



Cool Ideas Enterprise Open Innovation Challenge Statement

A. Problem Statement/ Title:

Develop a solution to improve waste collection operations in HDB estates where the Pneumatic Waste Conveyance System (PWCS) has not been installed. The solution should:

- Reduce reliance on manpower, and reduce foul smells and pests
- Maintain high operability in the event of wet weather and obstacles

B. Background:

The PWCS was introduced to new HDB estates to automate the labour-intensive process of collecting waste from refuse chutes. While it has been successfully implemented in old estates (such as Yuhua) to replace the previous Individual Refuse Collection System (IRCS), there are estates still using the IRCS. In these estates, Town Council workers drive battery-operated refuse carts to collect refuse at the bottom of each block.

HDB is looking for an automated solution for the clearing of refuse that can be implemented in estates with the IRCS. Potential solutions include autonomous vehicles, or robots with mechanisms that clear bins. Solutions should address one or more of the following challenges faced by IRCS:

- **Reliance on manpower:** The COVID-19 pandemic has highlighted the challenges posed by the reliance on manpower for waste management. During Circuit Breaker, several Town Councils noted a 10% to 40% increase in waste collected ([CNA, 2020](#)) yet there are 14% fewer waste collection workers deployed due to lockdown measures imposed ([Straits Times, 2020](#)).
- **Foul smell emission:** Due to improper disposal practice, height of waste disposal and weight of the waste thrown into the refuse chute, waste fluid may spill and stain the chute linings, especially at ground level. Over time, the accumulation of these fluids breeds pests and emit foul smells, which can be smelt through the chute openings within flats and during waste collection at ground level.
- **Pest and roaches in chutes:** As part of NEA's dengue control efforts, HDB's refuse chutes are regularly fogged. Even though residents are advised to seal up the openings of the refuse chutes in their units, roaches are still able to escape into HDB flats during or after the fogging process. In addition, the task of sealing up the refuse chute within the unit may be physically challenging for some, such as the elderly or the physically impaired.
- **Traffic and wet weather disruptions:** Current waste collection procedures become challenging and time-consuming during rainy days, or when battery operated refuse carts have to manoeuvre along the apron slabs of HDB blocks while avoiding passers-by and parked cars.

C. Technical Requirements/ Performance Criteria:

- I. **Technology maturity:** Battery life, maximum coverage per run, position accuracy, response latency, speed of task completion, energy consumption, performance in narrow spaces
- II. **Reliability:** Incidence of faults and failure, manhours involved in fault rectification, wet weather resistance
- III. **Safety and Security:** Roadmanship, incidence of collision, time to collision, rapid acceleration/ deceleration
- IV. **Scalability:** Manhours involved in task completion, profits and costs savings, regulatory compliance