SDG12 and Environmental Audit
—The Disposal and Reuse of General Industrial Waste

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SDG12與環境審計-
以一般事業廢棄物清理及再利用為例

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SDGs and Environment



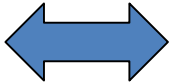
Source：https://sustainabledevelopment.un.org/sdgs



SDGs與環境議題



資料來源：整理自聯合國網站資料。





SDG12：Responsible Consumption and Production

Targets	Indicators
12.1 Implement the 10-year framework of programs on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	12.1.1 Number of countries with sustainable consumption and production (SCP) national action plans or SCP mainstreamed as a priority or a target into national policies
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1 Material footprint, material footprint per capita, and material footprint per GDP 12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	12.3.1 Global food loss index
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement 12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 National recycling rate, tons of material recycled

Source：https://sustainabledevelopment.un.org/sdg12

SDG12責任消費與生產

細項目標	指標
12.1實施永續消費與生產十年計畫架構（10YEP），所有的國家動起來，由已開發國家擔任帶頭角色，考量開發中國家的發展與能力	12.1推動永續消費和生產(SCP)國家行動計畫或優先納入SCP的國家數量
12.2在2030 年以前，實現自然資源的永續管理以及有效率的使用	12.2.1物質足跡，人均物質足跡和GDP物質足跡 12.2.1國內物質消費，人均國內物質消費和GDP國內物質消費
12.3在 2030 年以前，將零售與消費者階層上的全球糧食浪費減少一半，並減少生產與供應鏈上的糧食損失，包括採收後的損失	12.3.1全球糧食消耗指數
12.4在2020 年以前，依據議定的國際架構，在化學藥品與廢棄物的生命週期中，以符合環保的方式妥善管理化學藥品與廢棄物，大幅減少他們釋放到空氣、水與土壤中，以減少他們對人類健康與環境的不利影響	12.4.1依據有害及化學廢棄物國際多邊環境協定，履行相關協議要求義務之締約方數量 12.4.2人均有害廢棄物量及有害廢棄物處理比例(依處理方式分類)
12.5在2030 年以前，透過預防、減量、回收與再使用大幅減少廢棄物的產生	12.5.1國家回收率(物質回收量以公噸計)

SDG12：Responsible Consumption and Production(cont.)

Targets	Indicators
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1 Number of companies publishing sustainability reports
12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	12.7.1 Number of countries implementing sustainable public procurement policies and action plans
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment
12.A Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.A.1 Amount of support to developing countries on research and development for sustainable consumption and production and environmentally sound technologies
12.B Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	12.B.1 Number of sustainable tourism strategies or policies and implemented action plans with agreed monitoring and evaluation tools
12.C Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including ~~by~~ restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	12.C.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels

Source：https://sustainabledevelopment.un.org/sdg12

SDG12責任消費與生產 (續)

細項目標	指標
12.6鼓勵企業採取可永續發展的工商作法，尤其是大規模與跨國公司，並將永續性資訊納入他們的報告週期中	12.6.1發布永續發展報告之企業數量
12.7依據國家政策與優先要務，促進可永續發展的公共採購流程	12.7.1實施永續採購政策和行動計畫之國家數量
12.8在2030 年以前，確保每個地方的人都有永續發展的有關資訊與意識，以及跟大自然和諧共處的生活方式	12.8.1全球公民教育、永續發展教育（包括氣候變遷教育）在國家教育政策、課程規劃、教師教育和學生評估中主流化的程度
12.a協助開發中國家強健它們的科學與科技能力，朝向更能永續發展的耗用與生產模式	12.a.1援助發展中國家研發永續消費和生產以及環境友善技術的金額
12.b制定及實施政策，以監測永續發展對創造就業，促進地 方文化與產品的永續觀光的影響	12.b.1永續觀光策略、政策，及實施的行動計畫(採用監測及評估工具)數量
12.c依據國情消除市場扭曲，改革鼓勵浪費的無效率石化燃料補助，作法包括改變課稅架構，逐步廢除這些有害的補助，以反映他們對環境的影響，全盤思考開發中國家的需求與狀況，以可以保護貧窮與受影響社區的方式減少它們對發展的可能影響	12.c.1每單位化石燃料(生產和消費)占GDP之數量；及化石燃料占國家總支出比例
資料來源：整理自行政院國家發展永續委員會提供資料。	

SDG12.5 and Indicator



12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

12.5.1 National recycling rate, tons of material recycled

SDG12.5及其指標



12.5 在2030 年以前，透過預防、減量、回收與再使用大幅減少廢棄物的產生

國家回收率(物質回收量以公噸計)

The Innovation of Waste Management in Taiwan

A Removal and Disposal

Before 2001



SDG12.5
By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

After 2001

B Resource Circulation

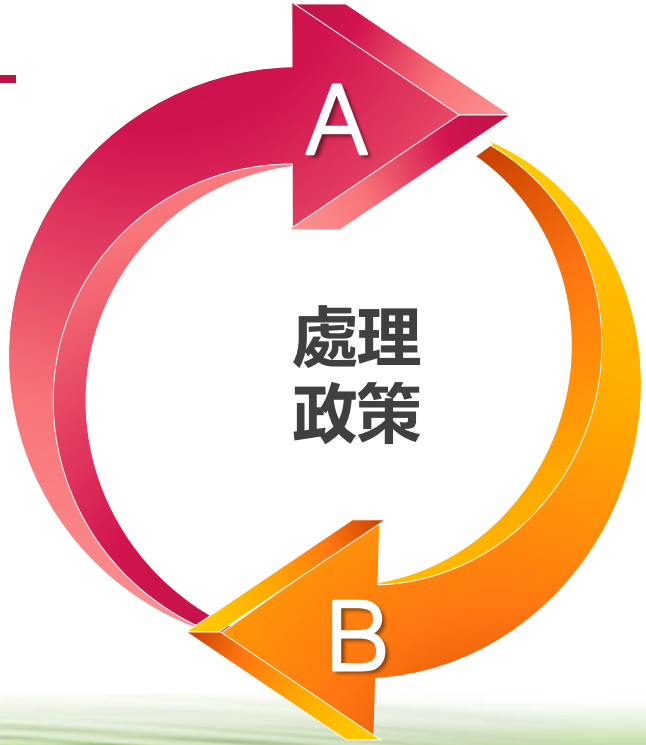
- ☐ Reduction
- ☐ Recycle
- ☐ Prevent Pollution

我國廢棄物處理政策變革

SDG12.5「在2030 年以前，透過預防、減量、回收與再使用大幅減少廢棄物的產生」

A 清除處理

2001年以前



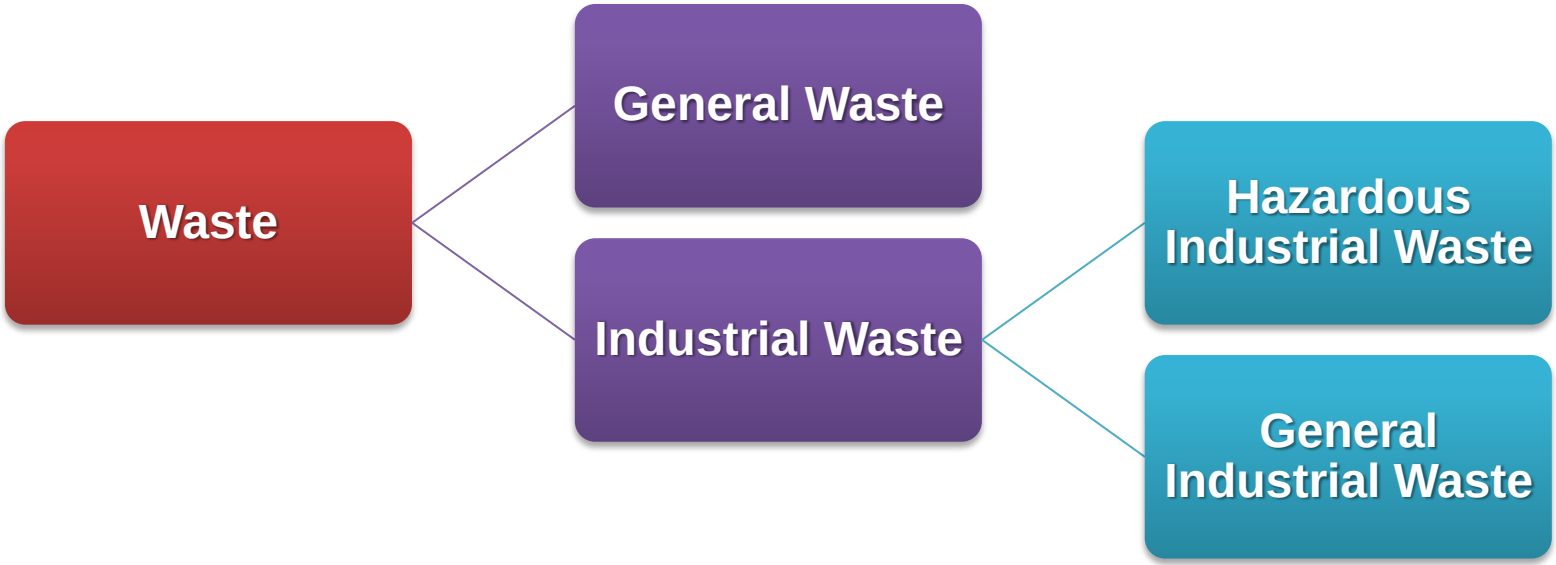
2001年以後

B 資源化管理

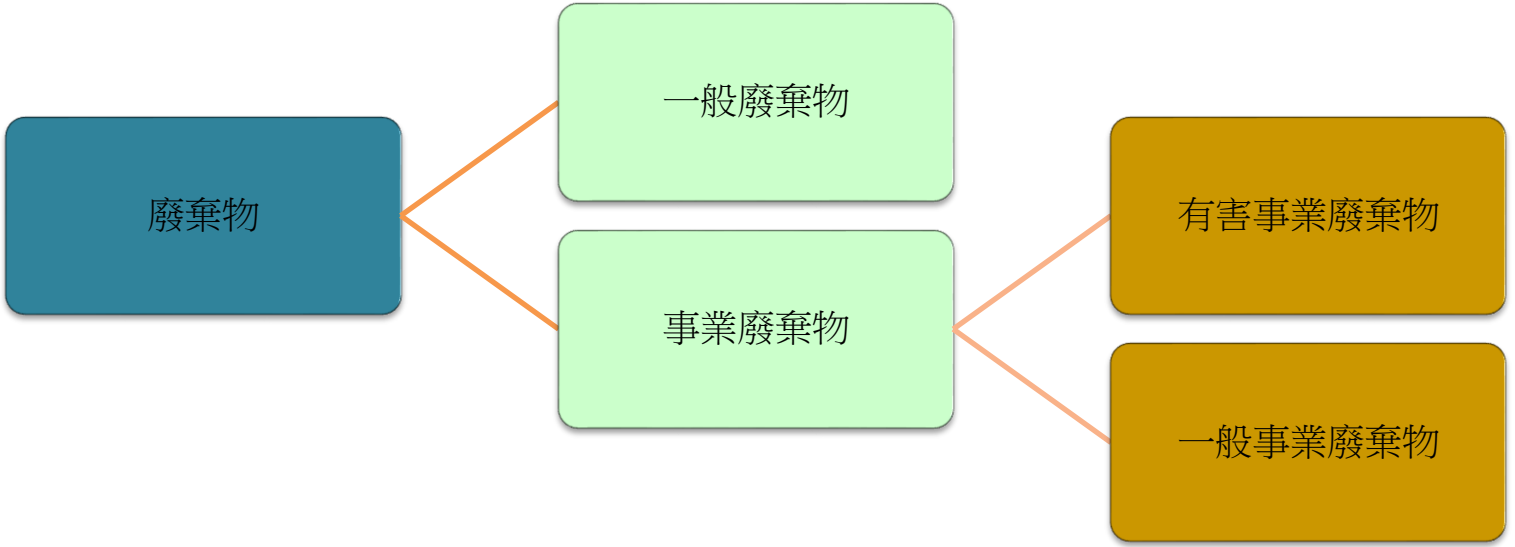
- 源頭減量
- 回收減廢
- 污染預防

Waste Classification in Taiwan

According to Article 2 of the Waste Disposal Act：

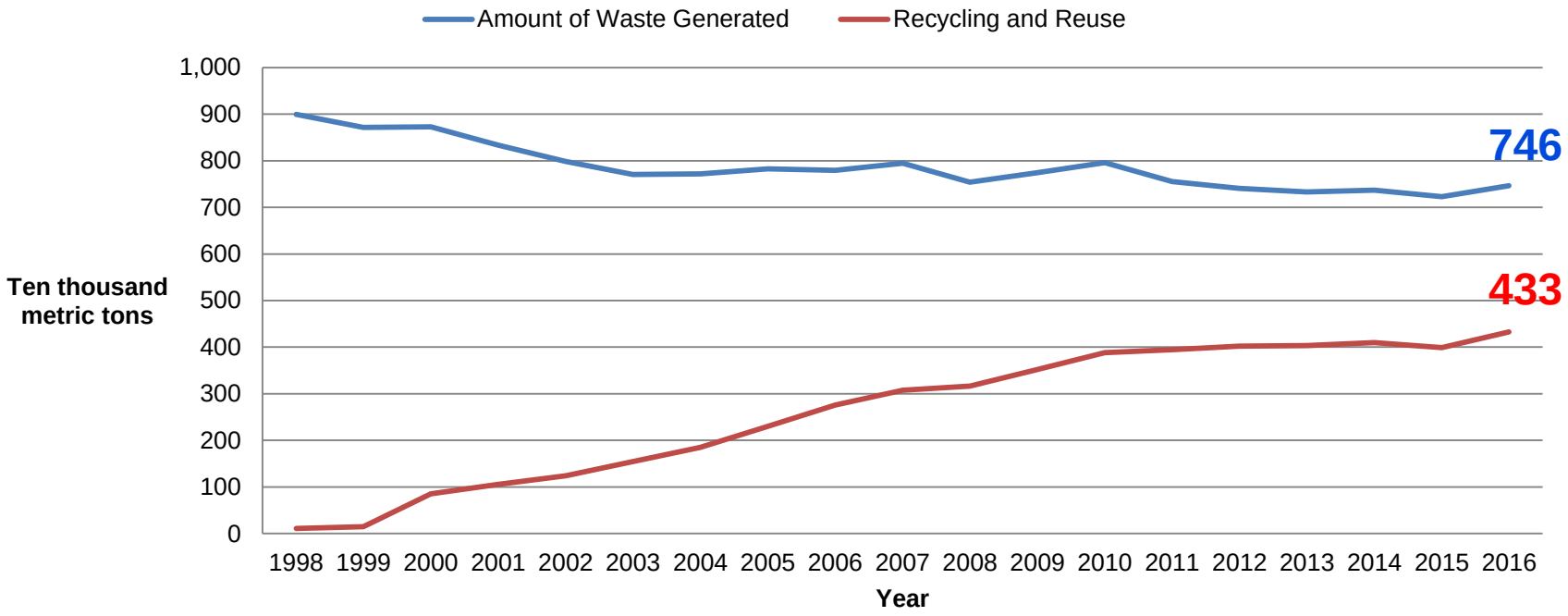


廢棄物分類

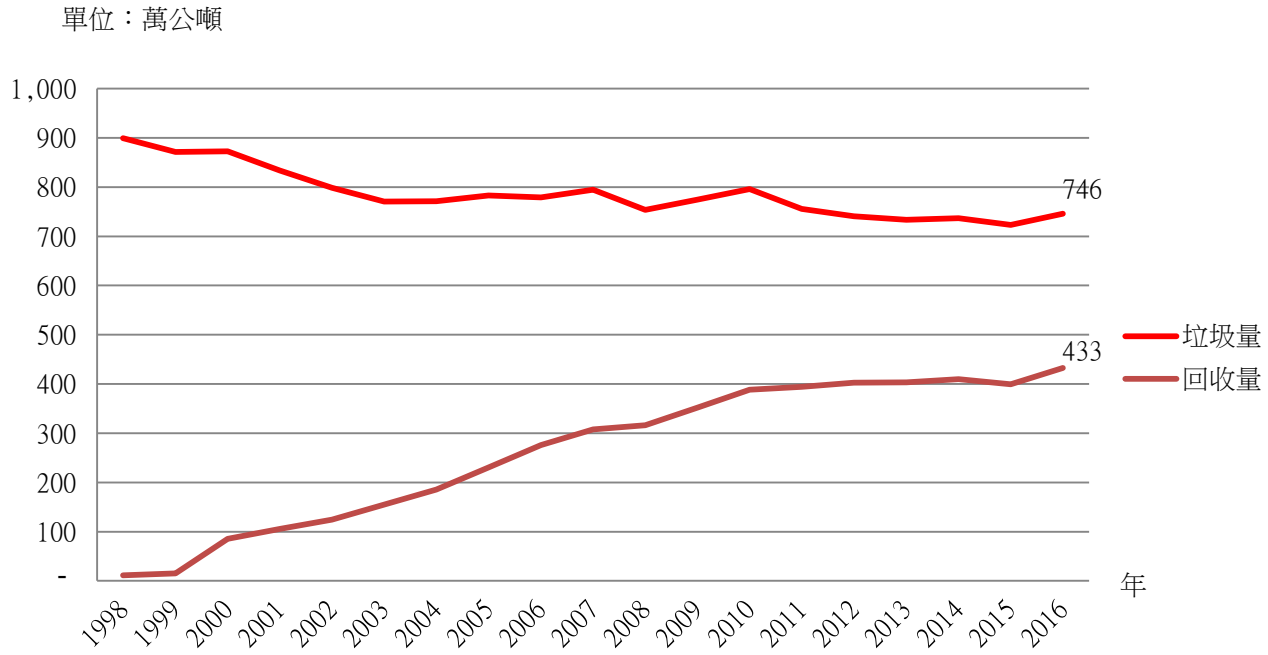


註：依廢棄物清理法第2條規定

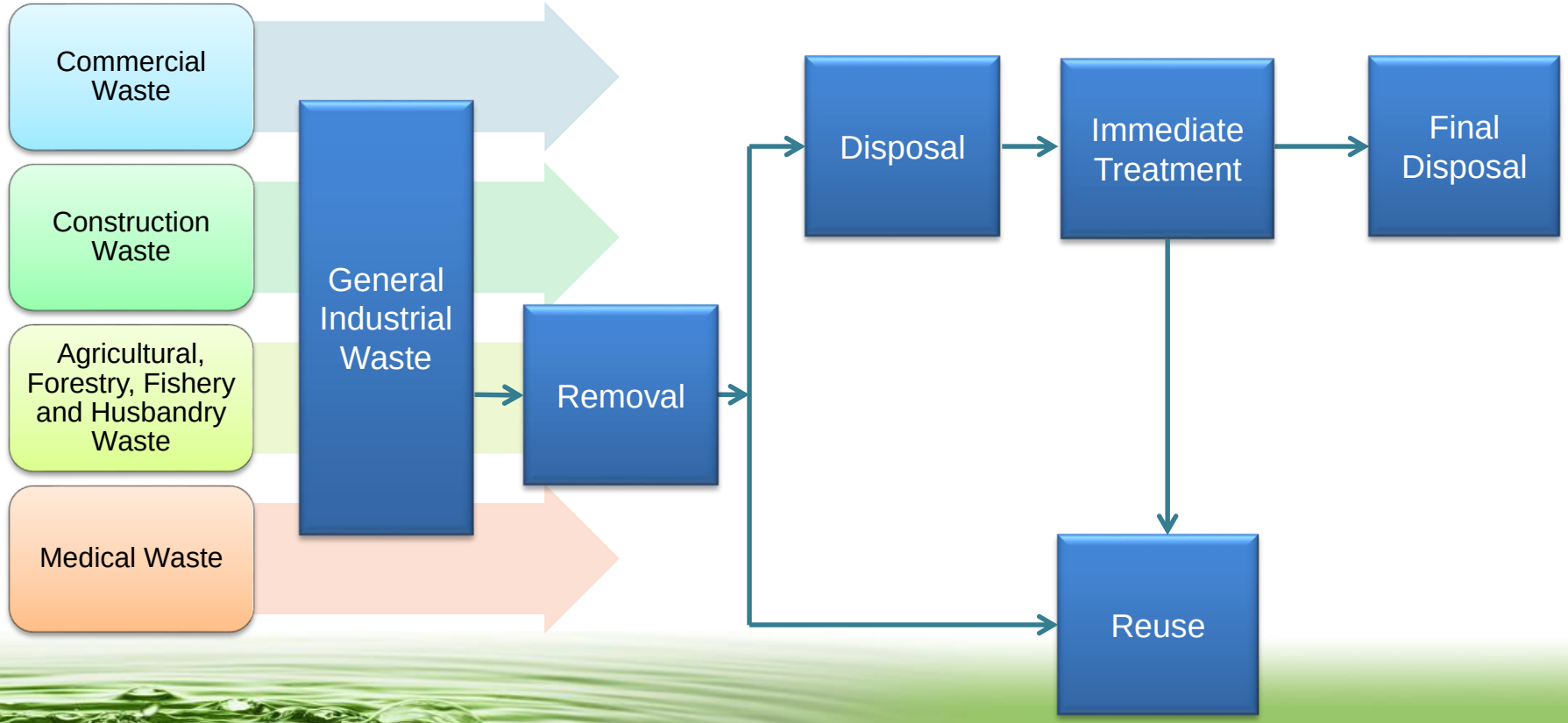
Waste Generation, Recycling and Reuse in Taiwan(1998-2016)



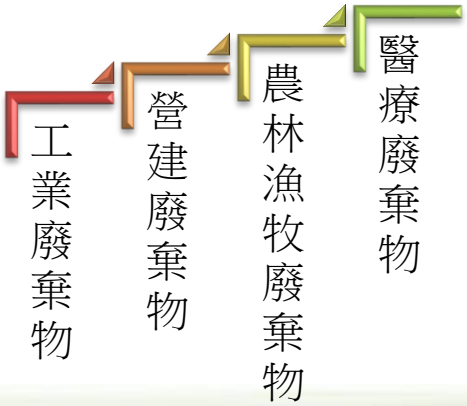
臺灣地區垃圾產生及回收(1998至2016年)

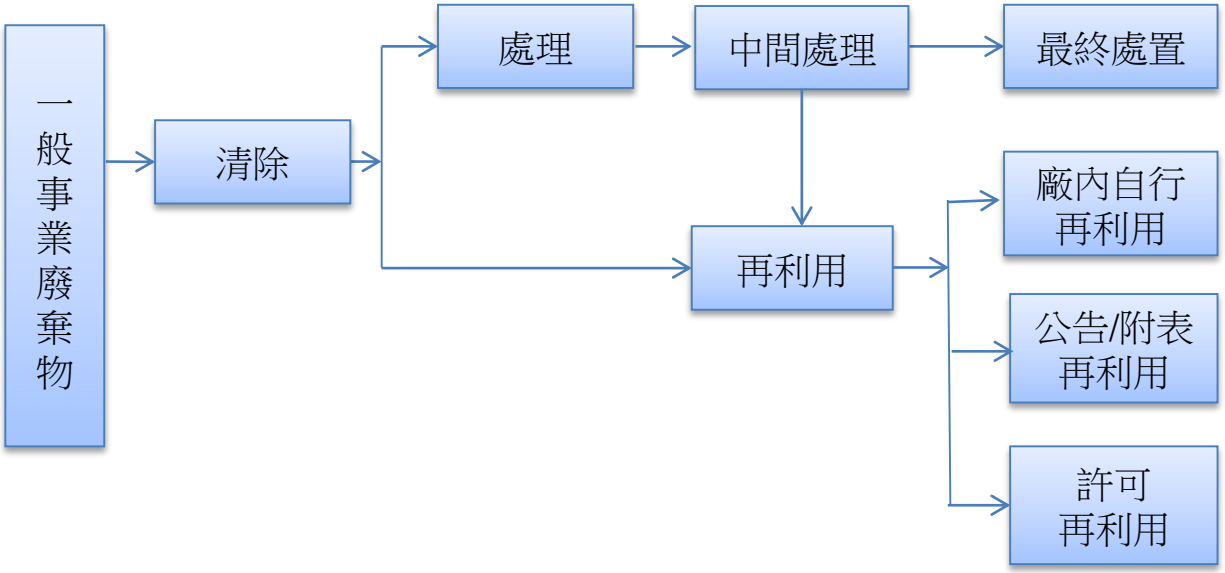


Process of General Industrial Waste Treatment



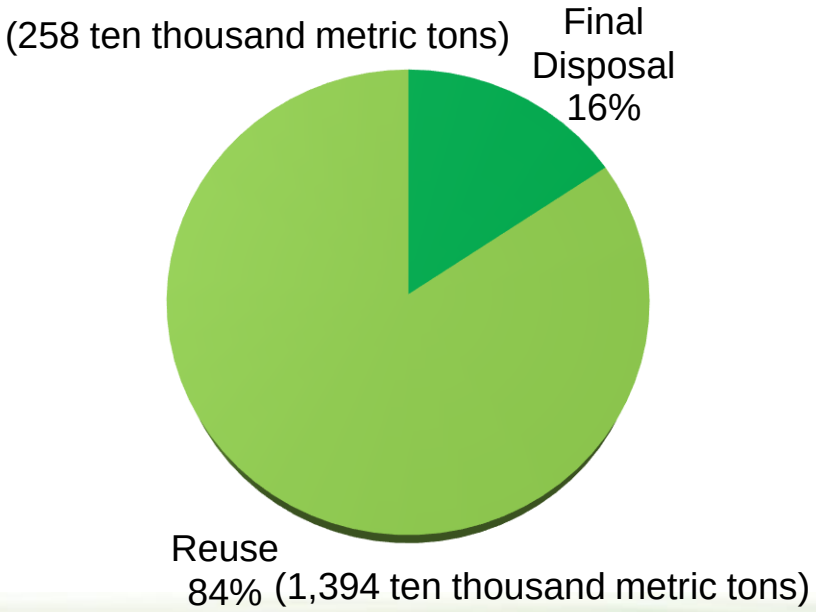
一般事業廢棄物清理及再利用流程





General Industrial Waste Flows(2016)

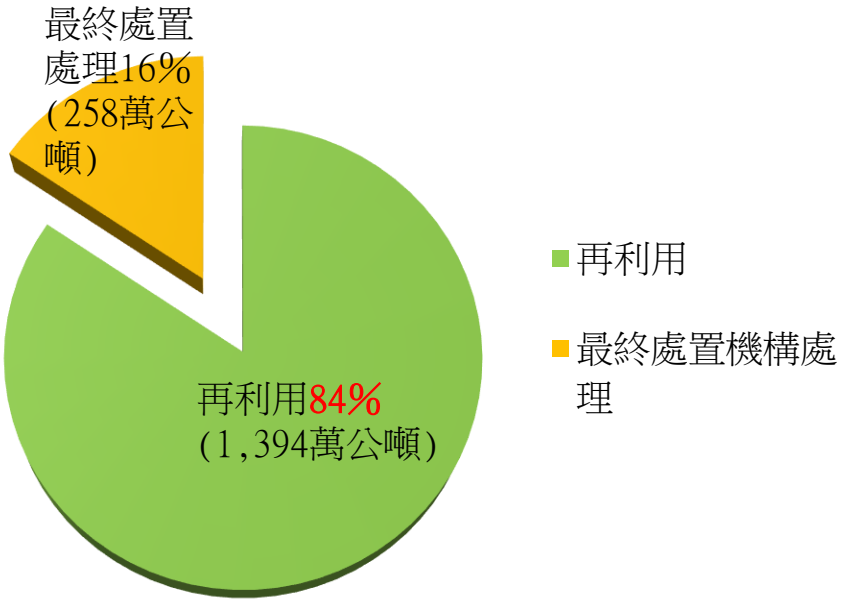
Final Disposal & Reuse



Reuse of General Industrial Waste



一般事業廢棄物流向(2016年)

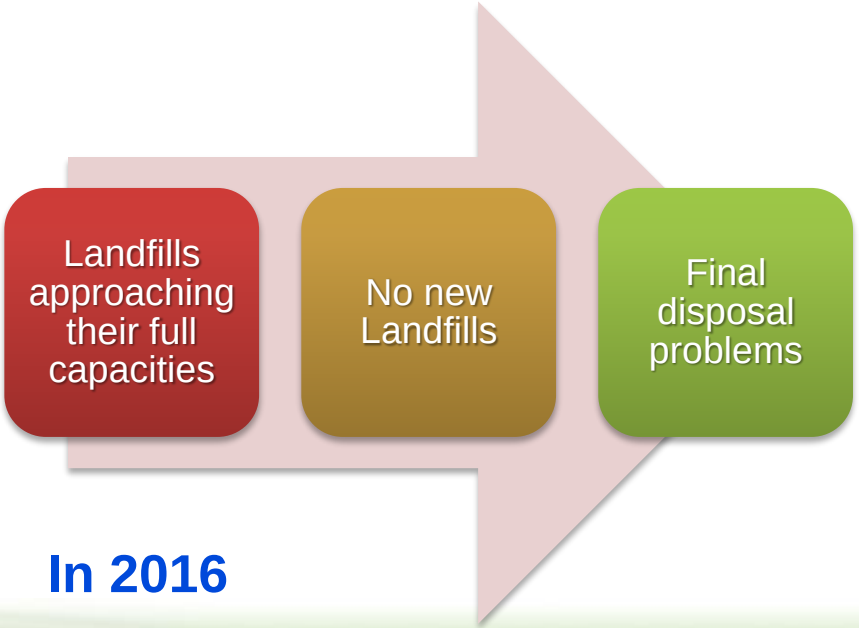




Audit Findings and Suggestions

1. **Some of general industrial waste during resources circulation still needed final disposal, but most of Taiwan's landfills were approaching their full capacities.**

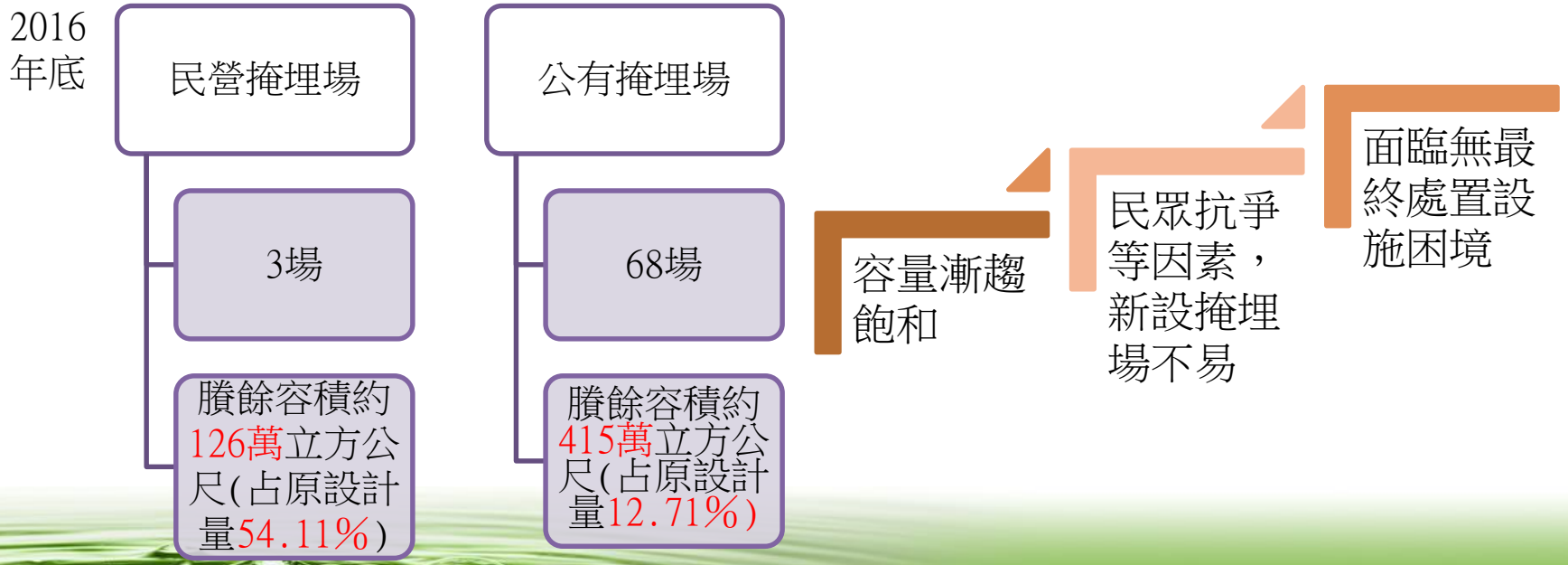
Private Landfill	Public Landfill
3 sites	68 sites
Residual Capacity 54.11%	Residual Capacity 12.71%



In 2016

重要審計發現及建議

一、一般事業廢棄物在資源循環運用過程，仍有最終處置或暫置需求，惟現有掩埋場容量漸趨飽和



Audit Findings and Suggestions

The capacity of private waste incineration was insufficient.

Private waste incineration	Incinerator Declaration
20 sites	Private: 92 ten thousand metric tons
Sites' Capacities: 119 ten thousand metric tons	Public: 85 ten thousand metric tons
	Total: 177 ten thousand metric tons

In 2016

- 24 public refuse incineration plants were dealing with general industrial waste.
- The Amendment of Waste Disposal Act (Jan. 2017)
- "In the case that the enforcement authority is entrusted to clear and dispose of general industrial waste, it shall not accept the assignment until there is a surplus disposal capacity left after disposing the following general waste."
- Final disposal problems got even worse.

民營焚化處理機構焚化量不足支應一般事業廢棄物

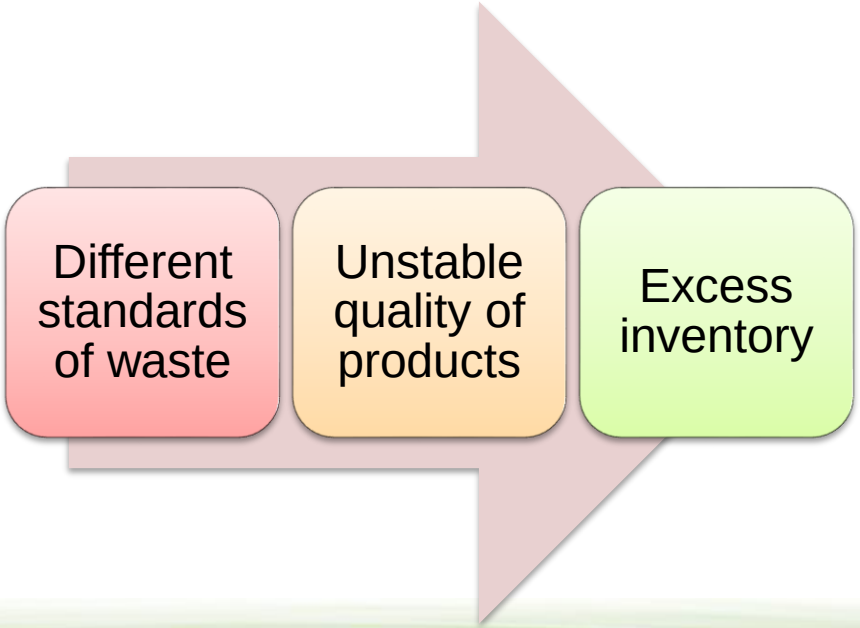
2016年
為例



- 大多數進入全國24座大型垃圾廠進行焚化
- 2017年1月廢棄物清理法修正
- 優先處理一般廢棄物
- 焚化處理問題更形嚴峻

Audit Findings and Suggestions

2. Government promoted recycling of general industrial waste, but the elimination of reusable products was not well.



249 Reusable Products

103 reusable products with standards

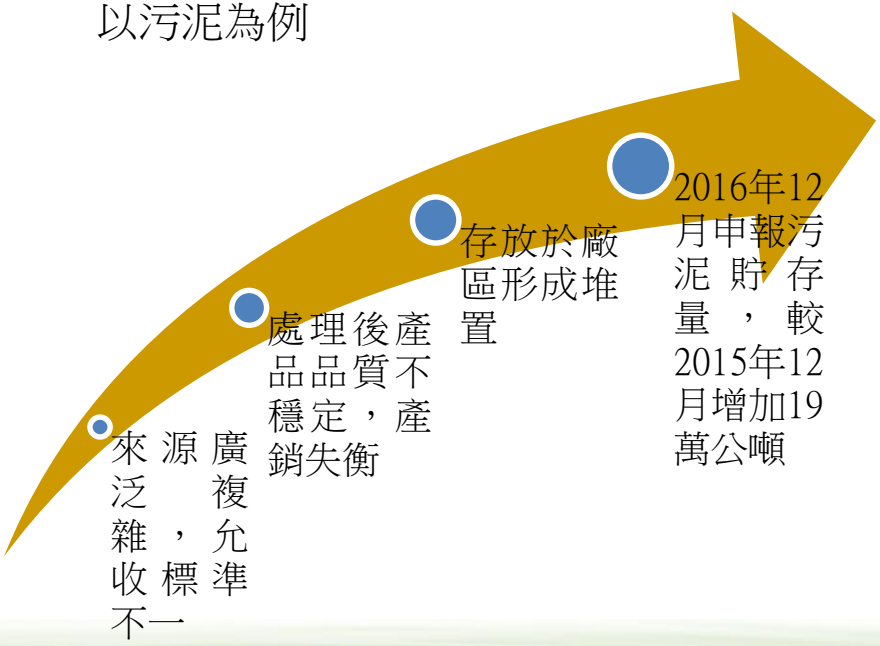
146 reusable products without standards

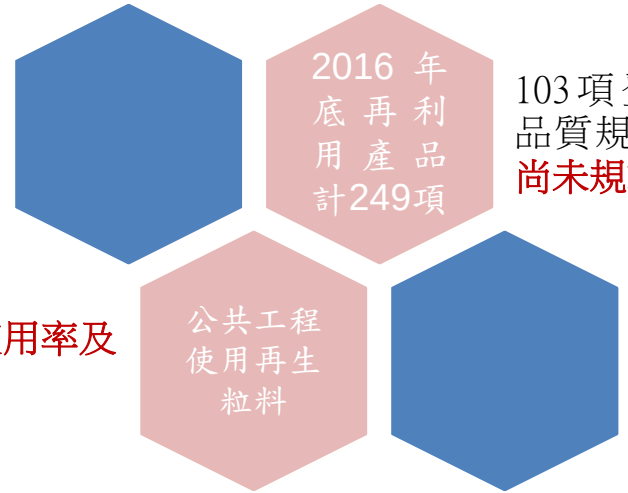
Recycled Pellets

Unspecified usage rate and scope of use

二、積極推動一般事業廢棄物後端再利用，惟部分再利用產品去化管道不足

以污泥為例





103項登載產品品質規範，146項尚未規範

未規範使用率及範圍

Audit Findings and Suggestions

3. **The inspection and supervision of general industrial waste recycling organization were not fully implemented.**

(1) Data errors of enterprises' industrial waste disposal plan

(2) Inspection results were not related to legal amendment.

(3) Different standards of government departments

三、 對於一般事業廢棄物再利用機構之檢核及督導未落實

- 部分再利用機構清理計畫登載內容錯誤、收受量超出檢核量等缺失，未能有效改善。
- 目的事業主管機關未能掌握地方政府查核結果，無法依稽查所發現之制度面缺失問題，適時修正管理辦法。
- 相同性質之廢棄物，因產源事業分屬不同中央主管機關，而面臨不同之再利用管理方式。

Audit Findings and Suggestions

4. The EPA established management information system, but local Environmental Protection Departments didn't make good use of it.

Some Environmental Protection Departments did not use information system to help manage, so that some enterprises processed waste without license.

Some Environmental Protection Departments did not require enterprises to weigh waste. Therefore, it was unable to grasp the actual removal weight of waste and increase the subsequent regulatory costs.

Information System



四、已建置清除處理機構服務管理資訊系統，惟部分地方環保機關未善用

- 部分地方環保局未運用資訊系統協助管理，肇生處理業者許可證過期，仍收受廢棄物進行處理之異常情事。
- 未要求事業、清除、處理機構於收受廢棄物時確實過磅，致地方環保局未能掌握廢棄物實際清運重量，增加後續管制成本。



Audit Findings and Suggestions

5. The EPA already set the environmental inspect plan, but local Environmental Protection Departments didn't carry out thoroughly due to the shortage of manpower.

Item / Year	Number of public and private waste clearance and disposal organizations (A)	Number of local Environmental Protection Departments' inspectors (B)	Per inspector for organizations (A/B)
2014	3,690	1,962	1.88
2015	3,925	1,951	2.01
2016	4,164	1,832	2.27

? **Lack of on-site inspection**

? **Low inspection density**

五、主管機關已訂定稽查工作計畫，惟地方環保局人力不足，難以落實

項目 / 年度	公民營廢棄物清除及處理機構（家數）	地方政府環保稽查人力(人)	平均每一環保稽查人力負責家數
2014	3,690	1,962	1.88
2015	3,925	1,951	2.01
2016	4,164	1,832	2.27

資料來源：整理自環保署提供資料。

- 未針對有害廢棄物、疑似應報未報等異常情事落實現場查核。
- 稽查次數未能嚇阻業者非法行為。

Audit Findings and Suggestions

Abnormal Type	Inspection Method	Number of type times		Number of Inspection
Total		7,036 (100%)	≠	6,635 (100%)
I	Phone-call Inspection	5,082 (72%)	≠	5,545 (84%)
II	On-site Inspection	1,954 (28%)	≠	1,090 (16%)

Insufficient Inspection

依行業類別勾稽之異常樣態		
類別	稽查方式	次數
合計		**7,036**
疑似異常樣態Ⅰ(如疑似登記錯誤)	經電話輔導後，酌情辦理現場稽查。	5,082 (72%)
疑似異常樣態Ⅱ(如疑似應報未報)	應即時進行現場稽查。	1,954 (28%)
資料來源：整理自環保署「105年事業廢棄物清理查核及勾稽稽查工作計畫」。		

環保局後續追蹤情形		
總追蹤數	電話輔導	現場稽查
6,635	5,545 (84%)	1,090 (16%)

部分異常態樣未追蹤(7,036 ≠ 6,635)

應現場稽查未辦理(1,954 ≠ 1,090)

Audit Findings and Suggestions

6. The EPA built Global Positioning Systems (GPS) to analyze the movements of waste removal trucks and automate inspections, but some trucks were not included in the scope of management.



Type	Waste Removal Trucks with Permission
Total amount	14,369
with GPS	7,534
without GPS	6,835

6,835 trucks were not included in the scope of management.

Illegal dumping of waste

六、已建置事業廢棄物清運機具即時追蹤系統(GPS)，惟功能未盡發揮



類別	車輛數
已裝置GPS車輛數(A)	9,081
各清除機構許可證登載之車輛數(B)	14,369
許可證登載中已裝置GPS車輛數(C)【註1】	7,534
許可證登載中未裝置GPS車輛數(B-C)【註2】	6,835
自行裝置(A-C)	1,547

註：1.屬依規定應予裝置者。
2.屬依規定目前尚無須裝置者。
3.資料來源：整理自環境保護署提供2017年1月24日止資料。

6,835輛清除機具未列入納管範圍

部分清運業者利用未裝置GPS車輛從事不法行為（ＡＢ車）

Audit Findings and Suggestions

- Automatic monitoring
- 11 examinations
- Warning area



? **Monitoring system**

? **Low inspection density**



環保署每日自動監控

執行11種異常態樣勾稽

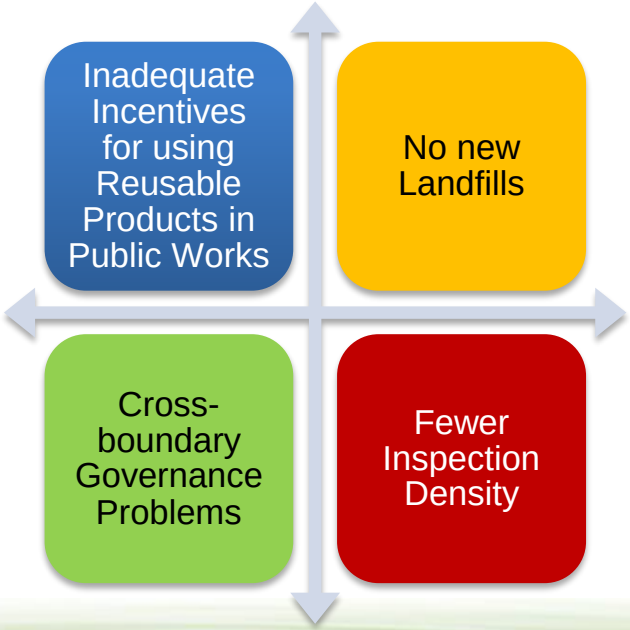
警示區建置與查詢功能

地方環保局未及時運用監控系統

稽查次數未能嚇阻業者非法行為

Conclusion

Causes



NAO & EPA respond to SDG12

NAO

- Environmental Audit
- Making a difference to the lives of citizens.

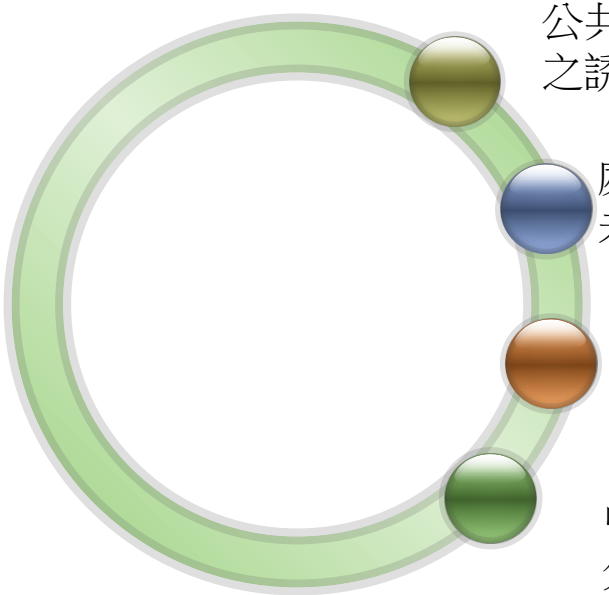
EPA

- Increase incentives to use reusable products.
- Reuse 83% of general industrial waste by 2017.

SDG12

- Responsible Consumption and Production

結語



公共工程使用再利用產品之誘因不足

處理設施因民眾抗爭未能如期設置

權責機關稽查強度不足

中央及地方管理權責分散，跨域協調待強化

已參據審計部相關審核意見，研謀因應改善措施

2017年一般事業廢棄物再利用率約83%

賡續提升使用一般事業廢棄物再利用產品之誘因



Thanks for listening.

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敬請指教

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