



# Strategy of Landfilled Waste Reduction by a Distributed Material Recycling Facility System in Surabaya, Indonesia

Afif Faiq Muhamad, Kazuei Ishii, Masahiro Sato, Satoru Ochiai  
 Laboratory of Sustainable Material Cycle Systems, Graduate School of Engineering, Hokkaido University

## INTRODUCTION

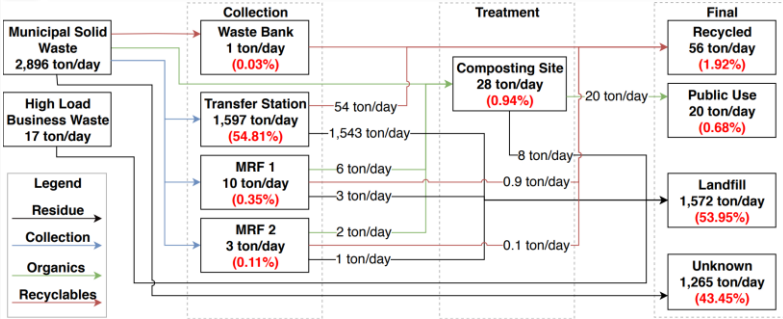


Figure 1. Waste Flow in Surabaya City, Indonesia.

## METHODOLOGY

### Scenario Setting

- Scenario 0: Existing condition
- Scenario 1: Merged TS
- Scenario 2: Upgraded TSs
- Scenario 3: Distributed MRF System

### Transportation Analysis

QGIS 2.18.20 'Las Palmas' with built-in extension of GRASS GIS

### GHG Emission Analysis

GHG Calculator for Solid Waste ver. II-2013

**Objective:** to propose a new realistic, reasonable, and cost-effective strategy with **small-sized distributed MRFs**, with improved transportation efficiency, to achieve a **30% reduction of landfilled waste** and to contribute to GHG emissions reduction, focusing on Surabaya as the case study.

## RESULTS AND DISCUSSION

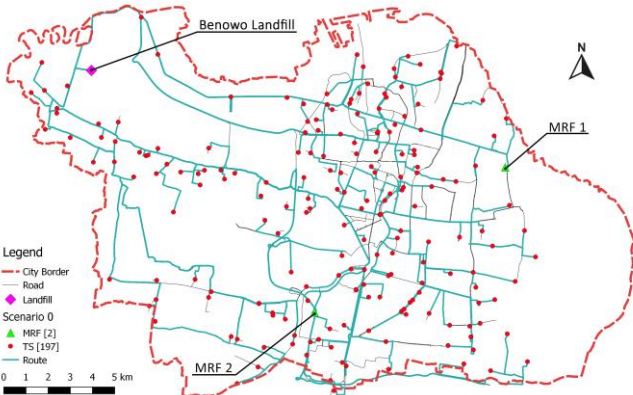


Figure 2. Scenario 1: Existing Condition.

Table 1. Evaluation Results.

| Details                              | S0      | S1      | S2      | S3      |
|--------------------------------------|---------|---------|---------|---------|
| TS (unit)                            | 197     | 194     | 149     | 173     |
| MRF (unit)                           | 2       | 2       | 50      | 26      |
| Composting Site (unit)               | 24      | 24      | 44      | 44      |
| Investment (bil. IDR/y)              | 2.9     | 2.9     | 13.7    | 9.4     |
| Total Cost (bil. IDR/y)              | 74.5    | 74.4    | 76.9    | 59.2    |
| MSW Reduction (ton/y)                | 19,111  | 19,111  | 140,746 | 141,964 |
| GHG Emission (tCO <sub>2</sub> -e/y) | 329,932 | 329,929 | 233,590 | 234,756 |

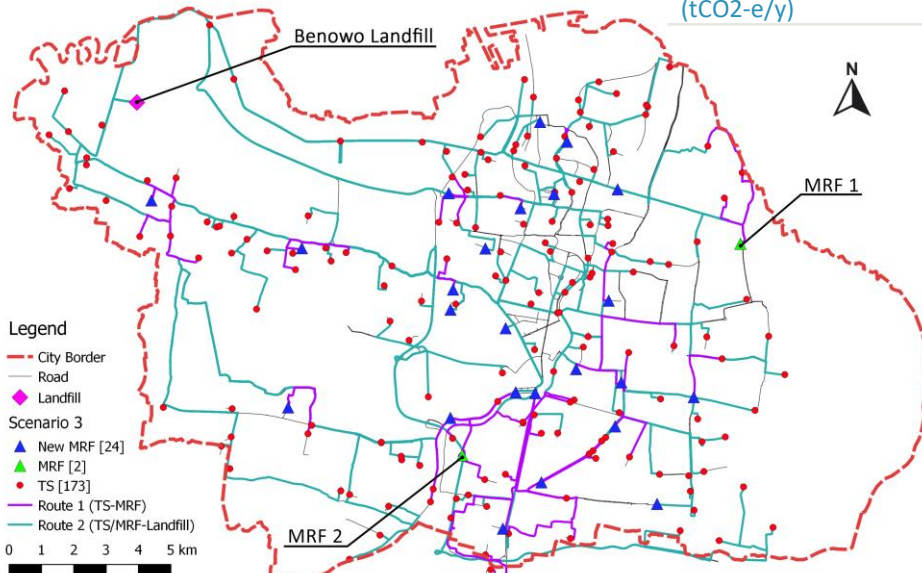


Figure 3. Scenario 3: Distributed MRF System.

## CONCLUSION

The distributed MRF system is a realistic and reasonable solution to reduce landfilled waste by 30% and reduce GHG emissions at a promising level.

- 2.2 times more revenue
- 27% less tipping cost
- 10% less transportation cost than the present condition.

For more in publication:

