectiveness in addressing the challenge statement
  - Operational feasibility for deployment at the MRF
  - Retrofit with minimal/ no nuisance and disruption to existing operation
- Economic feasibility of solution [25%]:
  - Commercialisation strategy
  - Estimated commercial price
  - Estimated operating, life cycle costs and return on investment upon deployment
- Capacity and expertise to execute project [25%]:
  - Requisite capabilities and committed resources to undertake solution development
- Clarity of proposal and accompanying information on POC/MVP [15%]

TECHNICAL BRIEFING

A technical briefing will be held to provide interested applicants with more information. The details for the briefing are as follows:

Date :	18 Nov 2019 *(Monday)*
Time:	9am to 12 pm
Location:	230 Victoria Street, Bugis Junction Office Tower, Level 10, Singapore 188024 - Room: Little Red Dot

Please register your interest here by 14 Nov 2019, 12pm.

PROPOSAL SUBMISSION

Submit your proposal using the Application Form, together with all supporting documents, in the Sustainability Innovation Call portal.

CONTACT

For further enquiries, please email:

- tan.phaykiat@sembcorp.com – for matters pertaining to the challenge statement

- Sustainability_Challenge@enterprisesg.gov.sg – for assistance on:
  - *Using the Sustainability Open Innovation portal for registration, submission of proposal, etc.*
  - *Funding enquiry*