

# From Trash to Cash

## Building a Sustainable ASEAN through Smart Waste Management

**Country:** MALAYSIA

**Team Legendary Production**

LIM XIN YING | LIM WEI YOU



## Problem Statement

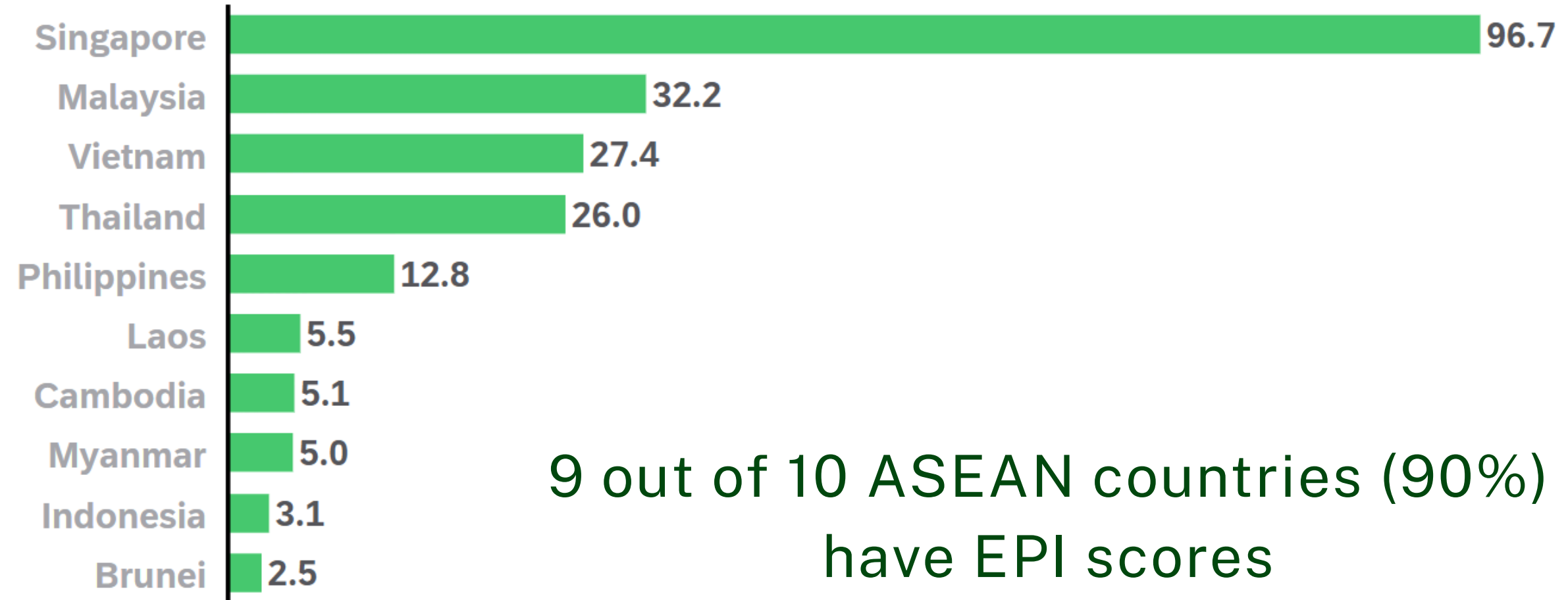
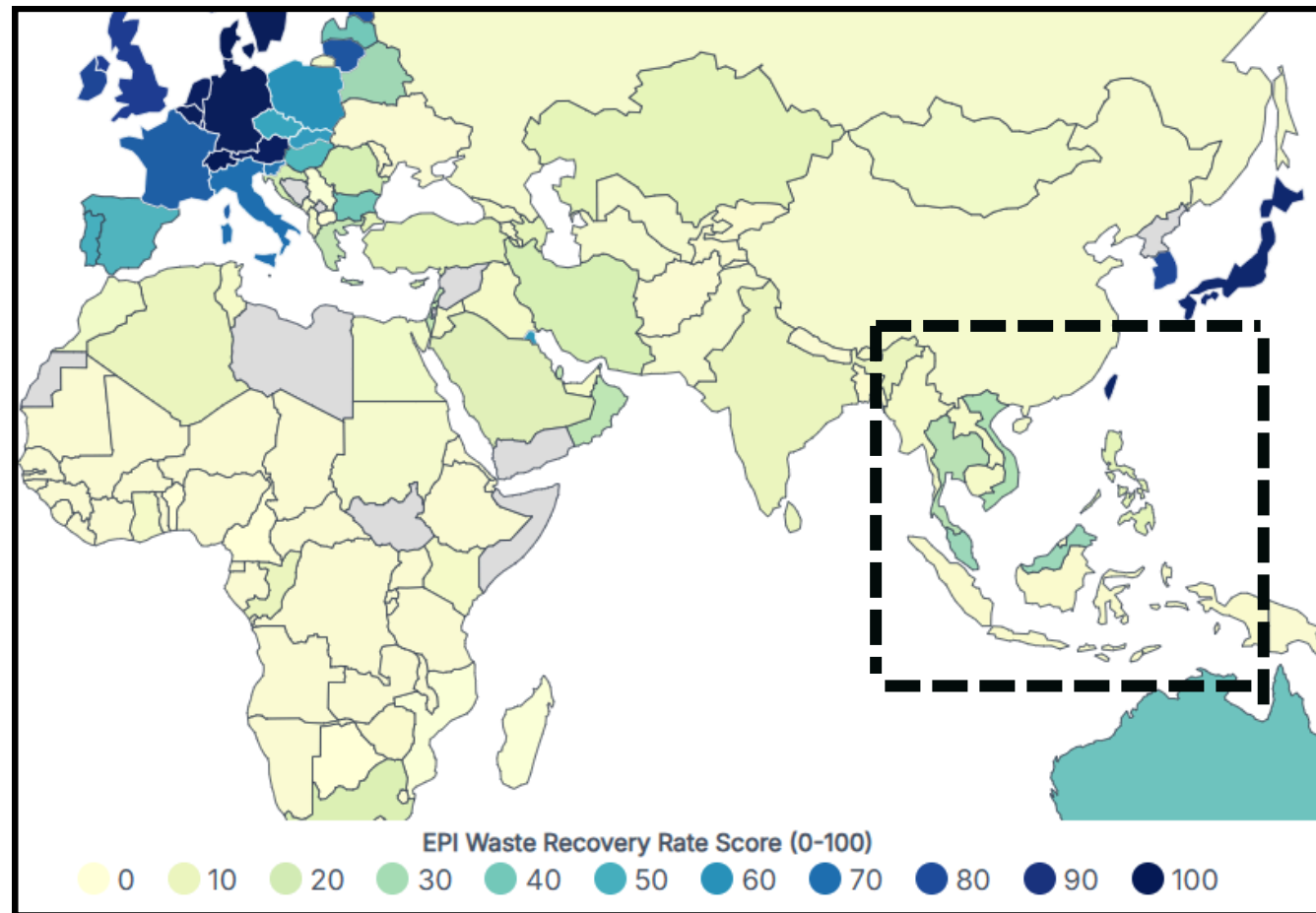


## Trash is growing...

Every day, ASEAN throws away about **411,022 tonnes** of solid waste.

...but recycling isn't keeping up

## 2024 EPI Waste Recovery Rate Score (0-100) of ASEAN:

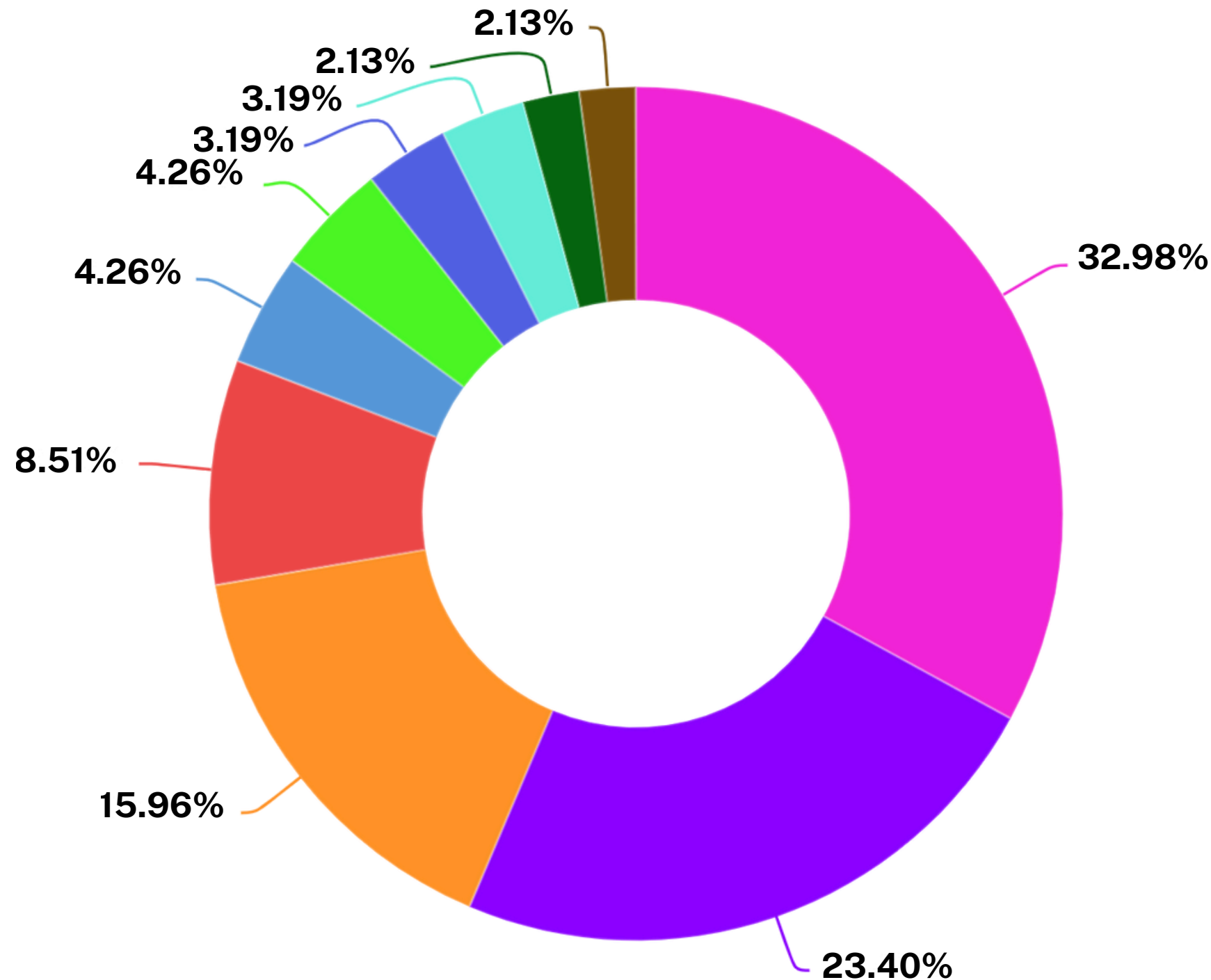


9 out of 10 ASEAN countries (90%)  
 have EPI scores  
**less than 50**

**Low EPI waste recovery score = Poor sustainable waste management**

# Composition (%) of MSW in Malaysia in 2022

- Food Waste
- Plastic
- Paper
- Diapers/napkin
- Comingle
- Household hazardous waste (HHW)
- Garden/yard
- Glass
- Metal
- Tetrapak



**More than 42.34% of waste are recyclable,**

**however, most waste ends up in landfill**

**We are not capturing recycling potential**

Source: The Star, The high price of not recycling, 2022

# Factors of Waste Growth



Population Growth



Urbanization

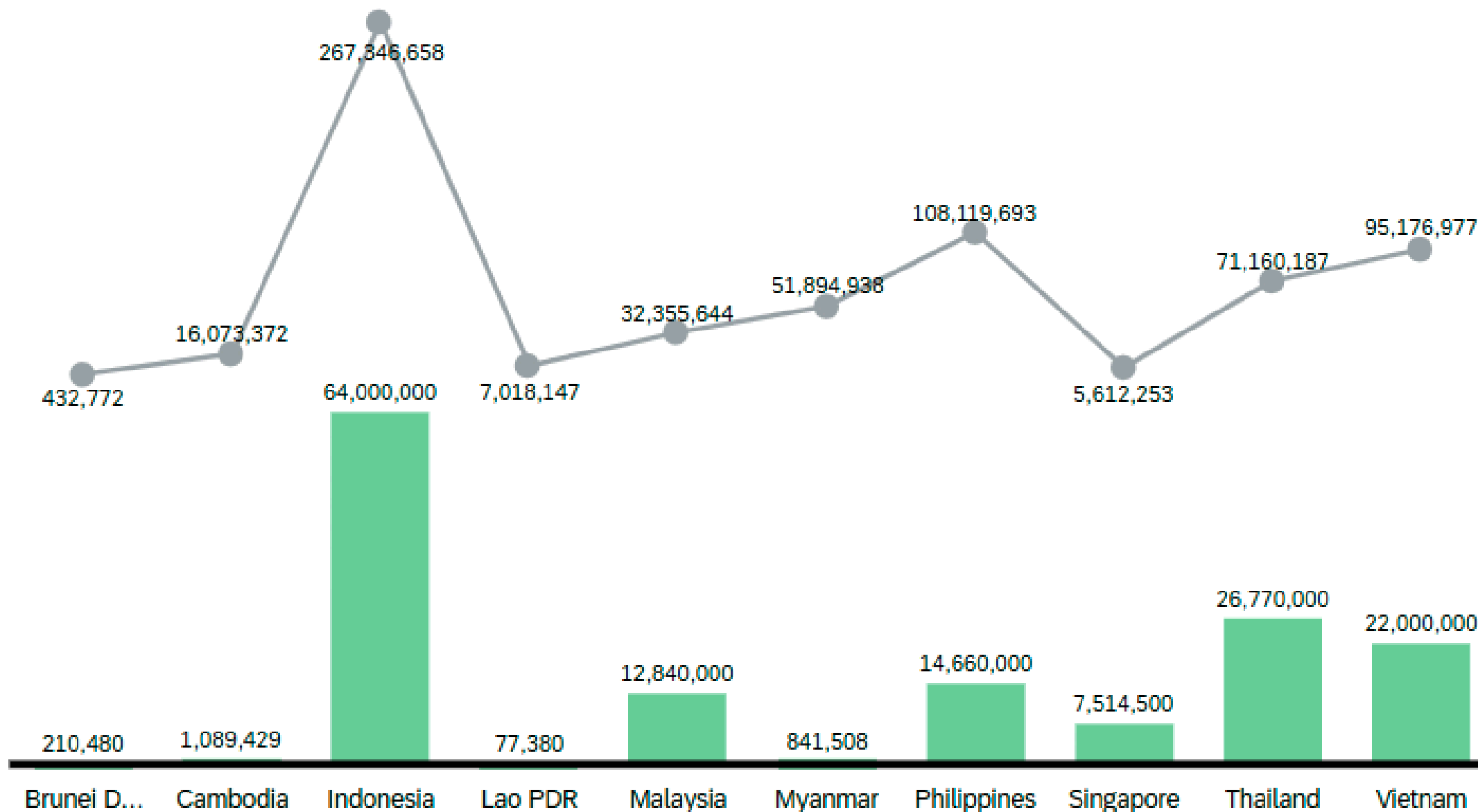


Waste Explosion

# Factor 1 Population Growth

### Correlation between Annual MSW Generation and Population in ASEAN 2017

■ Annual MSW Generation (tonnes) ● Population



**ASEAN population**  
**>680 million**

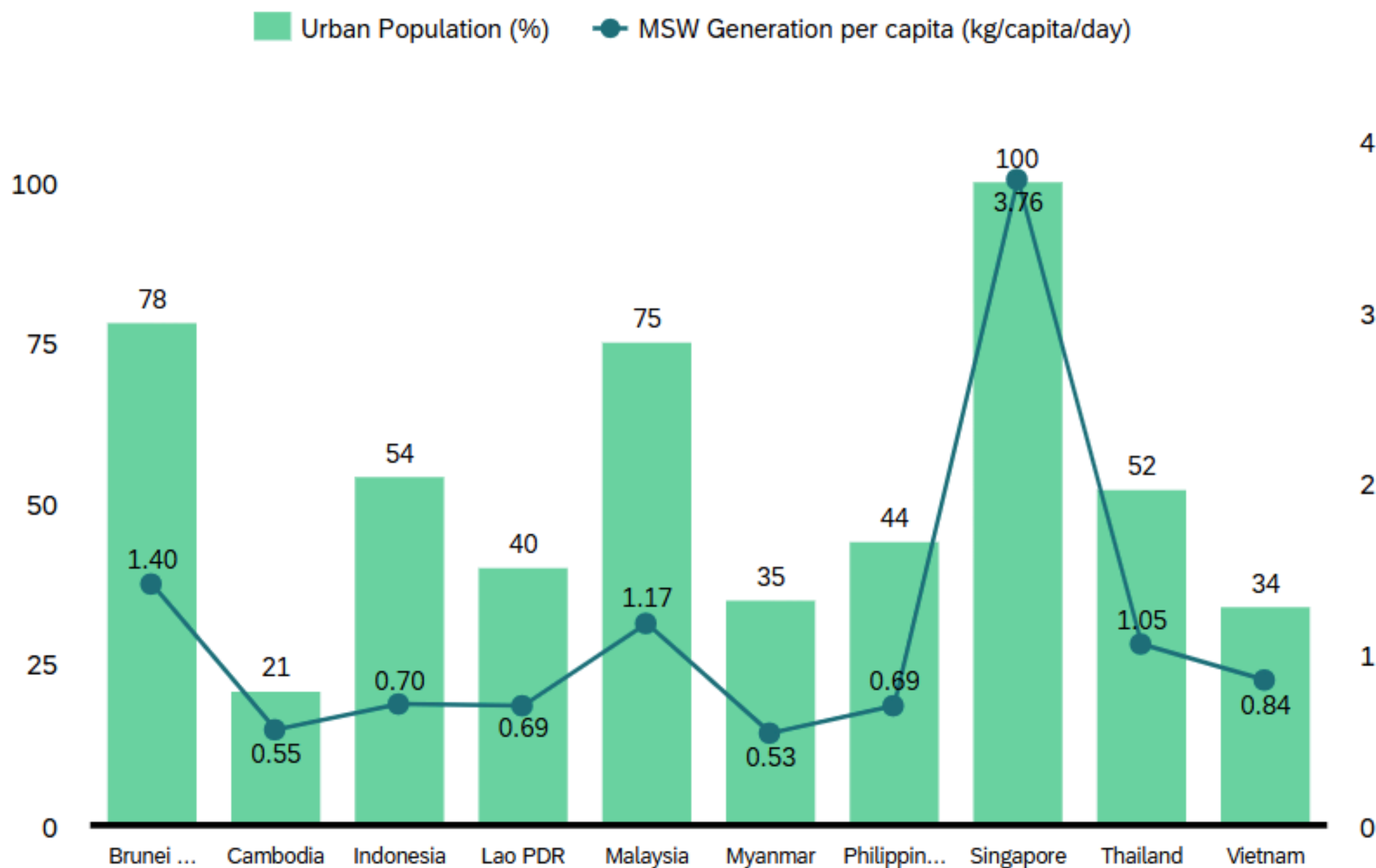
**Annual MSW generation in ASEAN:**  
**>150 million tonnes**

**Population ∝ MSW generation**

Source: UNEP Summary Report 2017, Waste Management in ASEAN Countries [1], World Bank Population

# Factor 2 Urbanization

### Correlation between Urban Population and MSW Generation per capita (2017)



## Percentage of urban population in ASEAN:

# + 7.1%

## from 2010 to 2023

**Urbanization ∝ MSW per capita**

Sources: UNEP Summary Report 2017, Waste Management in ASEAN Countries [1], ASEAN Statistical Yearbook 2018 [2], ASEAN Statistical Yearbook 2024 [3]

# Current Waste Treatment /Disposal Method in ASEAN

## Waste Disposal Method

Country	Composting	Incineration	Open Burning	Open Dump	Sanitary Landfill
Brunei	✓	✗	✗	✓	✓
Cambodia	✓	✗	✓	✓	✓
Indonesia	✓	✓	✓	✓	✓
Lao PDR	✓	✗	✓	✓	✓
Malaysia	✗	✓	✗	✓	✓
Myanmar	✗	✓	✗	✓	✓
Philippines	✓	✗	✗	✓	✓
Singapore	✗	✓	✗	✓	✓
Thailand	✓	✓	✗	✓	✓
Vietnam	✗	✗	✗	✓	✗

**ASEAN relies heavily on sanitary landfills & open dumping because of low cost and easy implementation**



### Disadvantages:

- 100% value loss
- space-consuming
- unsustainable

# **Impacts** of Current Waste Disposal Methods

# Impact 1

## Economic Losses



### Plastic

**RM70mil**

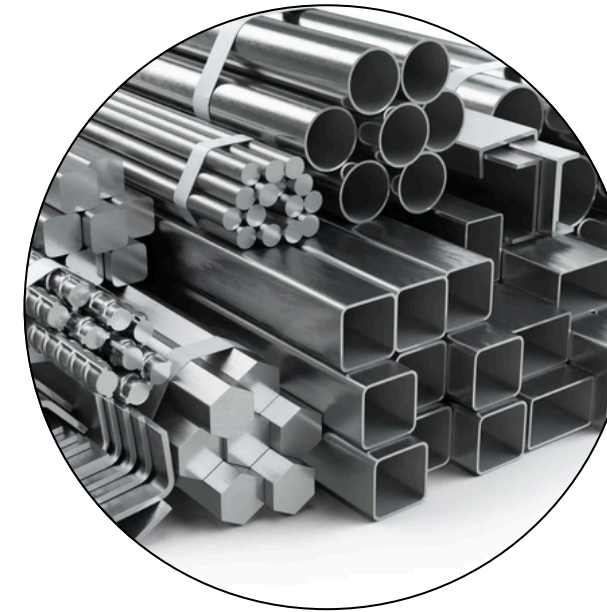
is lost per year based on minimum market rate of 10 sen per kg



### Paper

**> RM47mil**

is lost per year based on minimum market rate of 30 sen per kg



### Metal

**> RM25mil**

is lost per year based on minimum market rate of 40 sen per kg



### Tetra pak

**RM3mil**

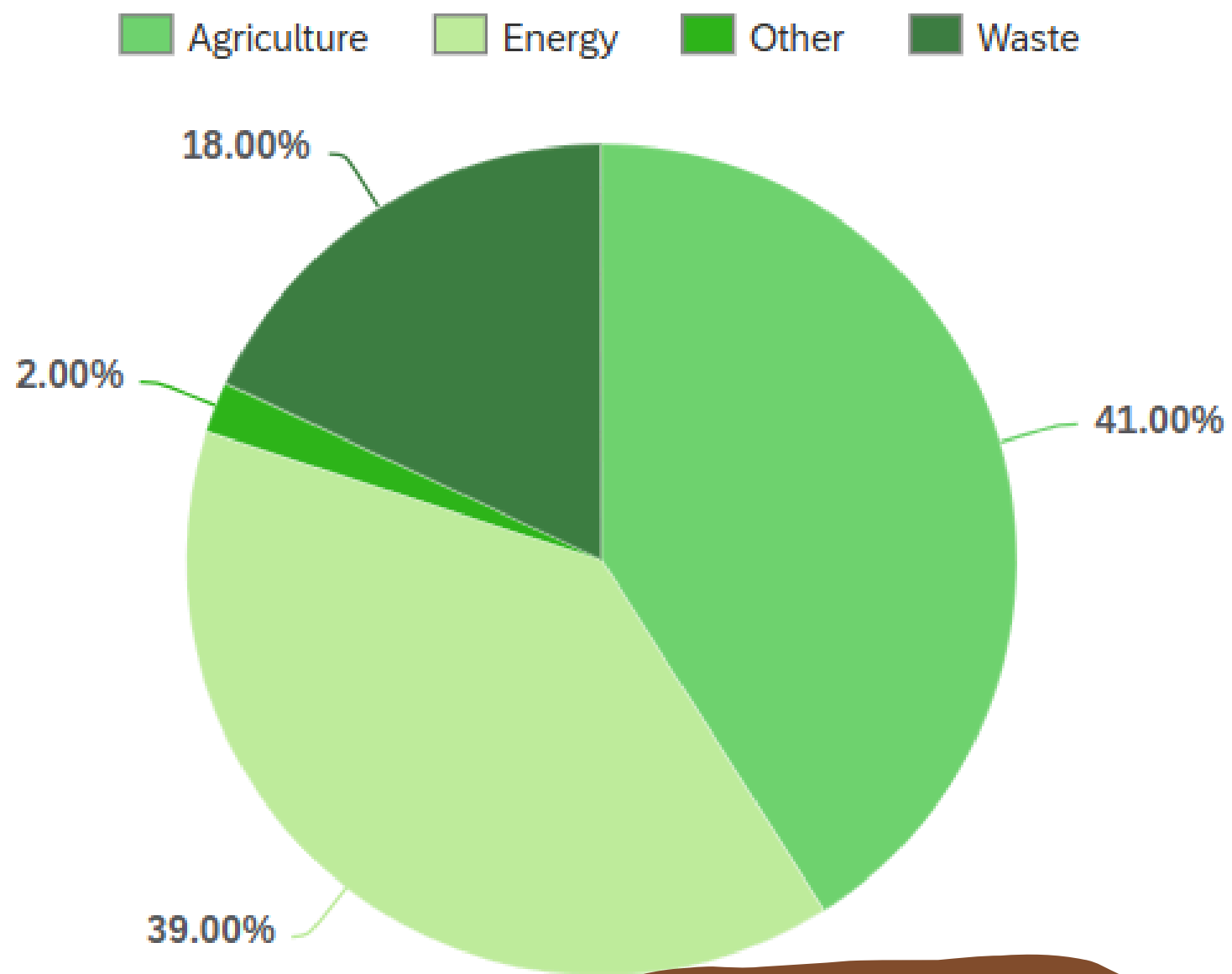
is lost per year based on minimum market rate of 5 sen per kg

Estimated value lost due to **missed recycling** in **Malaysia** is **RM291 million** in **2023**, assuming average price of of recycled waste is 30 sen per kg.

# Impact 2 Landfilling & Open Dumping Accelerate Global Warming

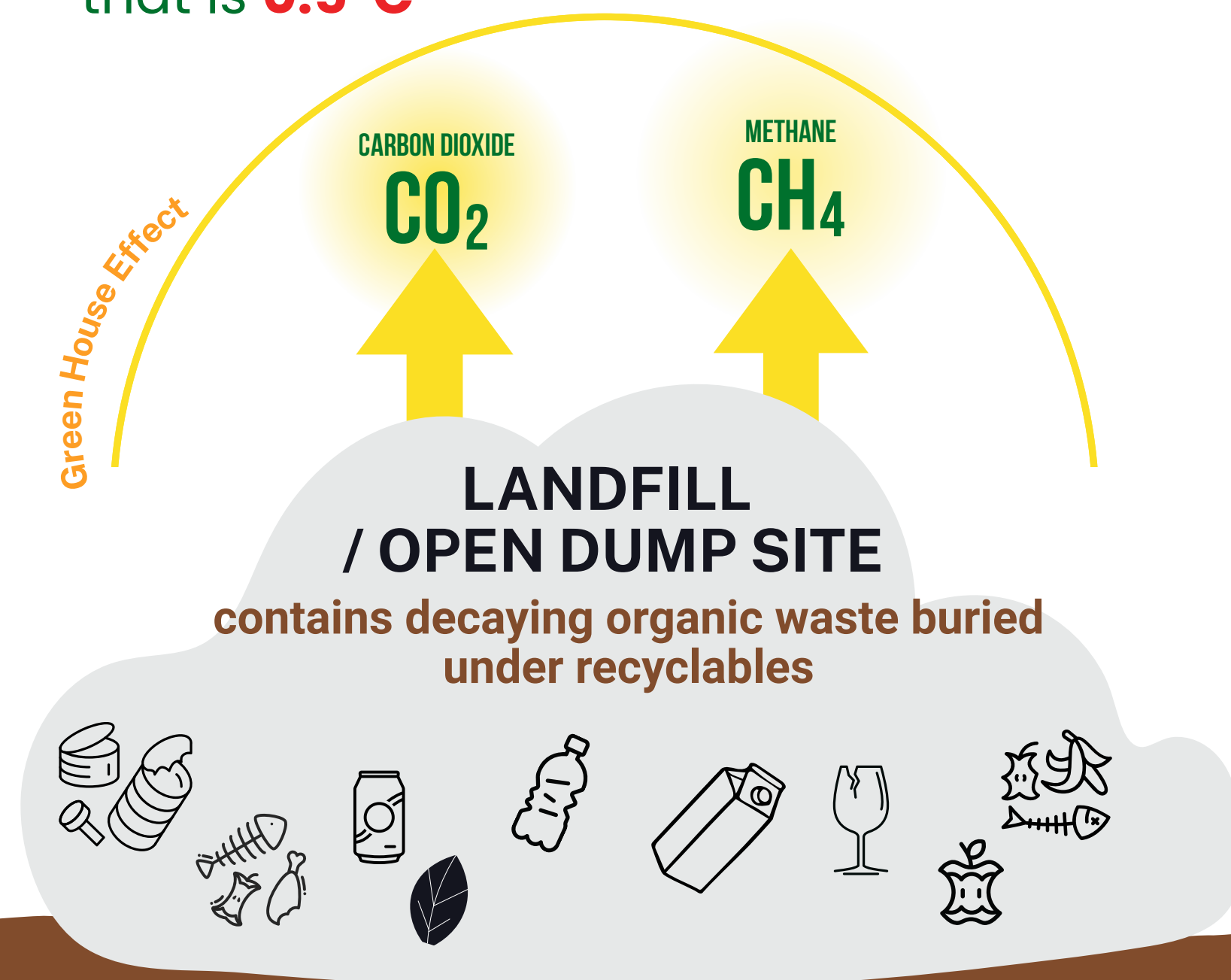
Waste contributes to **18%** of methane emissions in 2023

### Methane Emission by Sector



## Methane

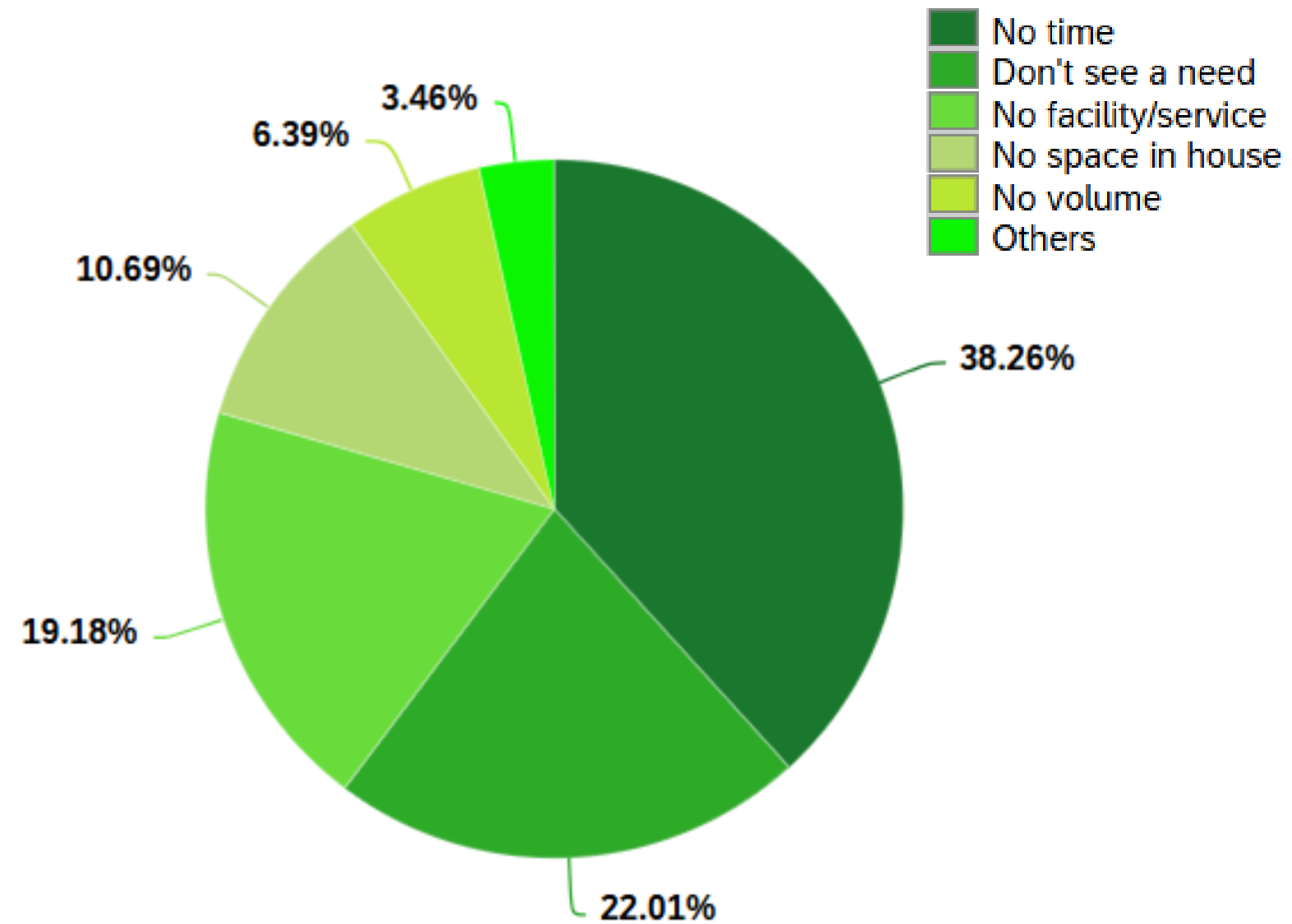
- can trap heat **80 times higher** than CO<sub>2</sub>
- contributed around **1/3 of global warming**, that is **0.5°C**



The issue is **real**,  
the consequences are **serious**  
so why is recycling still falling short?

# Problems Faced by Waste Producers

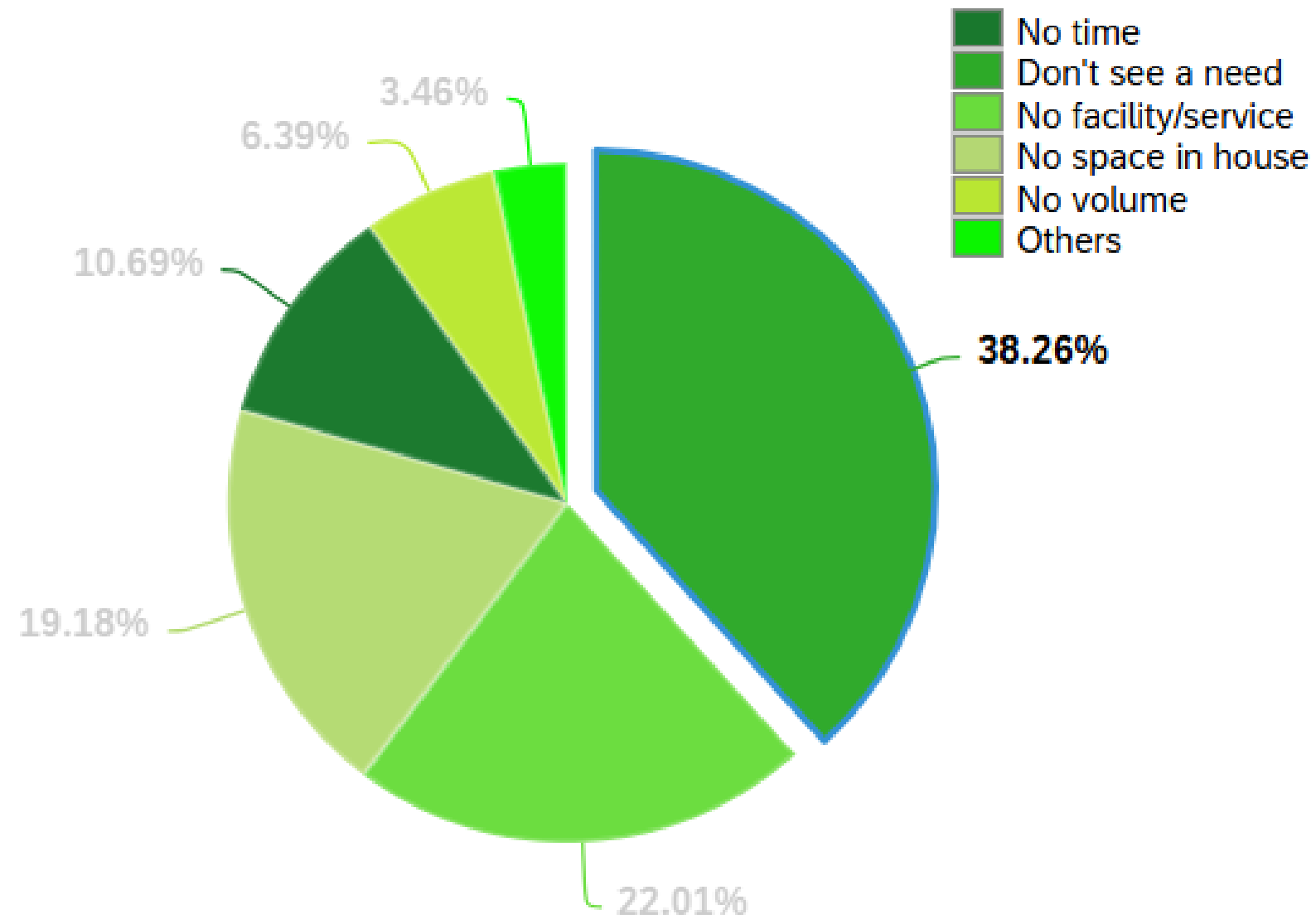
## Reasons for Not Recycling



**Source:** *Survey on SW Composition, Characteristics and Existing Practice of SW Recycling in Malaysia Final Report [5]*

# Problems Faced by Waste Producers

## Reasons for Not Recycling



## Top 3 problems:

Problem 1

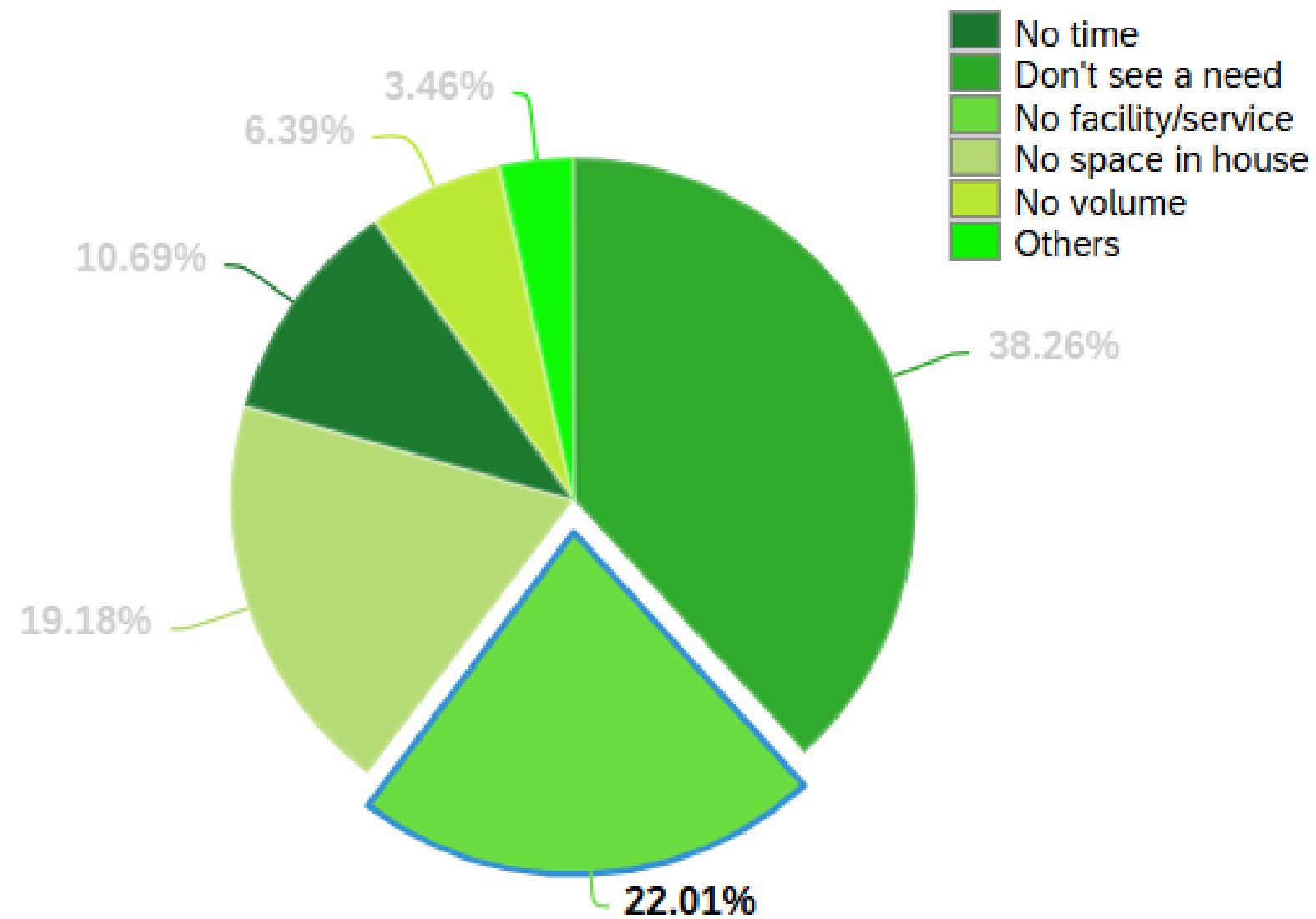
### No time

- Sorting recyclables
- Finding available recycling centres
- Sending recyclables to recycling centres

**Source:** Survey on SW Composition, Characteristics and Existing Practice of SW Recycling in Malaysia Final Report [5]

# Problems Faced by Waste Producers

## Reasons for Not Recycling



**Source:** Survey on SW Composition, Characteristics and Existing Practice of SW Recycling in Malaysia Final Report [5]

## Top 3 problems:

**Problem 1**

### No time

- Sorting recyclables
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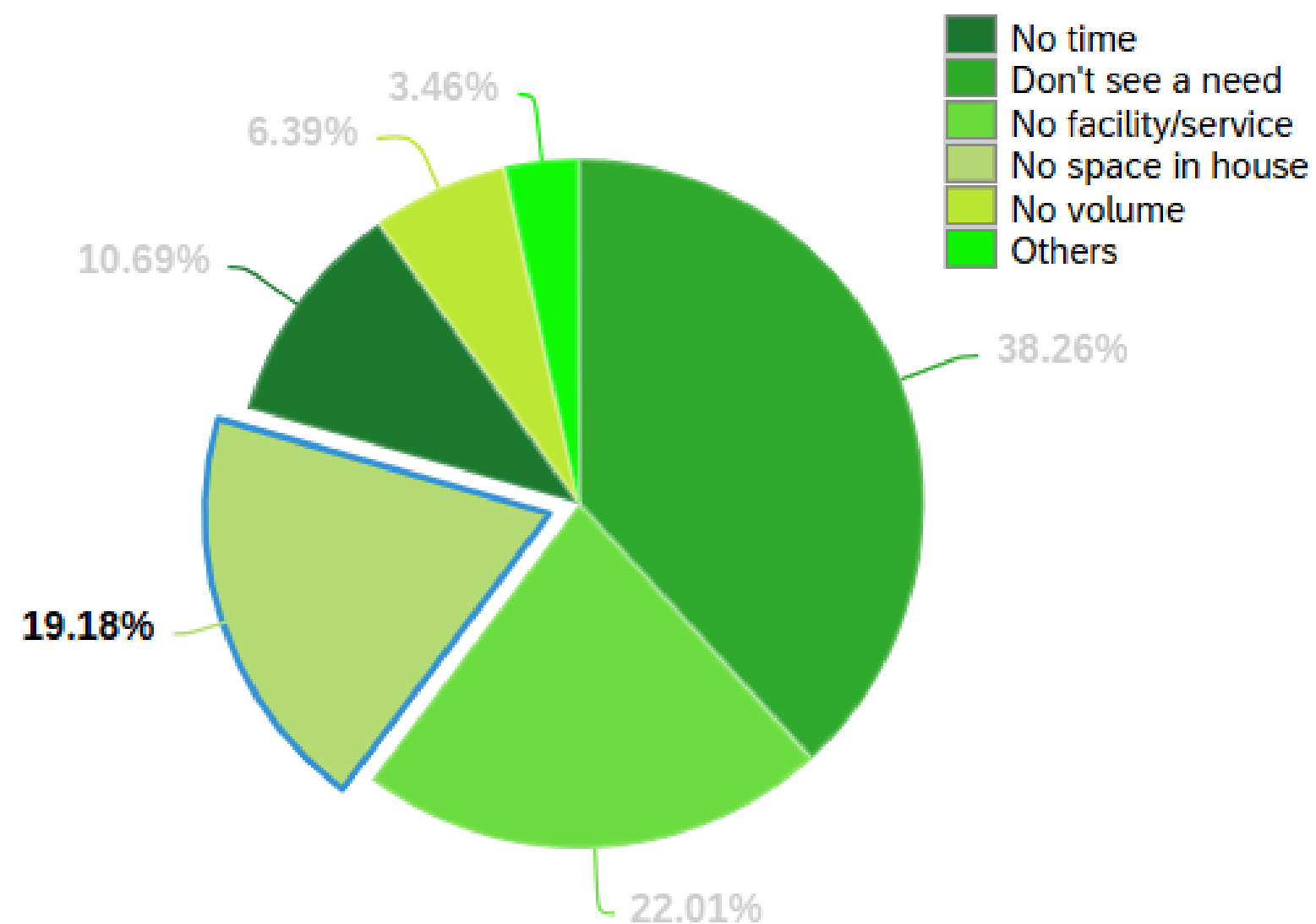
**Problem 2**

### Don't see a need

- Lack of awareness on recycling
- No personal benefit or incentives from recycling

# Problems Faced by Waste Producers

## Reasons for Not Recycling



**Source:** Survey on SW Composition, Characteristics and Existing Practice of SW Recycling in Malaysia Final Report [5]

## Top 3 problems:

**Problem 1**

### No time

- Sorting recyclables
- Finding available recycling centres
- Sending recyclables to recycling centres

**Problem 2**

### Don't see a need

- Lack of awareness on recycling
- No personal benefit or incentives from recycling

**Problem 3**

### No recycling facility/services

- Do not know any recycling centres or facilities near them
- No recyclables collection service to their location

# Current Solutions for Waste Management



## Solution 1:

**Education  
and  
Awareness**



## Solution 2:

**Practise 5R**

- Refuse
- Reduce
- Reuse
- Repurpose
- Recycle



## Solution 3:

**Law  
and  
Enforcement**



## Solution 4:

**Technology**

- Incineration
- WTE Plants

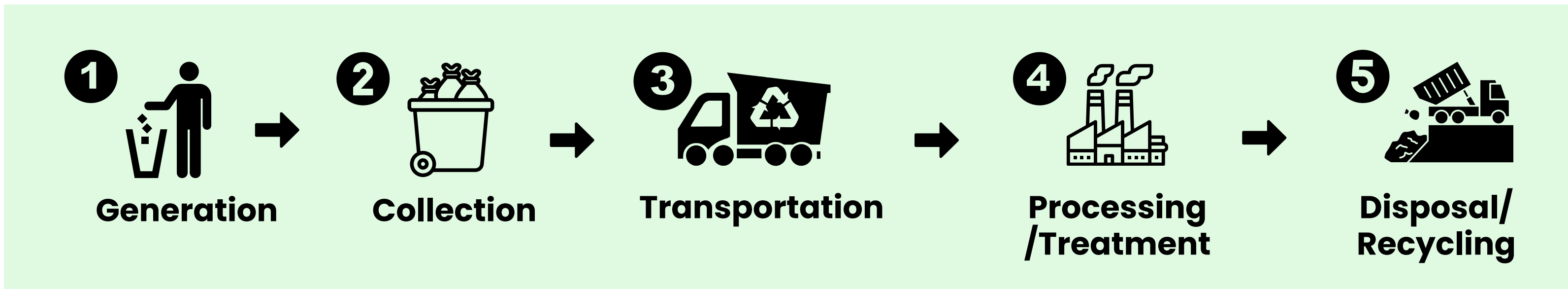
# Our Solution:



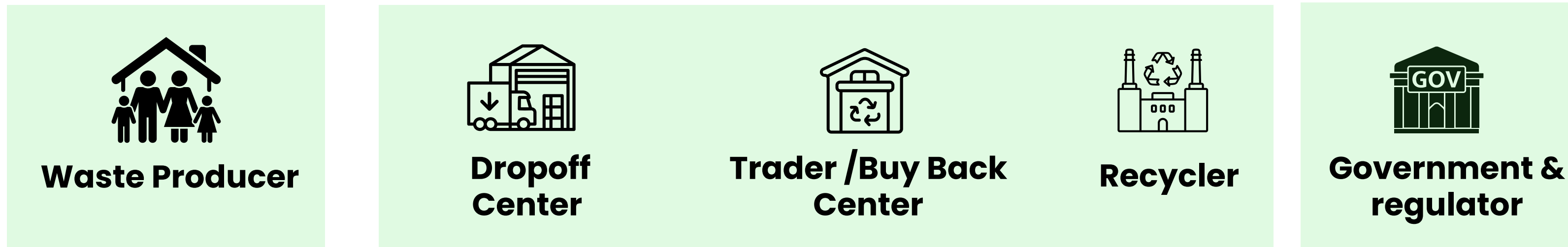
**Download the app here!**



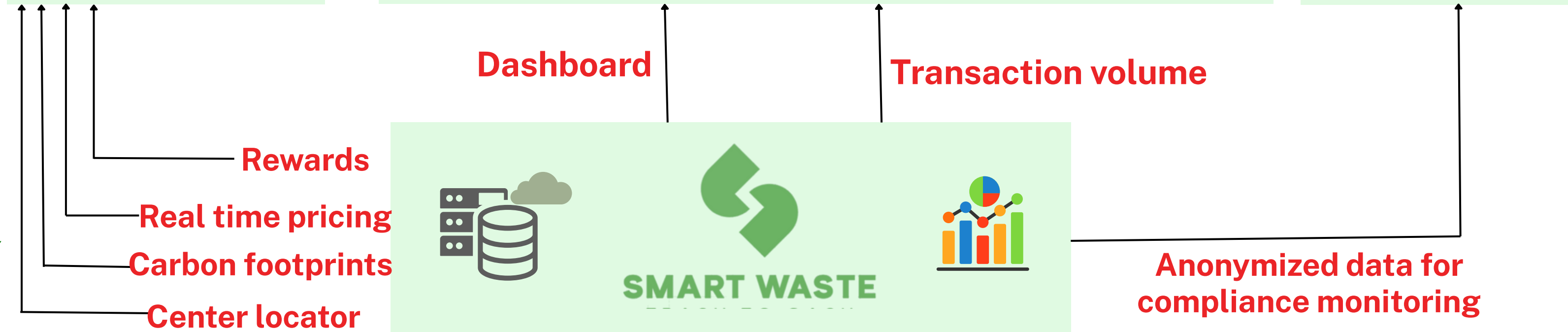
**WASTE VALUE CHAIN**



**STAKEHOLDERS**



**ENABLING TECHNOLOGY**



# Why use SmartWaste?

## The Triple A Solution:



**A**ccess

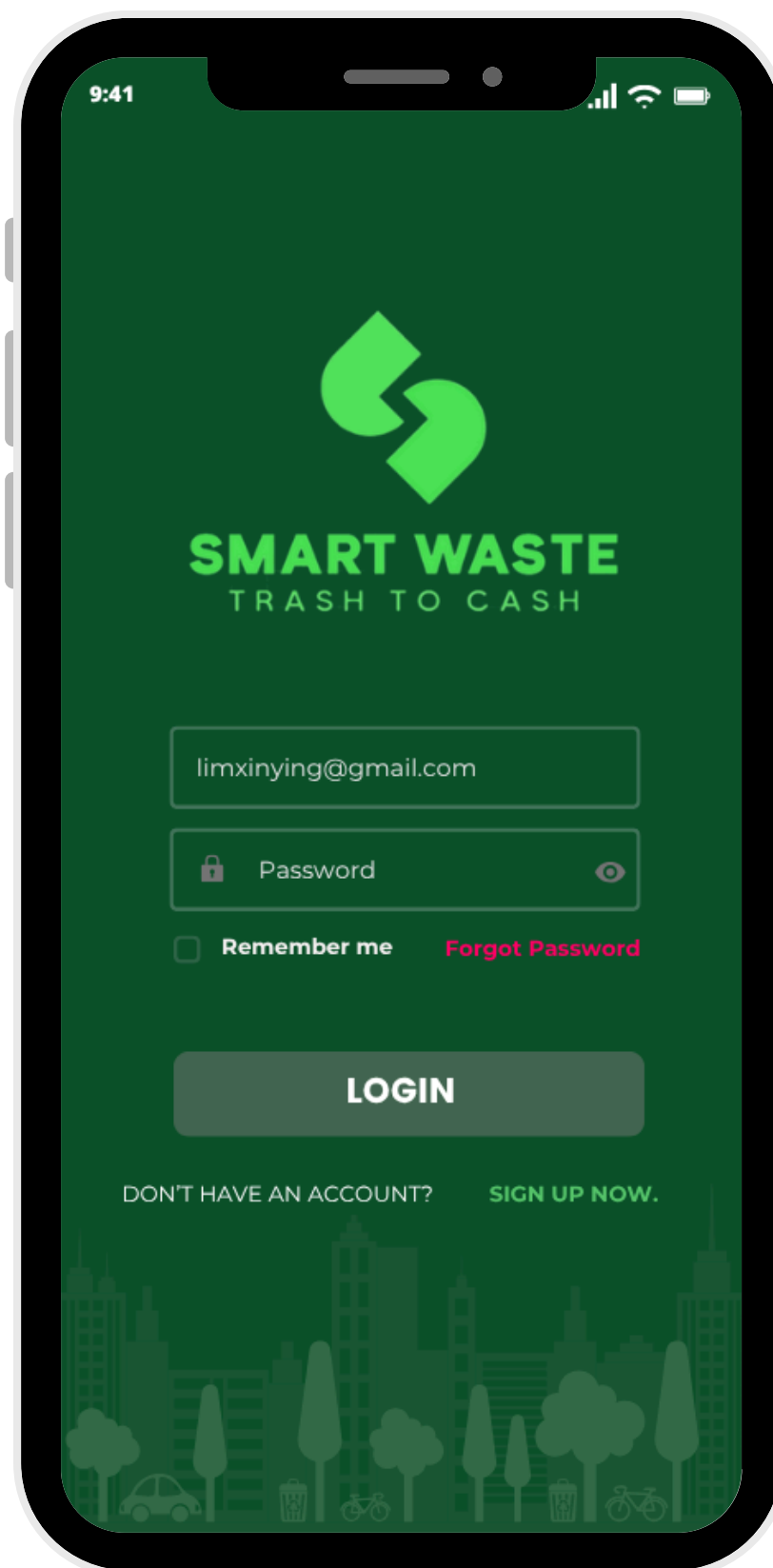


**A**ccuracy

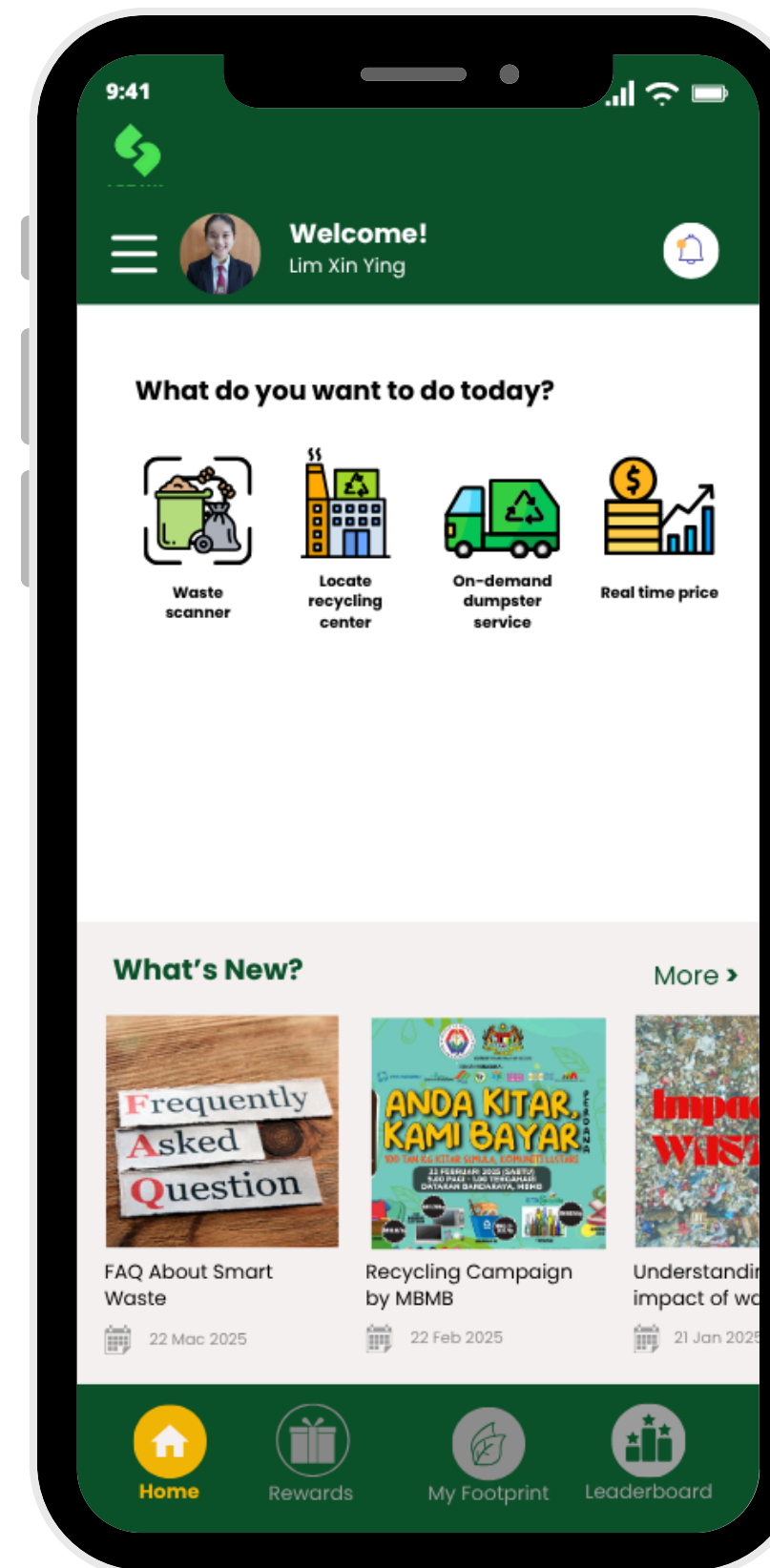


**A**wareness

SMART WASTE



Login Interface



Home Interface

Features

News /Updates

Features

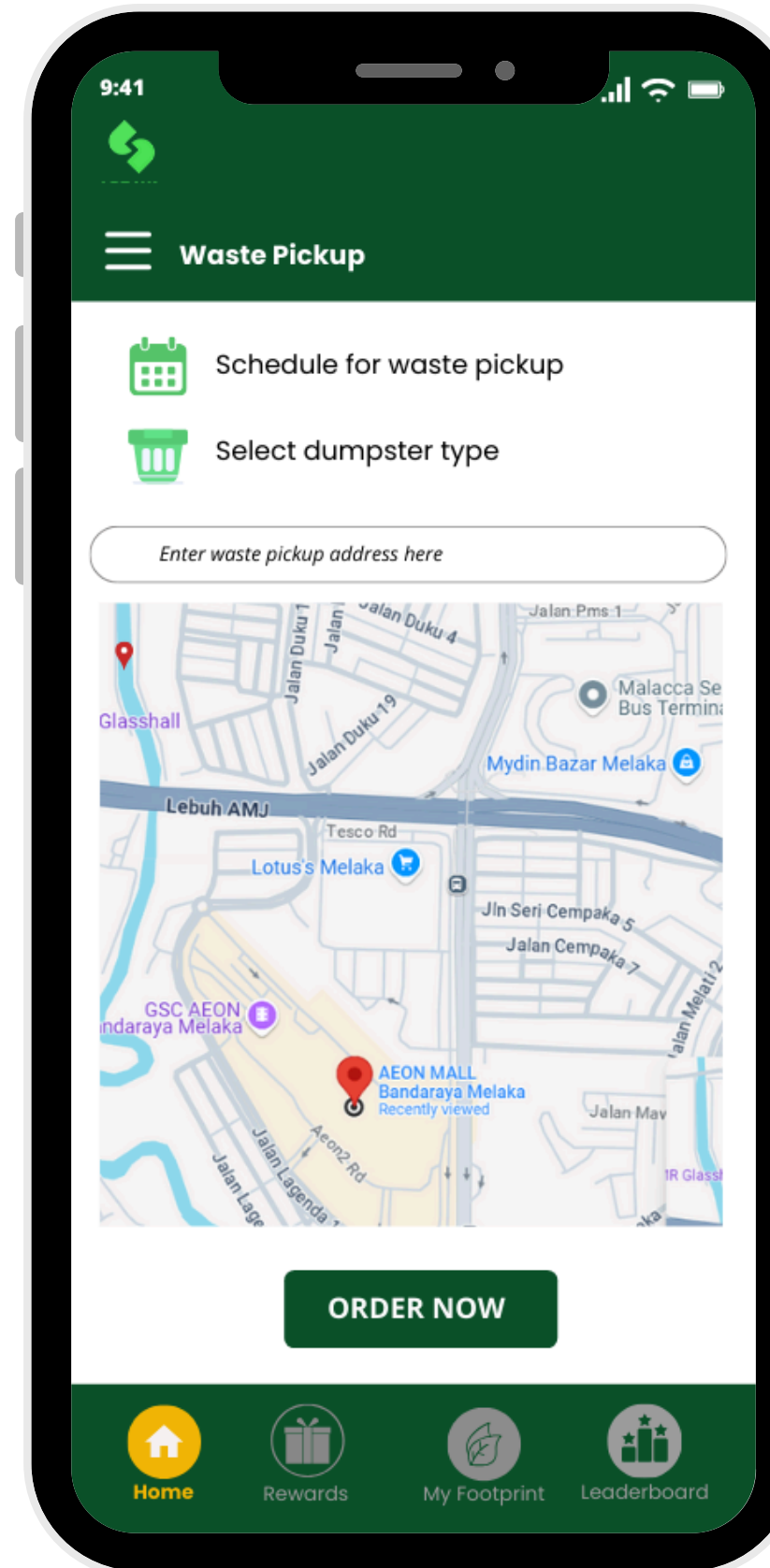
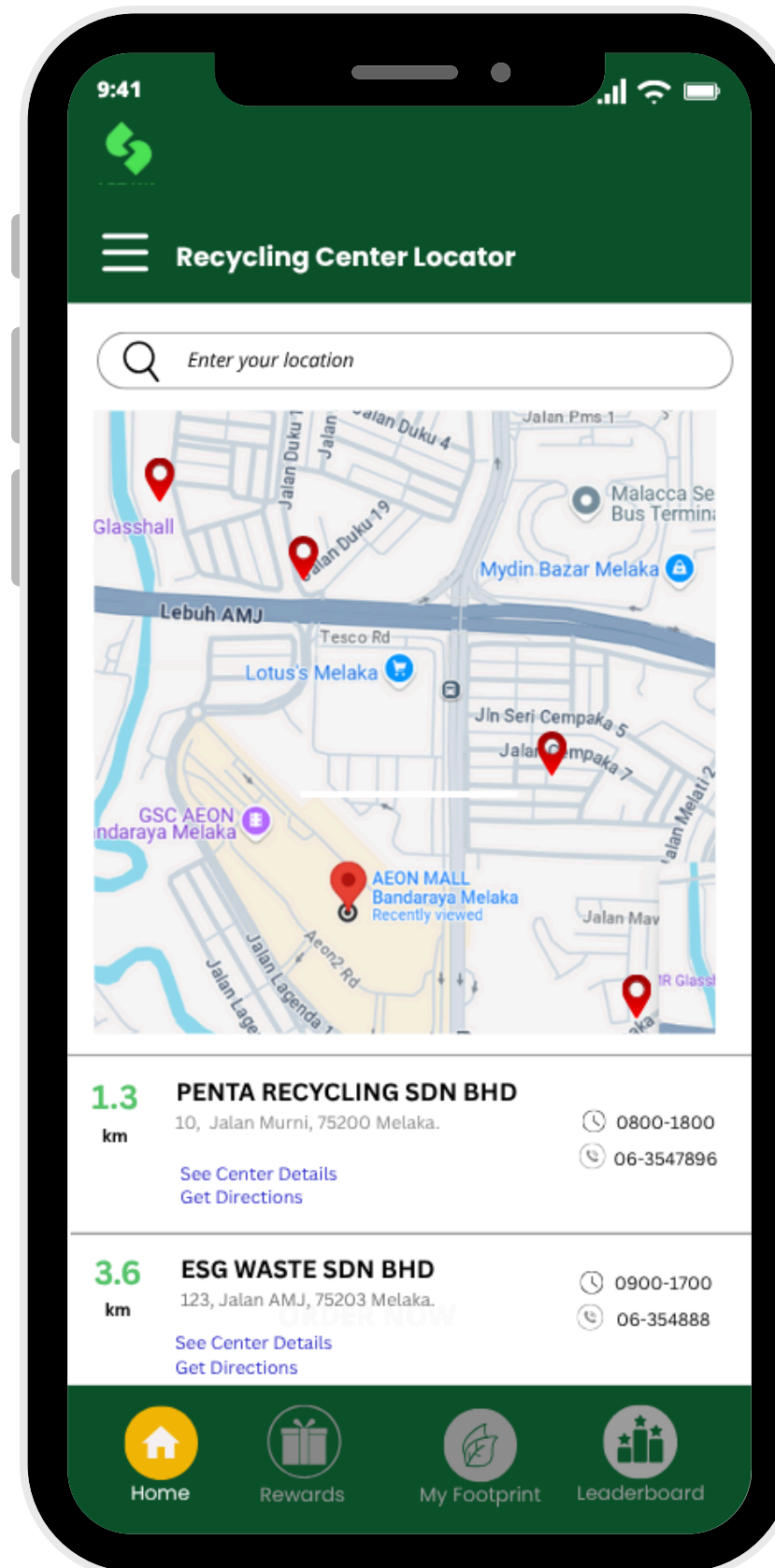


# Access

Make recycling easy & convenient

## Recycling Center Locator

- 1 Drive-through drop-off
- 2 App guides you to the nearest center via GPS
- 3 Fast & easy disposal



## On Demand Dumpster Service

- 1 Dumpster delivered to your location
- 2 Schedule pickup anytime
- 3 Perfect for bulk or special items



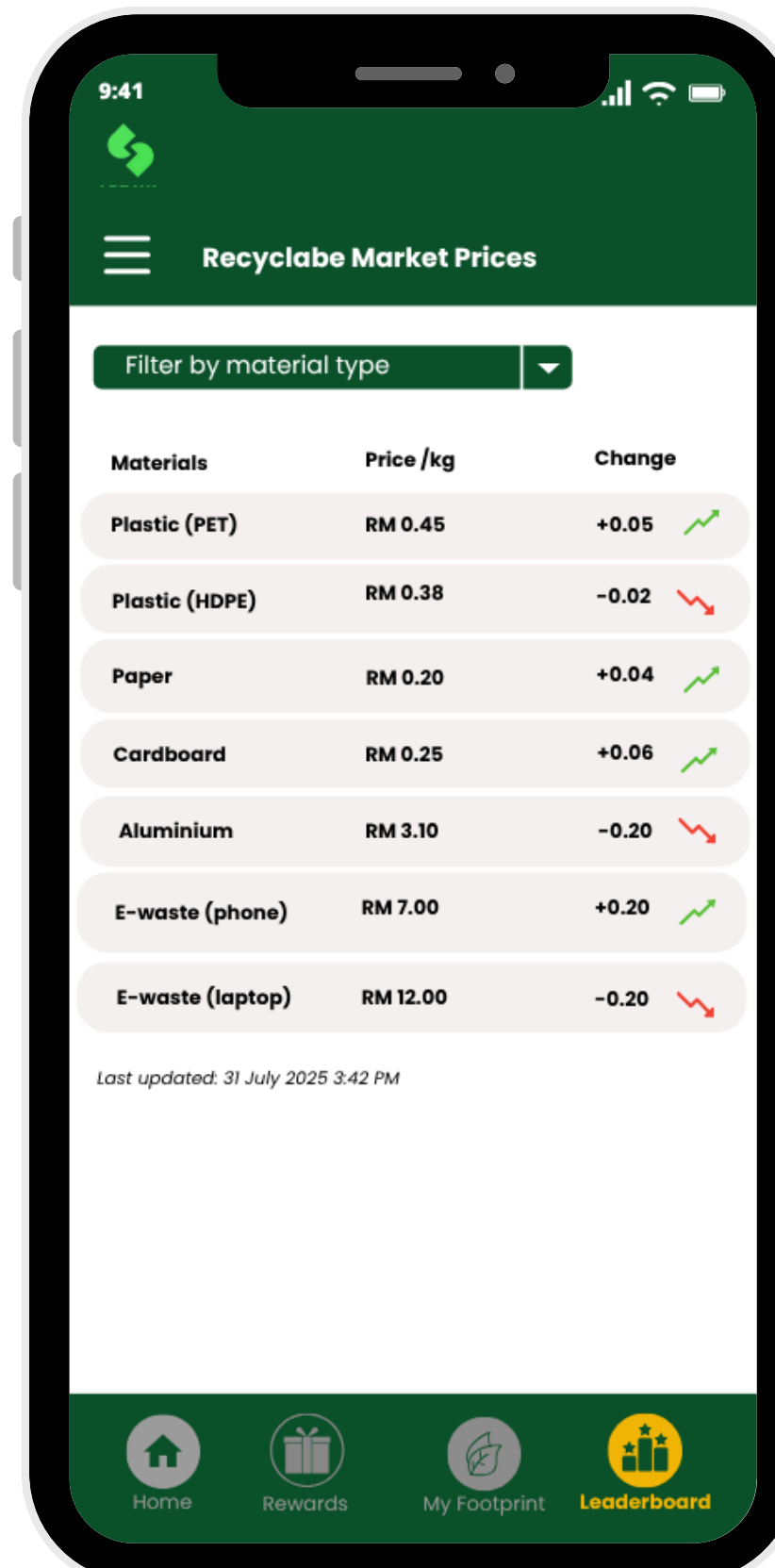
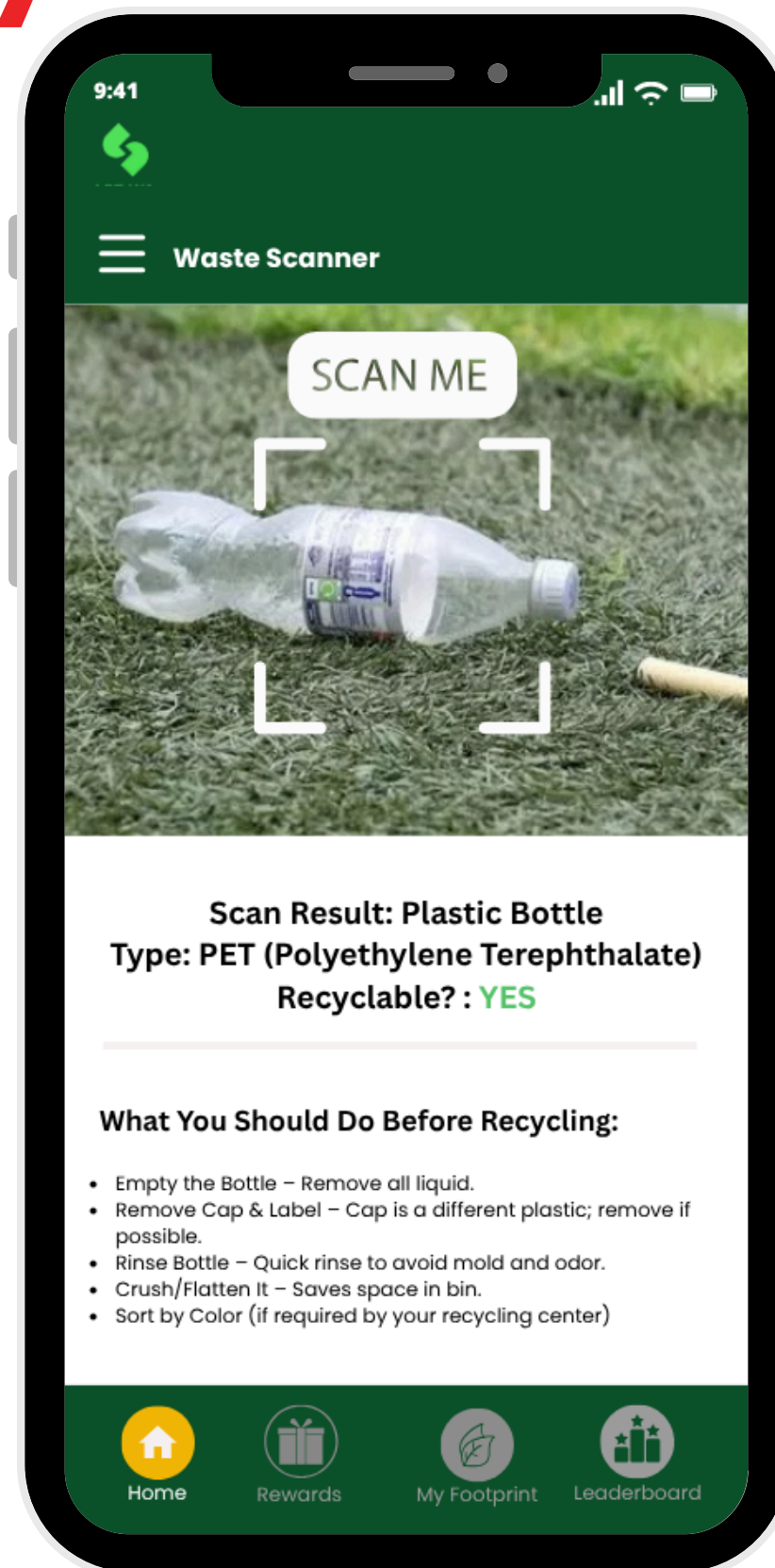
# Accuracy

Improve efficiency and trust



## Waste Scanner

- 1 AI-powered image recognition
- 2 Classify waste by material code
- 3 Provides actionable steps before recycling



## Recyclable Market Prices

- 1 Real-Time Price Updates
- 2 Material-Specific Listings
- 3 Price Trend Tracker



# Awareness



Motivate & sustain recycling habit

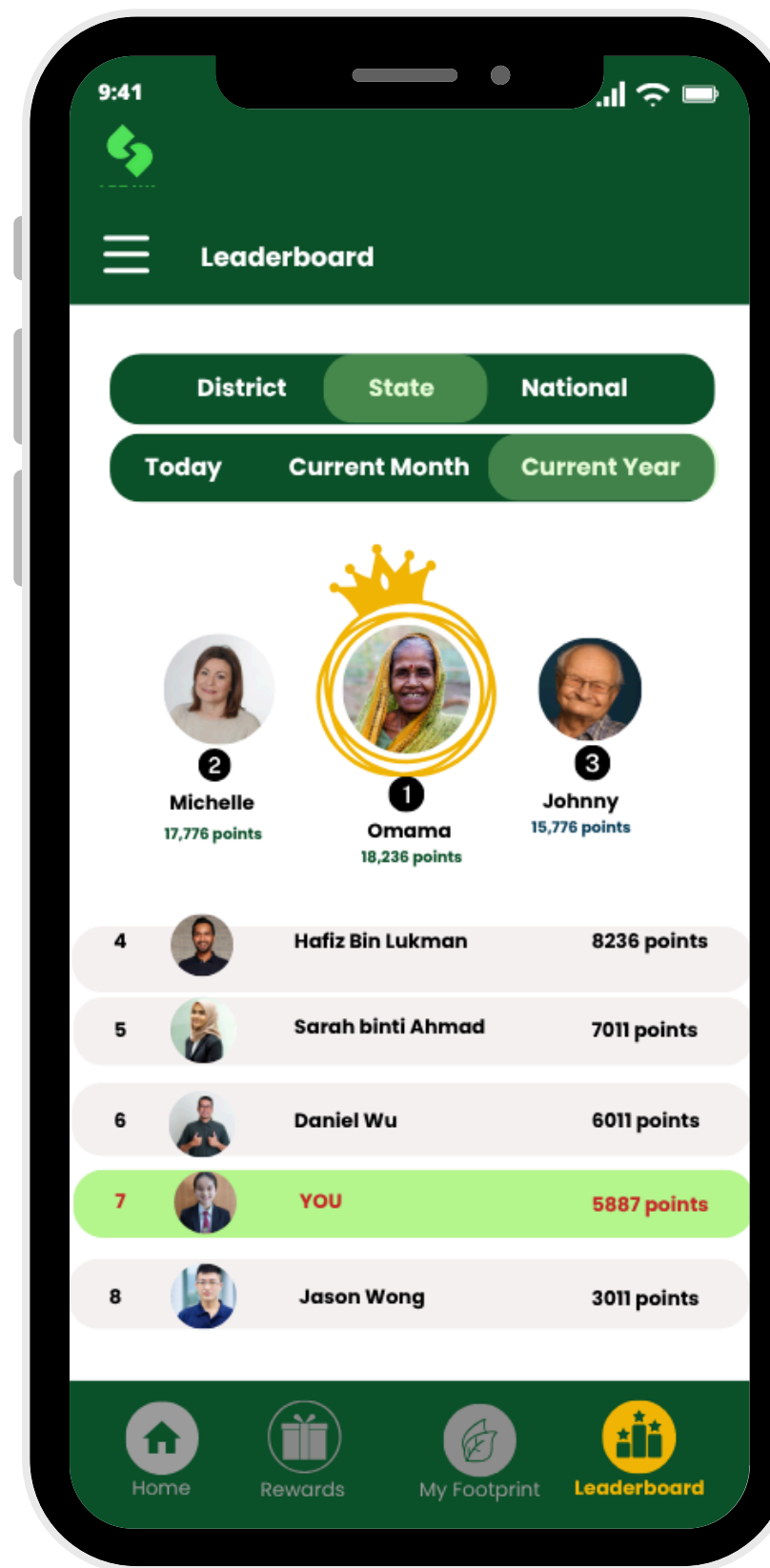
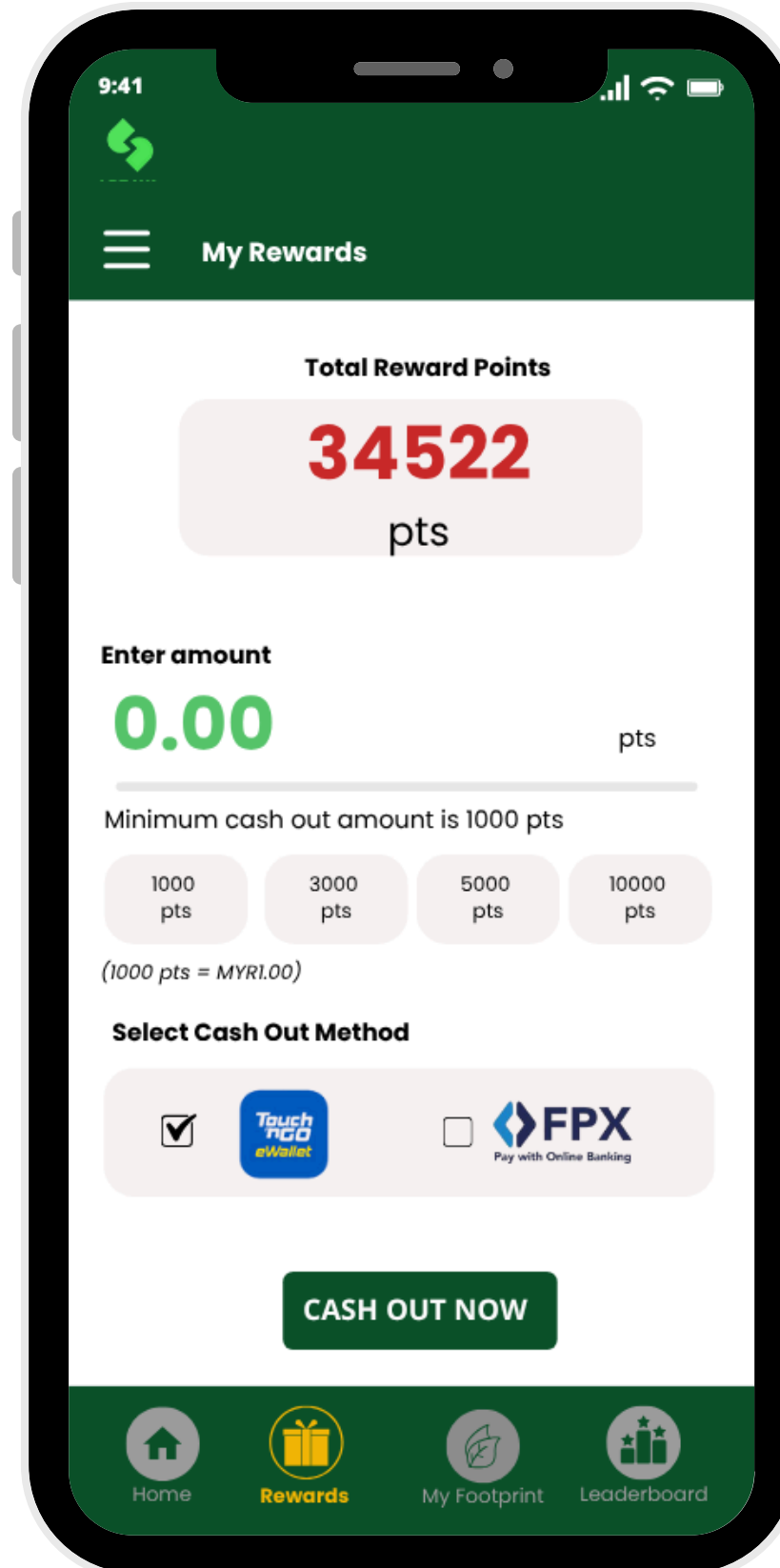


## Leaderboard

- 1 Track ranking
- 2 Compete at district, state & national levels
- 3 Boosts pride & motivation

## My Rewards

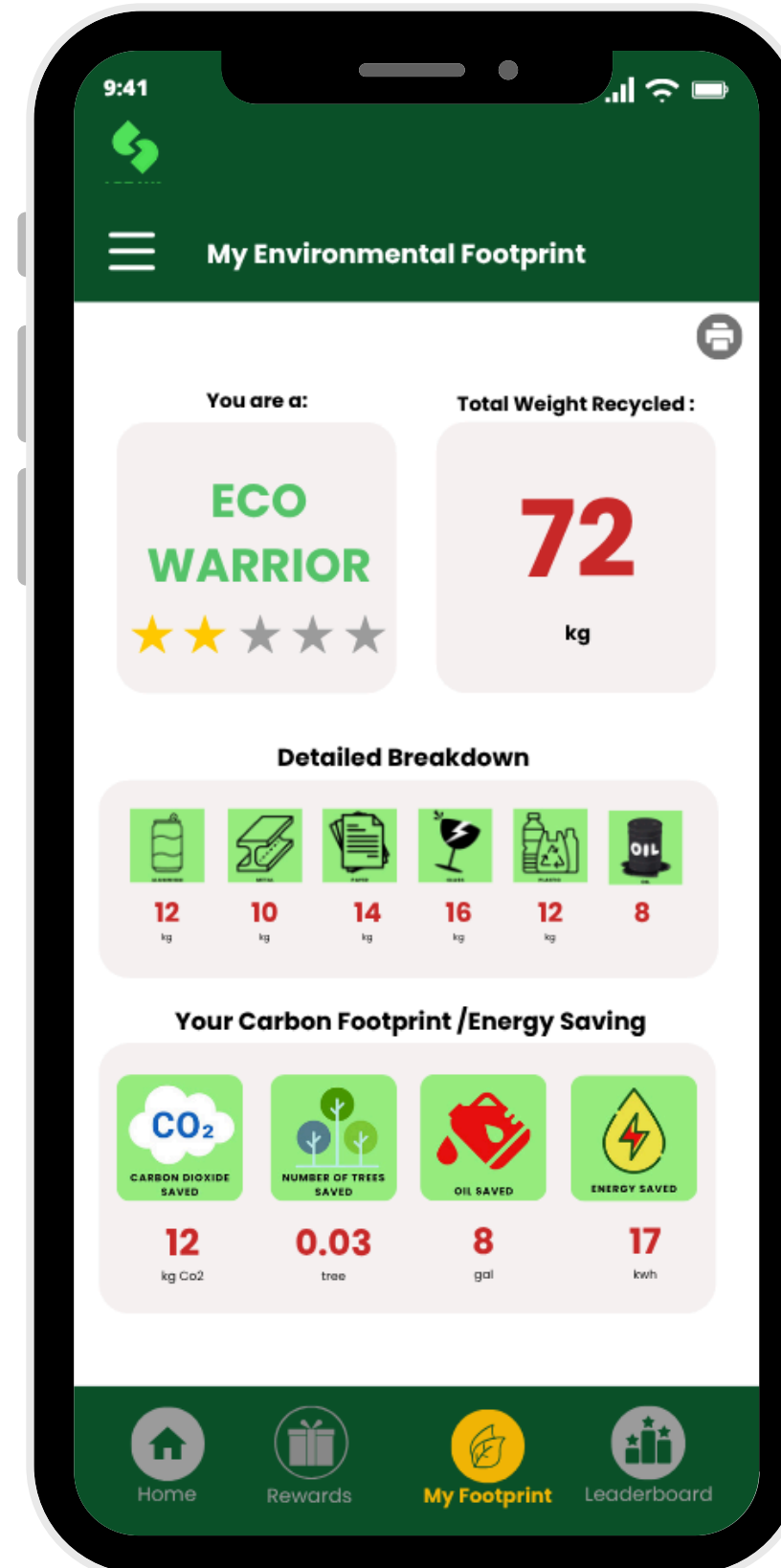
- 1 Earn points and convert to cash
- 2 Paid via e-wallet or bank transfer
- 3 Incentives build recycling habits





# Awareness

Motivate & sustain recycling habit



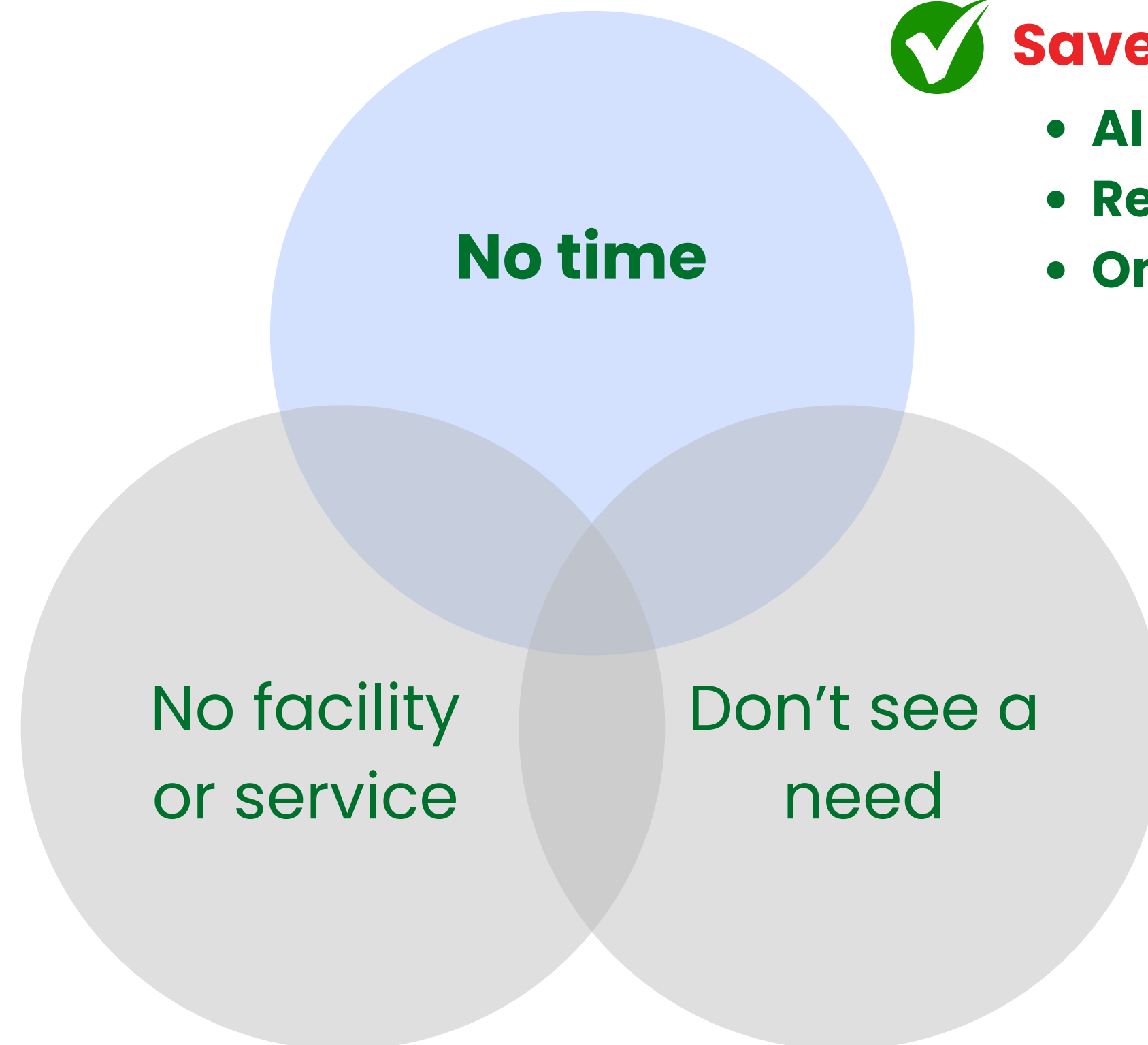
## My Environmental Footprint

- 1 Track total weight & material recycled
- 2 Check your environmental footprint
- 3 Historical data graph powered by SAP Analytic Cloud

# How SmartWaste bridges the barriers?



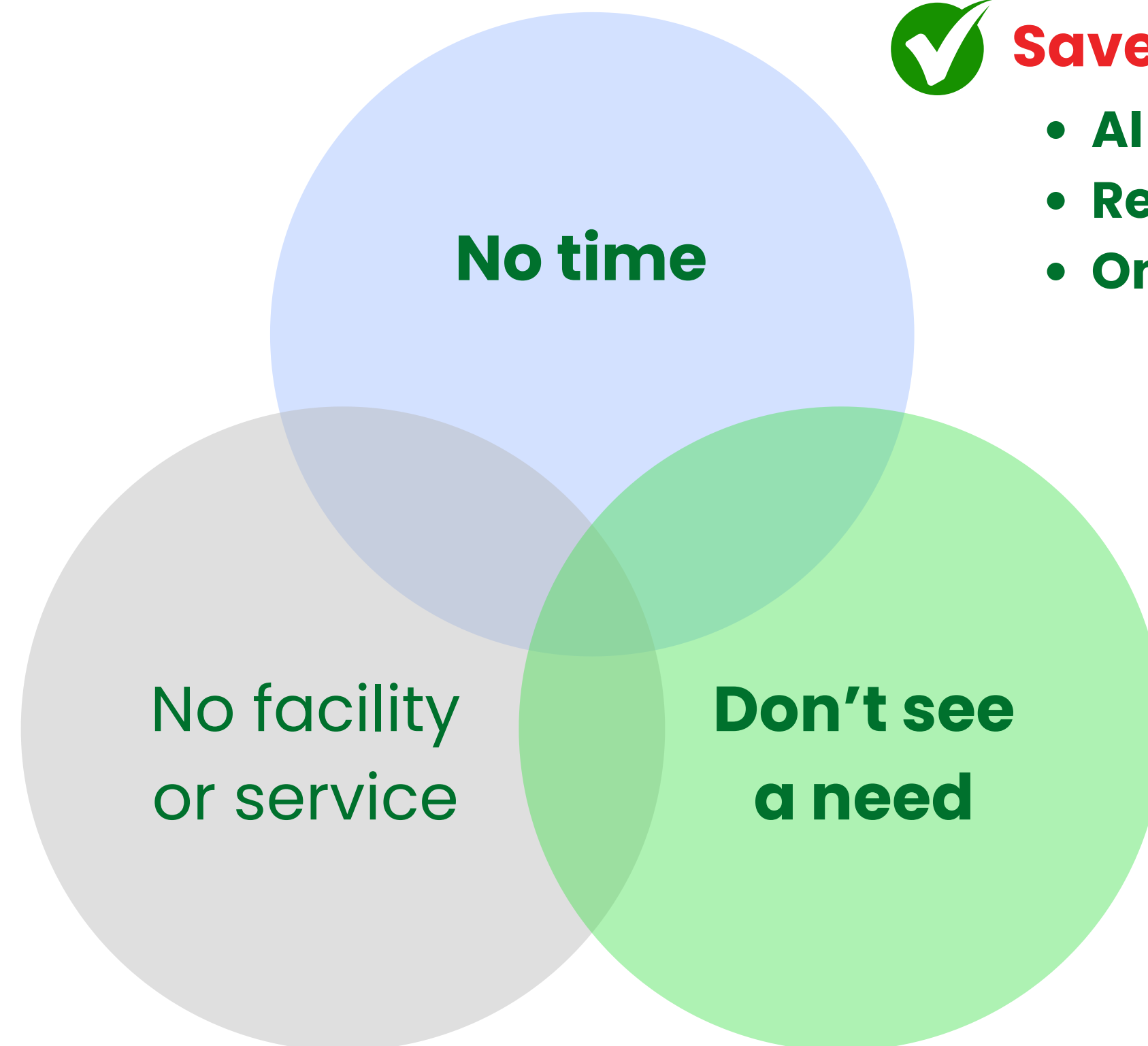
## How SmartWaste bridges the barriers?



### **Saves time:**

- **AI waste scanner**
- **Recycling centre locator**
- **On demand dumpster service**

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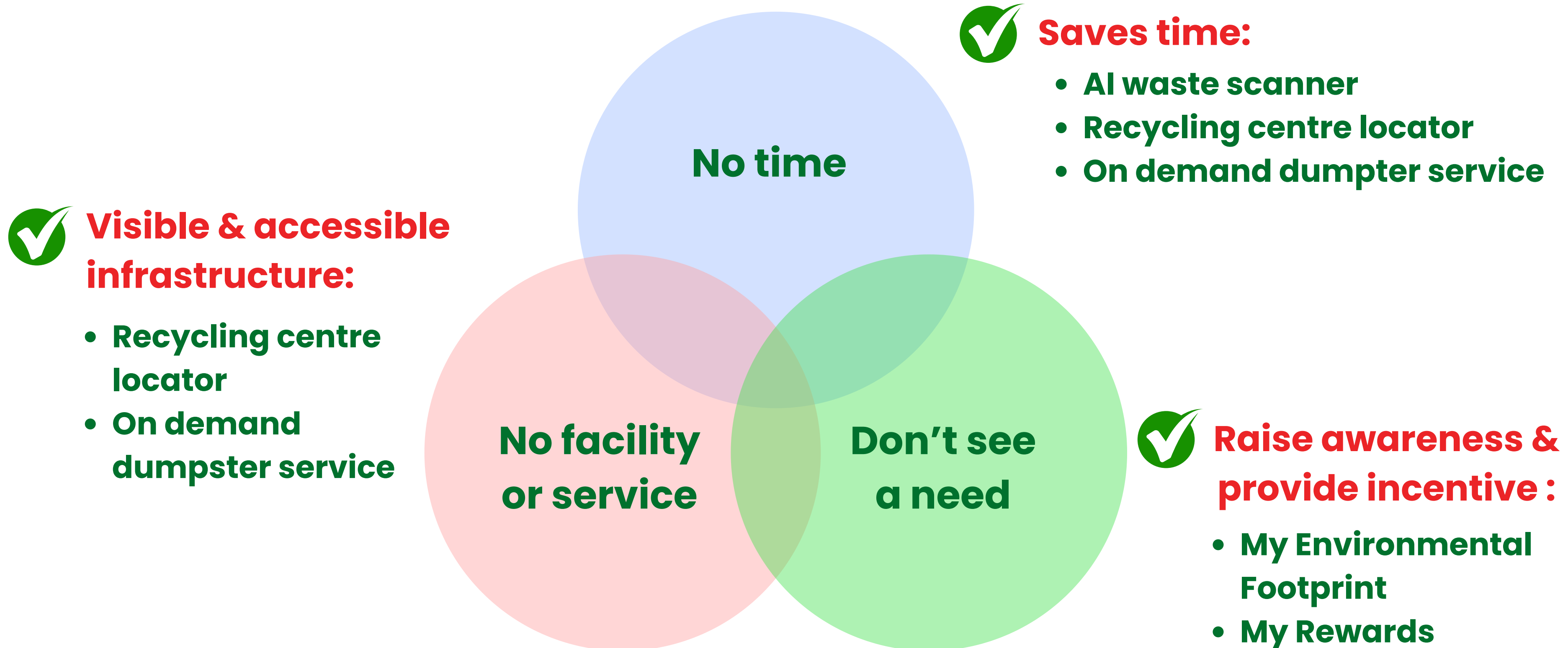
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- **Recycling centre locator**
- **On demand dumpster service**



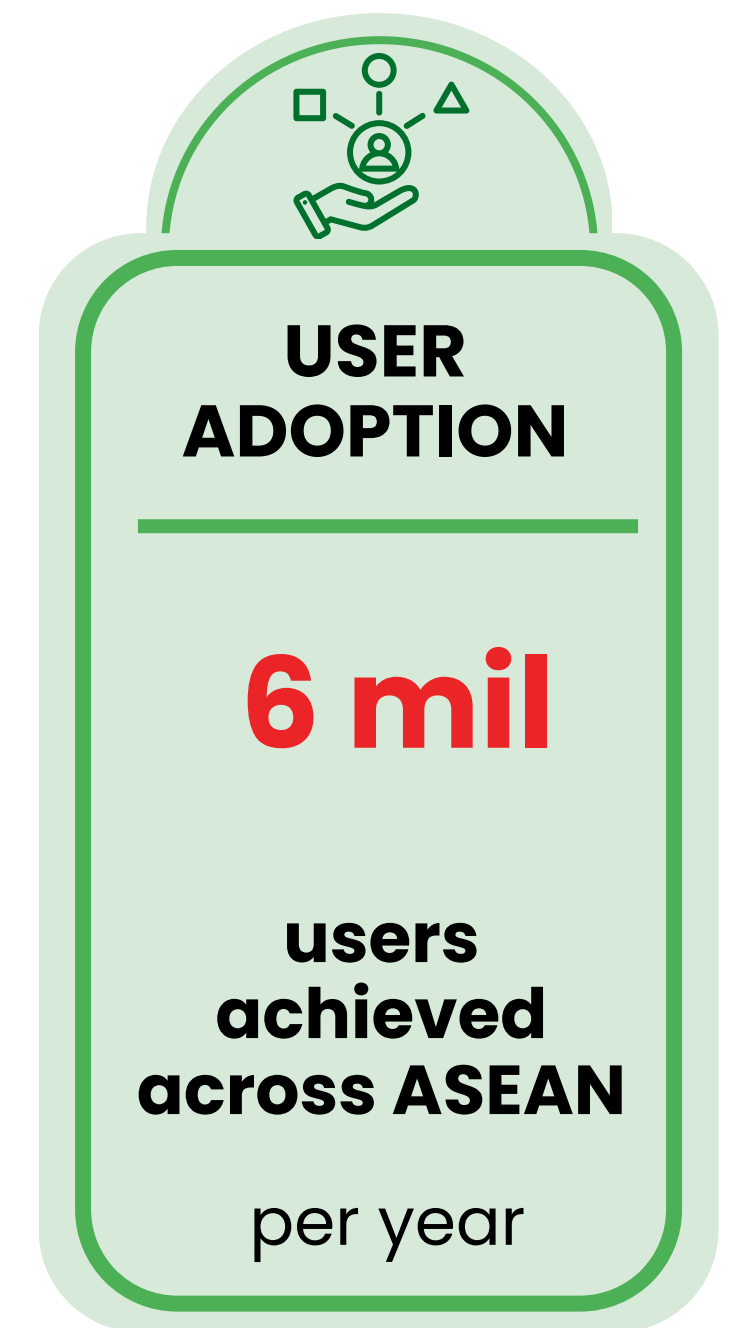
### **Raise awareness & provide incentive :**

- **My Environmental Footprint**
- **My Rewards**

## How SmartWaste bridges the barriers?



## Positive Impacts of Smart Waste



### Assumptions:

- 1) If 20% total MSW are recycled via our app
- 2) If 20% of total MSW are recycled with average payout of RM0.30 /kg
- 3) Assuming 1% of adoption rate across ASEAN

# Alignment with ASCC, AEC 2025 & Global SDGs

## ASEAN Socio-Cultural Community (ASCC) 2025



- B.5 – Sustainable consumption & production
- B.6 – Environmental protection
- B.7 – Climate change adaptation & mitigation



- SDG 11**
- 11.6 – Reduce cities waste & pollution

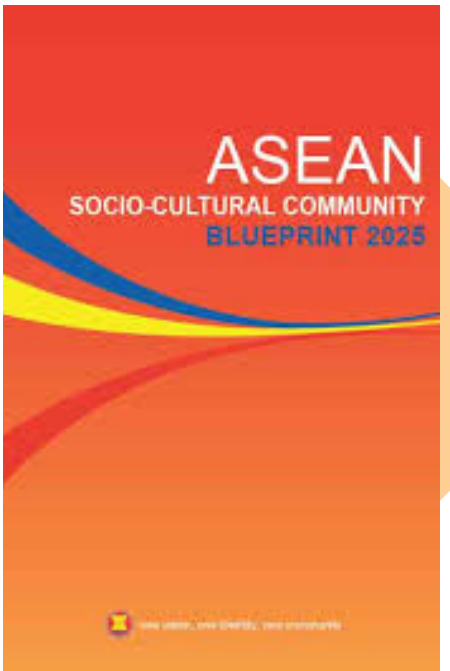


- SDG 12**
- 12.4 – Sound management of waste & chemicals
  - 12.5 – Cut waste through prevention, recycling, reuse



- SDG 13**
- 13.2 – Integrate waste reduction into climate policies

## ASEAN Economic Community (AEC) 2025



- A.1 – Sector connectivity & integration
- B.4 – Innovation & tech adoption
- C.3 – Inclusive & sustainable growth

# Stakeholder Ecosystem

Convenience, rewards

**Citizens/businesses**



**Government & Regulator**

Progress on climate goals  
Higher recycling rates

**Tech Players**

Commercial application of  
technology



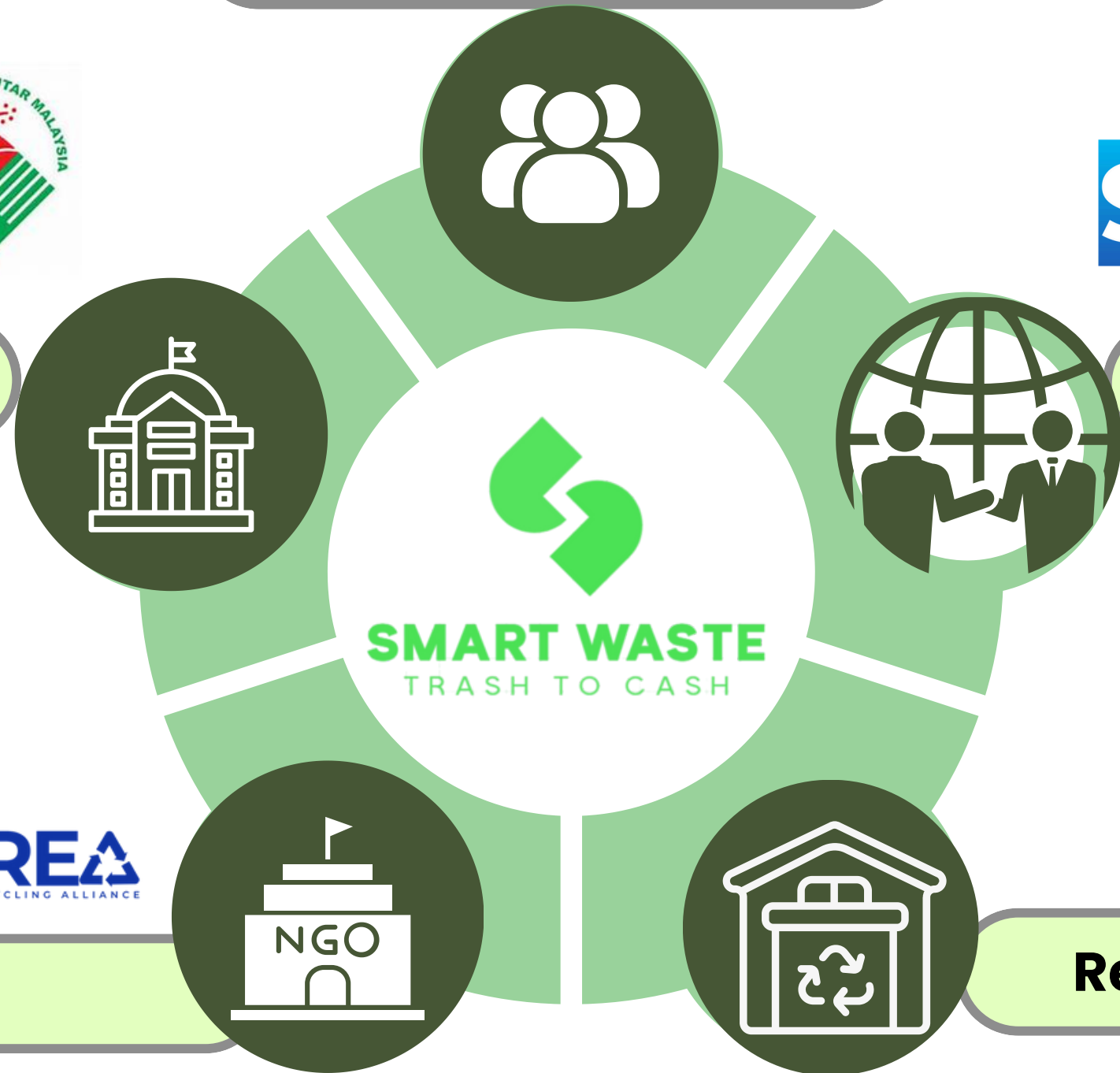
**NGOs**

Amplified mission impact

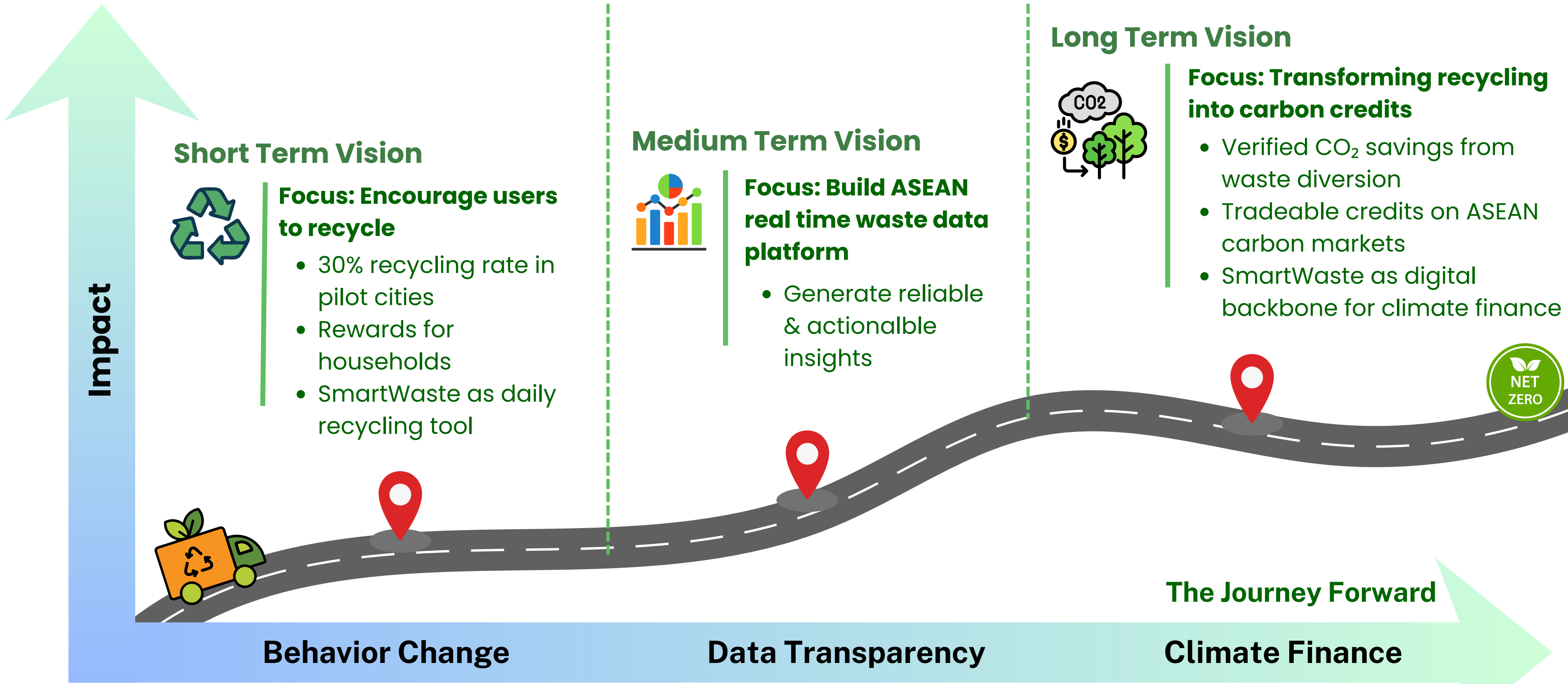


**Recycling Players**

Stable supply  
Higher quality input



# From Recycling Rewards Today to Carbon Credits Tomorrow



# Implementation Overview: 10-Year Plan

**2026 – 2028**

**2029 – 2031**

**2032 – 2035**

## Foundation & Pilot

Build user adoption, validate system, prove impact

**System development**

**Launch pilot (Melaka)**

**User engagement & behavior change**

## Scale Up

National & regional expansion

**National expansion (Malaysia)**

**Cross boarder expansion (Indonesia)**

**ASEAN roll-out**

## System Optimization

Integrate AI analytics & build real-time waste data platform

**System enhancement**

**Real time data platform**

## Long-Term Goals

Transform SmartWaste into a carbon finance platform

**Carbon credit certification**

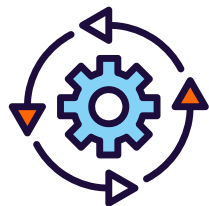
## Built to **Work**

### FEASIBILITY



#### Technical:

- Solution is already conceptualized



#### Operational:

- Partnership driven
- Uses existing recycling facilities



#### Financial:

- Low initial setup cost

## Built to **Last**

### SUSTAINABILITY

#### 4 revenue streams



Transaction fees from recyclable trading



Analytics & data insights services



Corporate sponsorships

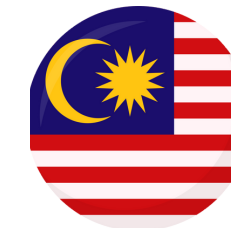


Sale of carbon credits

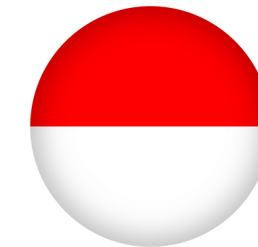
## Built to **Grow**

### SCALABILITY

#### Scalable across ASEAN:



Phase 1



Phase 2



Phase 3

#### High smartphone penetration across ASEAN:

**88.9%**

internet users in 2023

*Source: Asia Digital Users Forecast 2023, eMarketer*

A pair of hands is shown holding a green recycling symbol, which is a triangle of three arrows forming a circle. The background is a soft-focus outdoor scene with green foliage. The text is overlaid on the image in a bold, dark green font.

**“Turn Trash To Cash”**

**Thank you**

# References

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Research Gate 2024, The impacts of curbside feedback mechanisms on recycling performance of households in the United States,

[https://www.researchgate.net/publication/384695263\\_The\\_impacts\\_of\\_curbside\\_feedback\\_mechanisms\\_on\\_recycling\\_performance\\_of\\_households\\_in\\_the\\_United\\_States](https://www.researchgate.net/publication/384695263_The_impacts_of_curbside_feedback_mechanisms_on_recycling_performance_of_households_in_the_United_States)

Asia Digital Users Forecast 2023, <https://www.emarketer.com/content/southeast-asia-digital-users-forecast-2023>

# Appendix

## Appendix [1]

**Table 1 Amount of Waste Generation and Composition of MSW in ASEAN Countries**

No.	Countries	Waste Generation			
		Per Capita MSW Generation (kg/capita/day)	Annual MSW Generation (In ton)	Annual Hazardous Waste Generation (In MT)	Annual E-waste Generation (In Metric Kiloton ton)
1	Brunei Darussalam	1.4	210480		
2	Cambodia	0.55	1089429		
3	Indonesia	0.70	64000000		
4	Lao PDR	0.69	77380		8.00
6	Malaysia	1.17	12840000	1517434.06	
5	Myanmar	0.53	841508		
7	Philippines	0.69	14660000	1693856.72	39000
8	Singapore	3.763	7514500	411180	110
9	Thailand	1.05	26770000	3300000	368.314
10	Viet Nam	0.84	22020000		1609.775

## Appendix [2]

**Table 1.6. Urban Population, 2008-2017**

(in percent)

COUNTRY	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Brunei Darussalam	-	-	75.7	78.5	78.7	77.0	76.9	78.0	78.0	77.0
Cambodia	17.9	19.5	19.9	21.0	21.5	21.4	22.5	23.0	21.0	23.0
Indonesia	-	-	49.8	51.2	51.9	52.0	53.0	53.3	54.0	55.0
Lao PDR	29.7	-	33.2	35.0	35.3	36.0	37.6	38.0	40.0	34.0
Malaysia	63.5	63.7	71.0	71.9	72.7	73.0	74.0	74.0	75.0	75.0
Myanmar	30.6	-	30.7	30.8	30.8	30.8	30.0	30.0	35.0	30.0
Philippines	-	-	45.3	48.5	48.6	45.0	44.0	44.0	44.0	47.0
Singapore	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Thailand	33.8	-	-	36.1	33.9	44.5	49.0	49.0	52.0	49.0
Viet Nam	29.0	29.6	30.5	31.6	31.9	32.2	33.1	33.1	34.0	35.0
<b>ASEAN</b>	<b>-</b>	<b>-</b>	<b>44.6</b>	<b>45.0</b>	<b>45.2</b>	<b>45.9</b>	<b>46.8</b>	<b>47.0</b>	<b>48.2</b>	<b>48.5</b>

*Source:*

- 1). ASEAN Secretariat
- 2). Asian Development Bank, *Key Indicators for Asia and the Pacific 2010-2017*
- 3). World Bank WDI Population Data website as of 2010-2017; United Nations Population Division *World Urbanization Prospects: 2018 Revision*

*Notes:*

ASEAN figures are estimated based on AMS figures

## Appendix [3]

### ASEAN, 2023

Land area (million sqkm)	4.5
Population (million)	676.6
Population density (persons per sqkm)	152.0
Population as % world population	8.4
ASEAN+3 population (million)	2,275.3
ASEAN+3 population as % world population	28.1
ASEAN+6 population (million)	3,745.0
ASEAN+6 population as % world population	46.3
Sex ratio (males per 100 females)	100.3
Population below 5 years (million)	52.1
Population 65 years and over (million)	52.8
Population 15-29 years (million)	161.2
Urban population (%)	51.7
Unemployment rate (%)	3.8
Gender Parity Index (GPI) Gross Enrollment Ratio, Primary Education, 2022*	0.99
Pupil-teacher ratio in primary school (%), 2022*	20.5
Crude birth rate (births per 1000 population), 2022	15.0
Infant mortality rate (per 1000 live births), 2022	17.1
Life expectancy (years)	73.4

# Appendix [4]

**Table 3 Technology – Municipal Solid Waste (MSW)**

Country	Source Segregation	Collection Rate (Urban)	Technology Recycling Rate	Technology Gap Treatment/Disposal				
				Composting	Incineration	Sanitary Landfill	Open Dump	Open Burning
Brunei Darussalam	<50%	90%	15%			<input type="checkbox"/>	<input type="checkbox"/>	
Cambodia	<50%	80%	<50%	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Indonesia	<50%	56% - 75%	<50%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lao PDR	<50%	40% - 70%	<50%	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Malaysia	<50%	>70%	50% -60% (Metal, Paper, Plastic); Others (<50%)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Myanmar	50%		70% (Plastic, Paper, Metal)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Philippines	50% - 70%	40% - 90%	20%-33% (Paper) 30%-70% (Aluminum) 20% - 58% (Other Metals) 23% - 42% (Plastic) 28% - 60% (Glass)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Singapore	70%	>90%	50% - 60% (Paper, Horticulture) >90% (Fe, CandD, Used Slag) >80% (Scrap Tire) >80% (Wood) >50% (Others) Overall (60%)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Thailand	<50%	>80%	>90% (Metal) 50% - 60% (Paper, Construction) <50% (Others)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Viet Nam	<50%	80% - 82%	>90% (Metal) >70% (Plastic, E-waste) 50% (Paper) <50% (Others)	<input checked="" type="checkbox"/>			<input type="checkbox"/>	

## Appendix [5]

**Table 66: Reasons for Not Recycling, in per cent**

<b>Reasons for not Recycling</b>	<b>Northern</b>	<b>Central /Klang Valley</b>	<b>East Coast</b>	<b>Southern</b>	<b>Peninsular</b>	<b>Sarawak</b>	<b>Sabah</b>	<b>Total</b>
<b>No time</b>	32.4	42.6	18.3	32.5	<b>31.2</b>	45.8	53.9	<b>36.5</b>
<b>Don't see a need</b>	14.4	25.5	31.1	33.5	<b>25.2</b>	13.2	7.5	<b>21.0</b>
<b>No facility /service</b>	24.5	9.4	21.8	3.4	<b>16.0</b>	22.9	25.4	<b>18.3</b>
<b>No space in house</b>	6.2	12.3	13.2	10.3	<b>10.3</b>	14.6	7.0	<b>10.2</b>
<b>No volume</b>	14.7	2.1	3.9	9.4	<b>7.9</b>	0.7	1.8	<b>6.1</b>
<b>No incentive</b>	3.9	8.1	8.2	2.5	<b>5.7</b>	1.4	2.2	<b>4.7</b>
<b>Others</b>	3.9	0.0	3.5	8.4	<b>3.8</b>	1.4	2.2	<b>3.3</b>
<b>Number of respondents (n)</b>	<b>306</b>	<b>235</b>	<b>257</b>	<b>203</b>	<b>1001</b>	<b>144</b>	<b>228</b>	<b>1373</b>

# Business Model

## HOW

### KEY PARTNERS

- Local councils
- Recycling companies
- NGOs
- Tech partners
- Certification bodies
- Corporate sponsors

### KEY ACTIVITIES

- Develop and maintain app
- Run recycling reward and gamification programs
- Analyze waste data and CO<sub>2</sub> savings reporting
- Partner with corporates for material recovery and CSR campaigns
- Prepare carbon reduction reports and apply for carbon credit certification
- Marketing & awareness campaigns

### KEY RESOURCES

- SmartWaste digital platform
- Waste collection network
- User community
- Skilled team

### COST STRUCTURE

- App development and maintenance
- Data storage, analytics, and verification systems
- Reward and incentive payouts to users
- Marketing and educational campaigns
- Staff and operational costs
- Partnerships and certification fees (for carbon credits)

## WHAT

### VALUE PROPOSITIONS

- For citizens: Easy, rewarding, and transparent recycling experience.
- For government: Real-time data for better waste management and policy planning.
- For recyclers: Stable material supply.
- For corporates: Verified ESG impact and access to carbon credits.
- For the planet: Reduced landfill waste and measurable CO<sub>2</sub> savings.

## WHO

### CUSTOMER RELATIONSHIP

- Incentive-driven engagement
- Community events and in-app tips

### SALES CHANNEL

- Social media and school outreach campaigns
- Integration with corporate sustainability programs

### CUSTOMER SEGMENTS

- Primary: Households & businesses
- Secondary: Local governments (data clients and waste managers)
- Tertiary: Corporates and ESG investors (carbon credit buyers, sponsors)

### REVENUE STREAMS

- Transaction fees from recyclable trading
- Analytics and data insights services
- Corporate sponsorships / ESG partnerships (for campaigns and rewards)
- Sale of verified carbon credits on voluntary carbon markets (future stage)







## HOW MUCH?

# How SmartWaste Aligns with ASEAN Blueprints & SDGs

## ASEAN Socio-Cultural Community (ASCC) 2025

 <b>Strategic Goal</b>	 <b>How Our App Contributes</b>
 Environmental sustainability	Diverts millions of tonnes from landfills, reduces emissions, promotes recycling habits
 People-centered, inclusive community	Rewards users for action, empowers youth and households through cash incentives
 Digital access & awareness	Mobile solution with gamification and impact tracking
 Regional cooperation & resilience	Scalable across ASEAN, adaptable to local systems and languages

## ASEAN Economic Community (AEC) 2025

 <b>Strategic Goal</b>	 <b>How Our App Contributes</b>
 Innovation-driven economy	Leverages digital tech, behavior design, and data analytics in waste management
 Inclusive growth & entrepreneurship	Unlocks millions in economic value from recyclables
 Integrated regional market	Cross-border potential among ASEAN state members
 Support for SMEs and green jobs	Helps local recyclers scale via better supply, data, and performance insights

# Who are the recycling players?

## 1. Drop-off centres

- Designated places where the public can bring recyclable items voluntarily.
- Usually run by local authorities, NGOs, or supermarkets.
- Role: Provide a convenient point for citizens to drop recyclables (plastic bottles, paper, cans, etc.).

## 2. Traders / Middlemen / Buy-back Centres

- Small-scale businesses or collection shops that buy recyclables from households or scavengers, then resell them to larger processors.
- Role:
  - Act as intermediaries in the recycling value chain.
  - Provide income opportunities (e.g., people bring recyclables to sell for cash).
  - They consolidate and sort materials before passing them up the chain

## 3. Recyclers

- Factories or companies that process recyclables into raw materials for manufacturing.
- Role: Convert collected recyclables into reusable products or raw materials.

# Why Indonesia as 2<sup>nd</sup> phase piloting country?

## 1. Indonesia's Legal Advantages

- Driven by Policy: Binding national targets create urgent need for solutions.
- Perfect Alignment: App directly enables legal compliance for all stakeholders.

Law / Policy Name	Year	Relevance to "Smart Waste" App
Law No. 18 on Waste Management	2008	Foundation law mandating waste reduction, recycling, reuse, segregation, and processing.
Presidential Regulation No. 97 (Jakstranas)	2017	National strategy for household waste management (2017-2025), requiring local government action plans.
Presidential Regulation No. 83	2018	National action plan to reduce marine plastic debris by 70% by 2025, creating demand for innovative solutions.
Upcoming Mandatory EPR Regulations	2025	Creates a market: Businesses across the supply chain will be legally required to manage plastic packaging waste.

# Why Indonesia as 2<sup>nd</sup> phase piloting country?

## 2. Urgent need

- The EPI provides a data-driven scorecard of countries' environmental health and sustainability policies.
- While a specific 2024 "Waste Recovery Score" of 3.1 is cited in some reports, the official 2022 EPI ranks Indonesia 164th out of 180 countries overall, indicating significant environmental challenges.

