

AEL



Smart Weighing System

智能称重系统

Associated Engineers, Limited

香港联谊工程有限公司



Smart Weighing System 智能称重系統

The management of municipal solid waste (MSW) is divided into three major sections: collection, transfer and end-treatment. In recent years, there have been significant developments in the fields of transfer and end-treatment. However, little focus has been dedicated to waste collection, a process which typically contributes to more than half of the total cost in MSW management.

Our smart weighing system offers the perfect solution to enhance the waste collection process. Waste deposited by end-users in our self-serviced smart bins are weighed before collected data are sent wirelessly to our cloud monitoring system for central processing. End-users and operators can then view the information of individual smart bins and the overall waste collection through various online user platforms.

In the Pearl River Delta region, the fraction of food waste is around 50% of the collected MSW. With around two-thirds being from residential households, public participation in communities is essential for waste reduction. Our smart weighing system promotes waste sorting at source as end-users separate and place food waste into our smart bins. With a smart card tracking system, the individual contribution of each end-user is monitored. A point incentive scheme based on the weight of the collected waste can be implemented to encourage source reduction and promote food waste recycling.

城市生活垃圾的管理主要分为三大部分：收集、中转及末端处理。近年来，在中转及末端处理的领域已出现了显著的发展。但是，对于一个占总城市生活垃圾的管理成本一半以上的环节，垃圾的收集过程往往被忽略。

我们的智能称重系統是改良垃圾收集过程的完美解决方案。我们的智能垃圾桶将终端用户投入的垃圾进行称重，并把收集到的数据无线发送到我们的云端监控系统作中央处理。终端用户和操作人员可以透过不同的在线用户平台查看个别智能垃圾桶及整体垃圾收集的信息。

在珠三角地区，厨余垃圾占约总城市生活垃圾的一半。由于约有三分之二是来自住宅用户，在小区里推动公众参与对于垃圾减量化是至关重要的。在终端用户把厨余垃圾分开和投入智能垃圾桶内的同时，我们的智能称重系統有效促进源头垃圾分类。系統内的智能卡记录系统把各终端用户的垃圾投额进行监测。运营商可依据记录了垃圾投额实施奖励计划，以鼓励源头减量化及推动厨余垃圾的回收。

Applications 应用



Housing Estate
居民小区



Shopping Mall
商场



Commercial Center
商业中心



Hotel
酒店

Job Reference 案例参考

Baoan Xincun, Shenzhen 深圳宝安新村



In Shenzhen, food waste remains a major portion in the collected MSW, hence public participation in communities is essential for waste reduction.

AEL has partnered with Shenzhen Ying'er Technology to participate in the Food Waste Sorting Demonstration Project advocated by the Shenzhen Municipal Government. Eight smart bins with cloud monitoring technology now operate in the neighborhood.

Through a point incentive scheme, household users can exchange daily commodities based on the amount of food weight disposed. Within one year, up to 36 tons of food waste has been sorted out.

在深圳所收集的废物中，厨余垃圾占主要部分。对于减少废物，公众在社区的参与至关重要。

联谊工程与深圳英尔科技公司合作参与深圳市政府倡导的厨余分类示范项目。现时共有八台具有量身定制要求和云端监控技术的智能垃圾桶在小区里运行。

通过实施积分奖励计划，住户可根据设置在智能垃圾桶的厨余重量换取日用品。在运营的第一年，已分拣的厨余垃圾高达 36 吨，分拣率亦达到 70%。

New Tech Plaza, Hong Kong 香港新科技广场



The Hong Kong government is going to implement MSW charging under the 'producer responsibility principle' in the near future to reduce the MSW disposal rate.

AEL was invited by Greeners Action to participate in a MSW charging pilot scheme. Two smart bins and our Online User Interface were deployed to simulate future MSW charging in commercial buildings.

In the first month, the smart bins have collected over 400 kg of MSW from tenants. With the crucial data collected online, tenants and operators are able to obtain a better understanding in MSW disposal.

香港政府计划在不久将来按照「生产者责任原则」实施「都市固体废物收费」，以降低固体废物弃置率。

联谊工程获绿领行动邀请参加一项针对商业和工业机构的垃圾收费试点计划。透过设置两台智能垃圾桶和我们的线上用户平台，模拟将来商业大厦的垃圾费。

在运作的首一个月，智能垃圾桶已从租户收集了超过 400 公斤的生活垃圾。我们的云监控系统能收集关键数据，令租户和运营商更明确了解垃圾处理。



System Features 系統特点

Smart Bin 智能垃圾桶



- Weighing is achieved by an electronic weighing device to accurately measure the amount of collected waste, both individually and accumulatively.

电子称重设备用于精确测量垃圾收集的单次和积累重量。
- Self-service is provided with simple operation and voice guidance to reduce manpower and cost on waste collection.

自助和简易操作，并设有语音引导以减少垃圾收集的人手和成本。
- A smart card reader is installed to record user identity and waste collection data of each end-user.

装有智能卡读卡器以记录各终端用户的用户身分和垃圾收集数据。
- Real-time statuses of the bin and other components are automatically monitored to provide on-demand maintenance.

自动监控垃圾桶和其他组件的实时状态以提供按需维护。
- Components are robust, durable and secured with locks to be used in diverse environments.

组件稳固耐用，并配有门锁以用于不同的环境。

Cloud Monitoring System

云端监控系统



- All data from smart bins are collected and stored in a central cloud server.
所有智能垃圾桶的数据由中央云端服务器作收集和存储。
- Present data on the cloud server allows both individual and collective monitoring of smart bins.
云端服务器上的数据容许智能垃圾桶的个别和集体监控。
- End-user behavior is recognized through the smart card tracking system to enable implementation of incentive schemes.
透过智能卡记录系统中了解各终端用户行为以推行奖励计划。
- Collected data is analyzed to derive waste collection patterns and enhance the overall waste collection process.
对收集到的数据作出分析以得出垃圾收集模式并改善垃圾收集总过程。

Online User Platform

线上用户平台

- End-users can remotely access their previous weighing and their account information anytime.
终端用户能够在任何时候远程查询自己的称量记录和用户资料。
- Environmental data based on behavior of each end-user (energy conserved, carbon footprint) is displayed to encourage source reduction.
根据各终端用户的行为显示的环境数据 (节能量、碳足迹) 以鼓励源头减量化。
- Operators can remotely check the status of each smart bin anytime to conduct efficient on-the-spot maintenance.
操作人员能够随时随地远程查询各智能垃圾桶的状态以进行高效的现场维修。



System Overview

系統概覽



Food Waste Collection
厨余垃圾收集

Waste Sorting at Source
源头垃圾分类



Smart Bin
智能垃圾桶

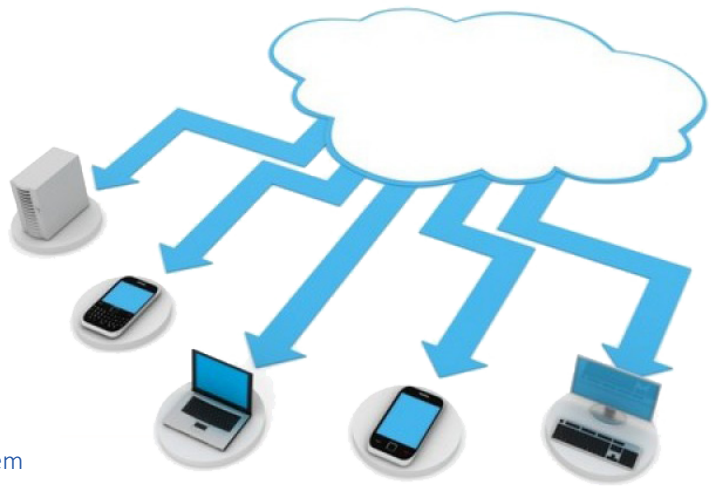
End-user Registration by Smart Card Tracking System
终端用户使用智能卡记录系统作登记



Food Waste Transfer
厨余垃圾转移



Our smart weighing system is integrated with our cloud monitoring system where, through various online user platforms, end-users and operators can view information of the smart waste collection system.



Central Cloud Server
中央云端伺服器

我们的智能称重系统综合了我们的云端监控系统。透过不同的线上用户平台，终端用户和操作人员可以查看整个智能垃圾收集系统的信息。

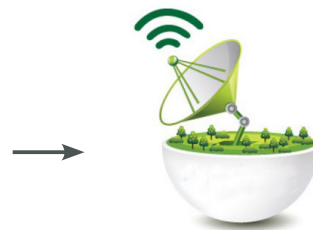


Online User Platform
线上用户平台

End-user/Operator Checking through User Interfaces
终端用户 / 操作人员可使用不同用户界面作查询



Remote Monitoring System
远程监控系统



Mobile Data / Wired Network
移动数据 / 有线网络



Self-serviced Kiosk
自助服务亭

Point Incentive Scheme Checking by End-user
终端用户可查询奖励计划的积分和信息

Online User Interface

线上用户平台

- Real-time access to waste data for easy monitoring and management, through our user-friendly web user interface.
- 透過我們人性化的线上用户平台，實時存取垃圾收集的数据，更有效作监控和管理。



End-user Interface 终端用户界面

User Waste Disposal History 用户垃圾弃置记录

- End-users can check their waste disposal history via our Smart Weighing System website or mobile applications. The history includes input time, input weight, the accumulated input weight and available points received. This information plays an important role for the users to evaluate their own behavior and achieve waste reduction consequently.

终端用户可以通过智能称重系统的网上平台或手机程序來查阅他们的个人垃圾弃置记录，包括弃置时间、单次或累计弃置重量、可用积分等。透过了解这些信息，终端用户可以评估个人的垃圾弃置量，并优化生活习惯以达致源头减废。

Point Incentive Scheme Checking 个人积分查阅

- By implementing a Point Incentive Scheme, points are allocated to the end-users according to the amount of waste disposed. Based on the points received, end-users will be able to use the points to redeem daily necessities or special prizes.

当推行积分奖励计划时，系统将根据终端用户的垃圾弃置量自动为用户分配积分；终端用户则可以利用所得积分来兑换礼品或日用品。

Operator Interface 操作人员界面

Real-time Bin Status Monitoring

实时监测垃圾桶情况

Manual checking of the remaining capacity of bins is troublesome. Also, bins running out of space for a long period brings inconvenience to the end-users. Our Smart Weighing System presents information on the bin status real-time, meaning the operator can check it wherever and whenever while online.

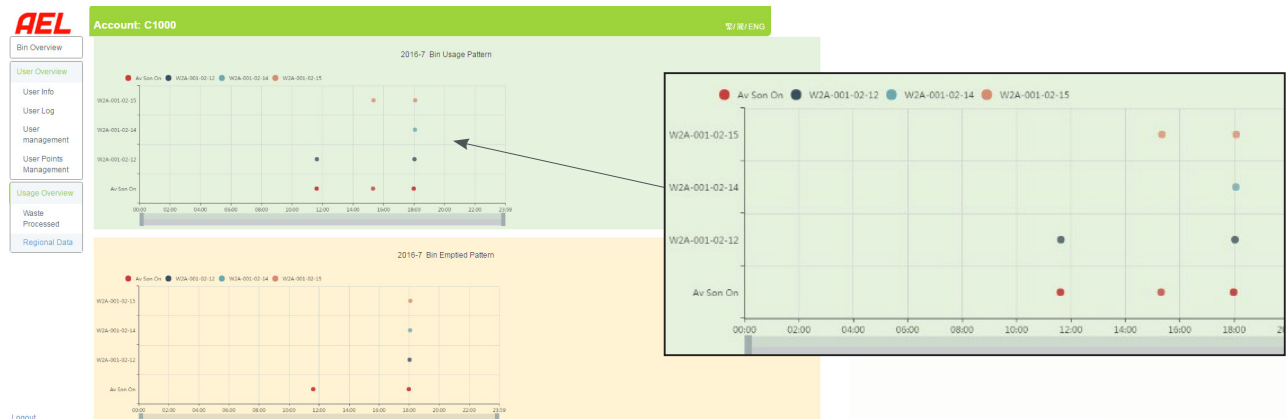
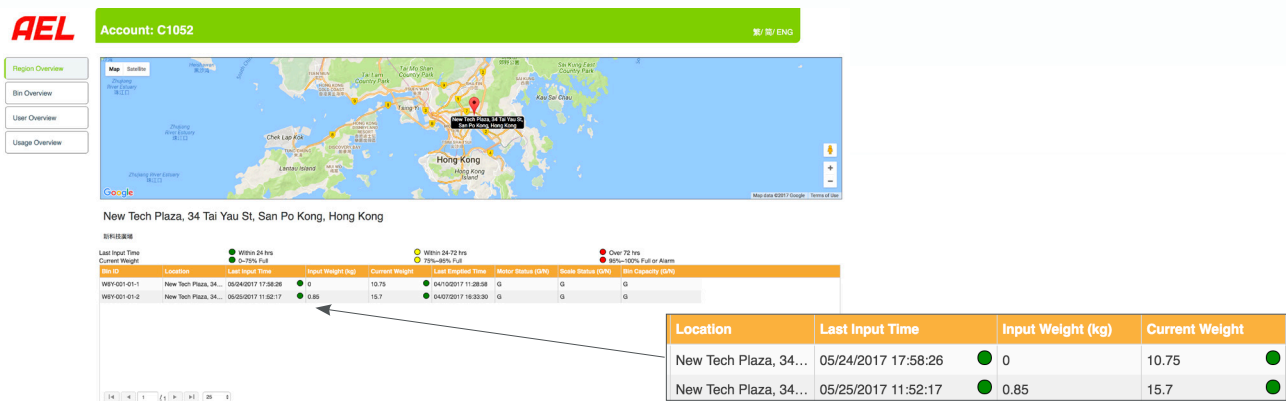
平常只依靠人手监察垃圾桶需要大量劳动力，垃圾桶长期满载时亦会对终端用户构成不便。智能称重系统能实时监测垃圾桶使用情况，操作人员可随时随地在线上管理。

Smart Bin Usage Pattern Analysis

智能垃圾桶用量分析

Our Smart Weighing System utilizes all collected information to offer analysis which will significantly increase effectiveness of waste collection business. By monitoring the smart bin usage pattern, optimum collection and maintenance schedules can be easily made.

智能称重系统收集所有智能垃圾桶的数据并进行分析，加强垃圾收集的营运效率。操作人员亦可以据此安排最佳的清理和维修时间表。



End-User Account Management

终端用户帐户管理

With this feature, looking into specific end-users' behavior will give a clear understanding of waste disposal trends. Any suspicious end-user account can also be suspended if any malpractice is found.

操作人员可以透過監察终端用戶的使用習慣，清楚了解垃圾棄置的趨勢。如果有终端用戶行為不當，操作人员亦可即時凍結其帳戶。

Point Incentive Scheme Management

积分奖励计划管理

While implementing a Point Incentive Scheme, our Smart Weighing System provides a centralized management system to keep track of and evaluate the scheme performance.

推行積分獎勵計劃期間，智能称重系統會將數據進行中央管理，並追蹤及評估計劃的情況和成效。

Major Components of Smart Bin

智能垃圾桶的主要部件

1. LED Lighting

LED 灯

- Illumination system in low-light environment
在光线不足的情况下可作照明用途

2. LCD Display

液晶显示器

- For checking the machine status
显示系统的运行状态

3. Smart Card Reader

智能卡读卡器

- For identifying the unique ID on each smart card
识别智能卡

4. Keypad

输入键盘

- For setting and data input
设置和输入数据

5. Deodorizing System

除臭系统

- For eliminating smell from collected food waste before treatment
消除厨余垃圾的气味



6. Wireless Antenna

天线

- For transmitting data from the machine to the cloud server
传送由机器收集了的数据到云端服务器

7. Canopy

顶盖

- For maximizing the protection of the electronic equipment
增加机内电子设备的维护



8. Infeed Door

入料门

- Automatic operation with smart card reader
由智能卡读卡器启动自动操作

9. Bin Access Door

收集桶进出门

- For replacing the standard 120L garbage bin
放入或取出标准 120 公升垃圾收集桶

10. Door Lock

门锁

- For preventing unauthorized persons from accessing the machine
防止未经授权的人员打开机器门

Operation Flow of Smart Bin

智能垃圾桶的操作流程

1. Place your smart card onto the card reader. The infeed door will open automatically.
将智能卡放在读卡器上。进料门将自动打开。



Place your card
请刷卡

2. Dispose your waste through the inlet.
把垃圾投入口。



The infeed door opens
盖子打开

3. Place your smart card onto the card reader again. The infeed door will close automatically.
再次将智能卡放在读卡器上。进料门将自动关闭。



Place your card again
投放完毕后请再次刷卡

4. Check and confirm the weight of the disposed waste.
检查并确认投进废物的重量。



Weight
投放重量
0.30 kg

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