Using Economic Instruments (EIs) to Promote Improved Waste Management

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- **Education**
  - BA: International Relations, Faculty of Political Science, Chulalongkorn University
  - MA & Ph.D.: Development Science (Environmental Economics), Graduate School for International Development and Cooperation (IDEC), Hiroshima University
  - Master Thesis: Valuation of Health Benefits of Air Pollution Control in Bangkok, Thailand: Application of Meta-analysis for Benefits Transfer
  - Doctoral dissertation: A Health Benefits Analysis of Reducing Particulate Matter Air Pollution in Bangkok, Thailand

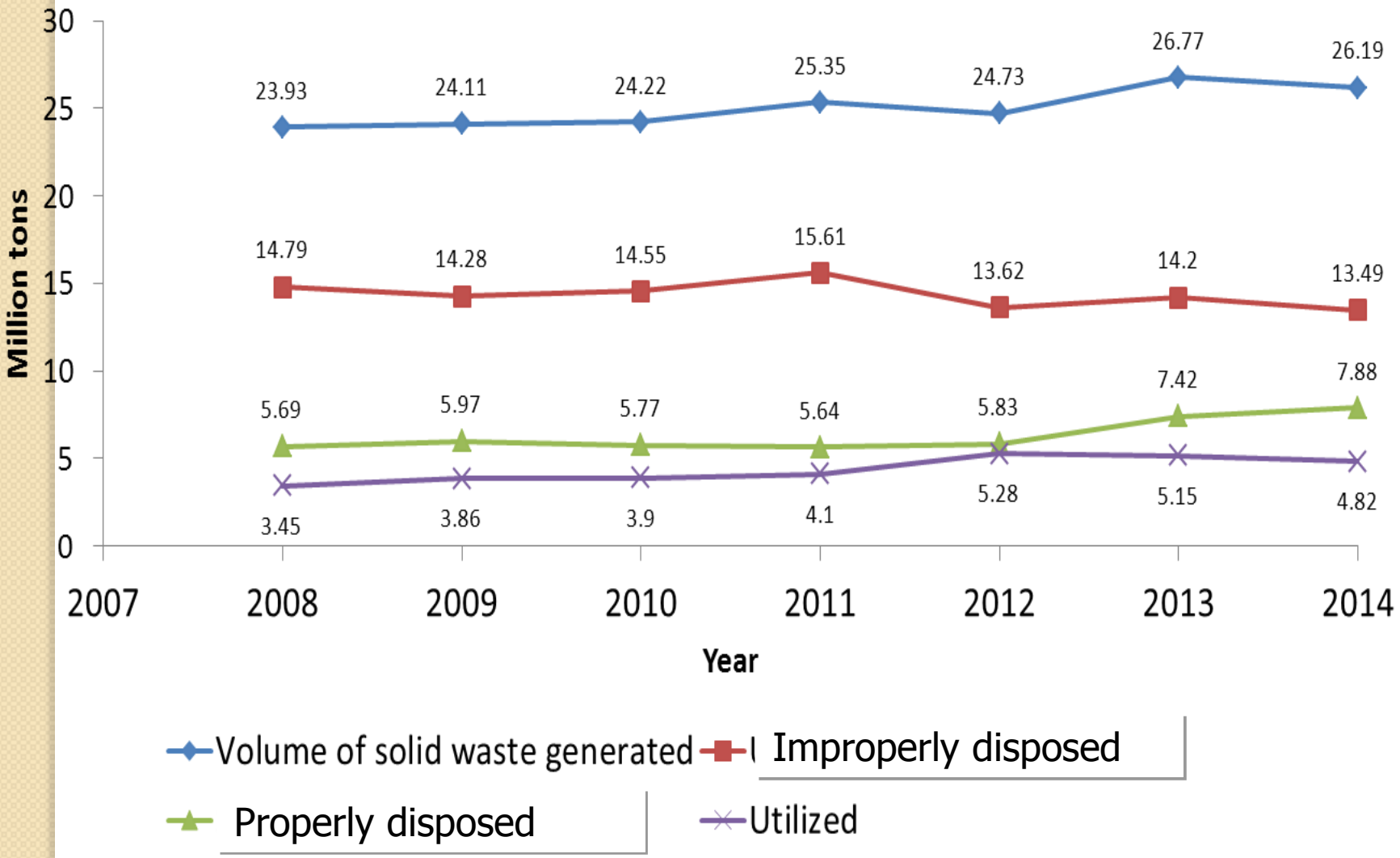
- **Working experiences**
  - 2004: Thailand Environmental Institutes
  - 2007: Federation of Thai Industries
  - 2008: Center of Excellence for Hazardous Substance Management, CU
  - Oct 2013 - present: Environmental Research Institute, CU (ERIC)

What are the problems of municipal solid waste in Thailand?

- Increasing waste volume every years
- Improper treatment of waste (open dumps) + illegal dumping with industrial waste
- Improper maintenance of sanitary landfills
- NIMBY – hard to develop new waste disposal facilities (even WTE)
- Not enough waste avoidance and waste segregation – mixed waste types incl. household hazardous waste (HHW)
- Low recycling rate, 3Rs not yet actualized in Thai society

**********Unsustainable future*********

Municipal Solid Waste Situation in Thailand, 2008-2014



Where it goes and ends?

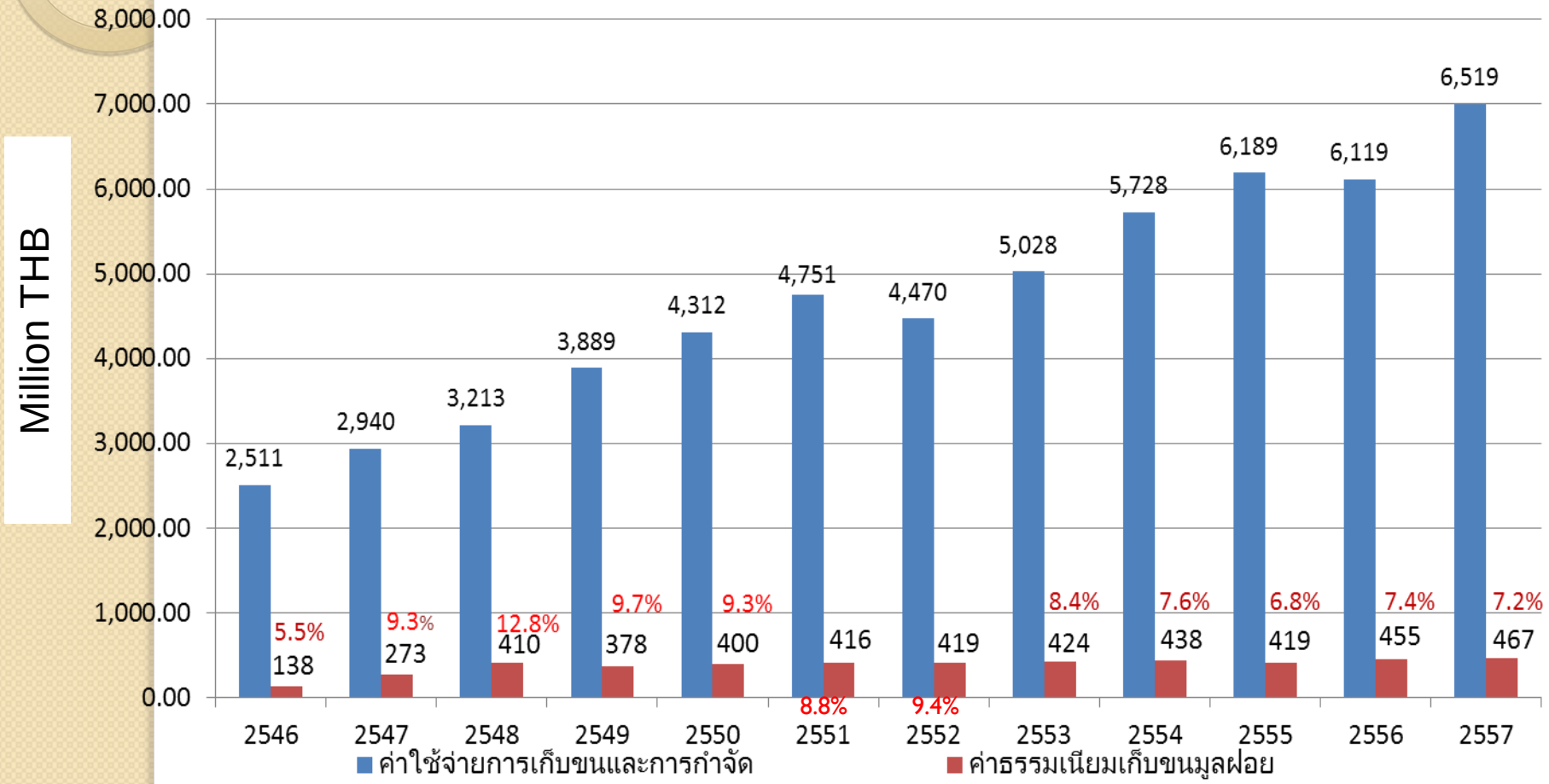
PLASTIC BAGS LOOK LIKE JELLYFISH AND KILL TURTLES AND OTHER MARINE LIFE THAT EAT IT, MISTAKING THEM FOR JELLYFISH

Related laws and policy instruments

- **Public Health Act (1992)**
  - Authorized local administrative organizations to manage MSW.
  - Allowed LAOs to collect user charges (for waste collection services)
    - The user charges for waste collection are very low: 10 – 40 Baht per month (cover only collection cost, not disposal cost)– no enough budget to improve the waste treatment services
    - Using flat rate for households (less than 4 kg./day) → no incentive to reduce waste volume

- The new draft Ministerial Notification will increase the rates of user charges
  - New ceiling of user charges will be 65 (collection) + 155 (disposal) = **220 Baht/month**
  - It is expected that no LAOs will increase the charges to that amount, probably keep it quite low (not more than 100 Baht)

Waste collection & disposal cost vs. collected user fees in BMA, Thailand



Source: Suwanna Jungrungrueng (2015)

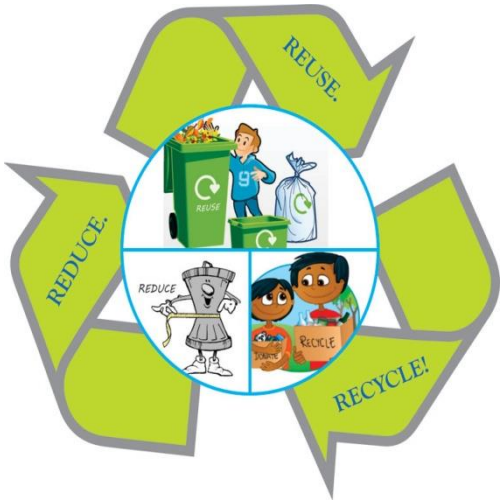
Waste Collection Fees in BMA

Flat rate for households, variable rate for commercial/business waste generators

รายละเอียด	อัตราค่าธรรมเนียม (บาท/เดือน)
สถานที่ที่มีมูลฝอยไม่เกินวันละ 20 ลิตร	20 บาท/เดือน
วันหนึ่งมีมูลฝอยเกิน 20 ลิตร แต่ไม่เกิน 500 ลิตร	ทุกๆ 20 ลิตร หรือเศษของแต่ละ 20 ลิตร จัดเก็บ 40 บาท (เช่น 40 ลิตร คิดค่าธรรมเนียม 80 บาท)
มูลฝอยวันหนึ่งเกิน 500 ลิตร – 1 ลบ.ม.	2,000 บาท
มูลฝอยวันหนึ่งเกิน 1 ลบ.ม.	2,000 บาท ต่อทุกๆ 1 ลบ.ม. หรือเศษของลูกบาศก์เมตร

- **To achieve sustainable waste management, we need to fully implement waste reduction and segregation at source**
- **Waste utilization according to their waste types**

- **We should explore the application of EIs and other new policy instruments**
  - **Landfill taxes (waste disposal taxes)**
    - Increase the cost of disposal making reuse/recycling more attractive
  - **Pay-as-you-throw (PAYT) – you pay the charge according to the volume you produce (like paying water or electricity bills)**
  - **Producer engagement in taking back their used products from consumers**
    - Using EPR (Extended Producer Responsibility) concept
    - Widely used in many countries, to reduce the burden of local governments in handling hazardous waste like electronic waste or to improve the recycling rate of some certain products



1. Charges for waste disposal and treatment

- Most popular EI in solid/industrial waste management is "Landfill Tax"
  - Mostly used in EU countries and Australia
  - In Japan, landfill tax used only for industrial waste (called 'industrial waste tax')

- In the US, many states introduced both landfill tax and waste generation tax (hazardous substance/waste)

Tax/fee setting approach

- **A: Pigovian pollution tax- impact pathway analysis**
  - Assessing external costs of waste disposal
  - UK, Norway, Australia (NSW, VA)

- **B: Baumol-Oates approach**
  - Set the tax rate high enough to achieve the desired target
  - Using expert judgment and consultation with stakeholders

Tax/fee setting in practice

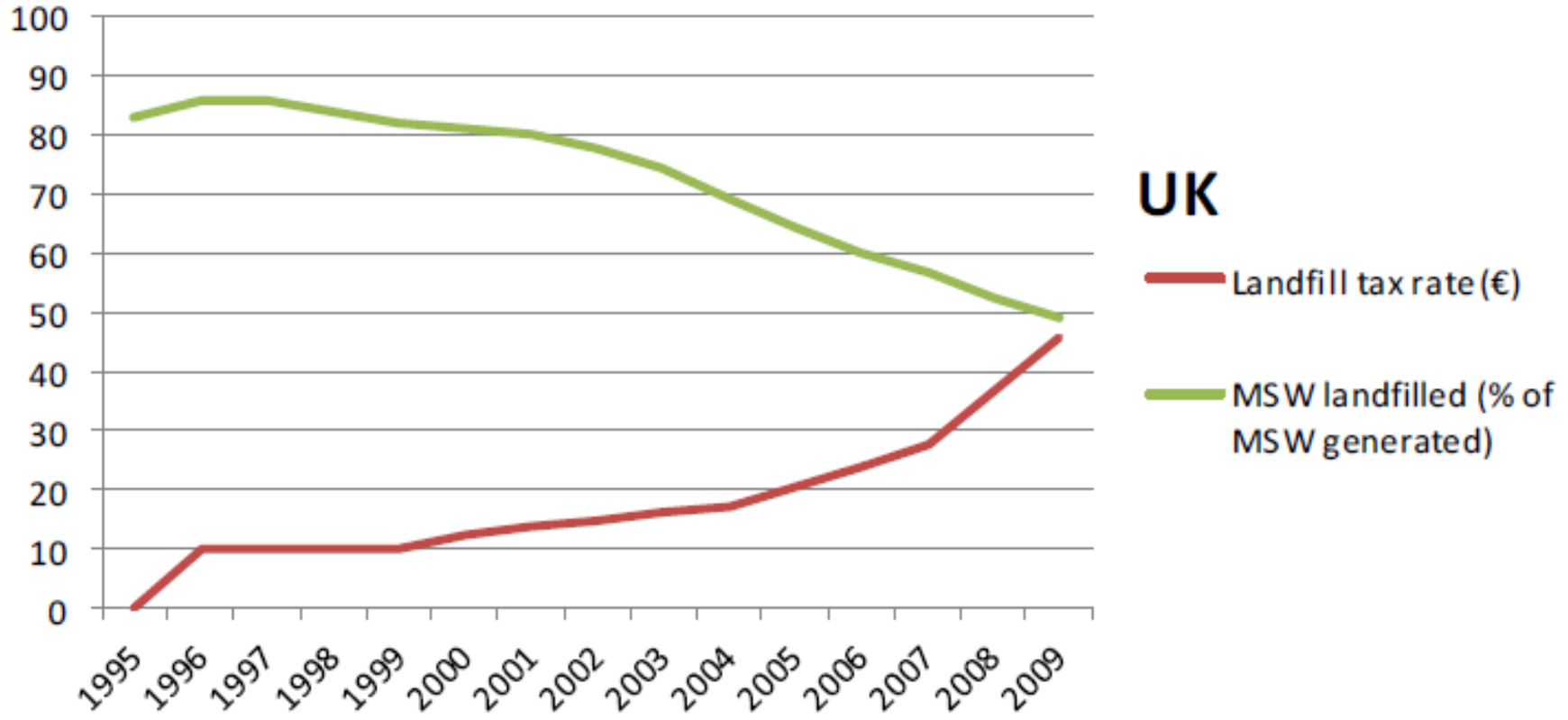
- Start with very low tax/fee rates
- Gradually increase the tax/fee rates if the initial ones couldn't change behavior of waste generators to reduce waste
- Mostly use variable rates according to waste amount and waste management (landfill or incineration)
- Use simple tax/fee rates and waste categories

Example: UK

- Landfill tax in 1996
  - All types of waste including industrial waste: £7 (336 baht) per ton waste
  - Inert waste: £2 (96 baht) per ton waste
- Since 1999: increase £1 every year
- Since 2005: increase £8 every year

- Landfill tax in 2011
  - All types of waste: £56 (2,688 baht) per ton waste
  - Inert waste: £2.5 (120 baht) per ton waste

Effect of landfill tax: UK case



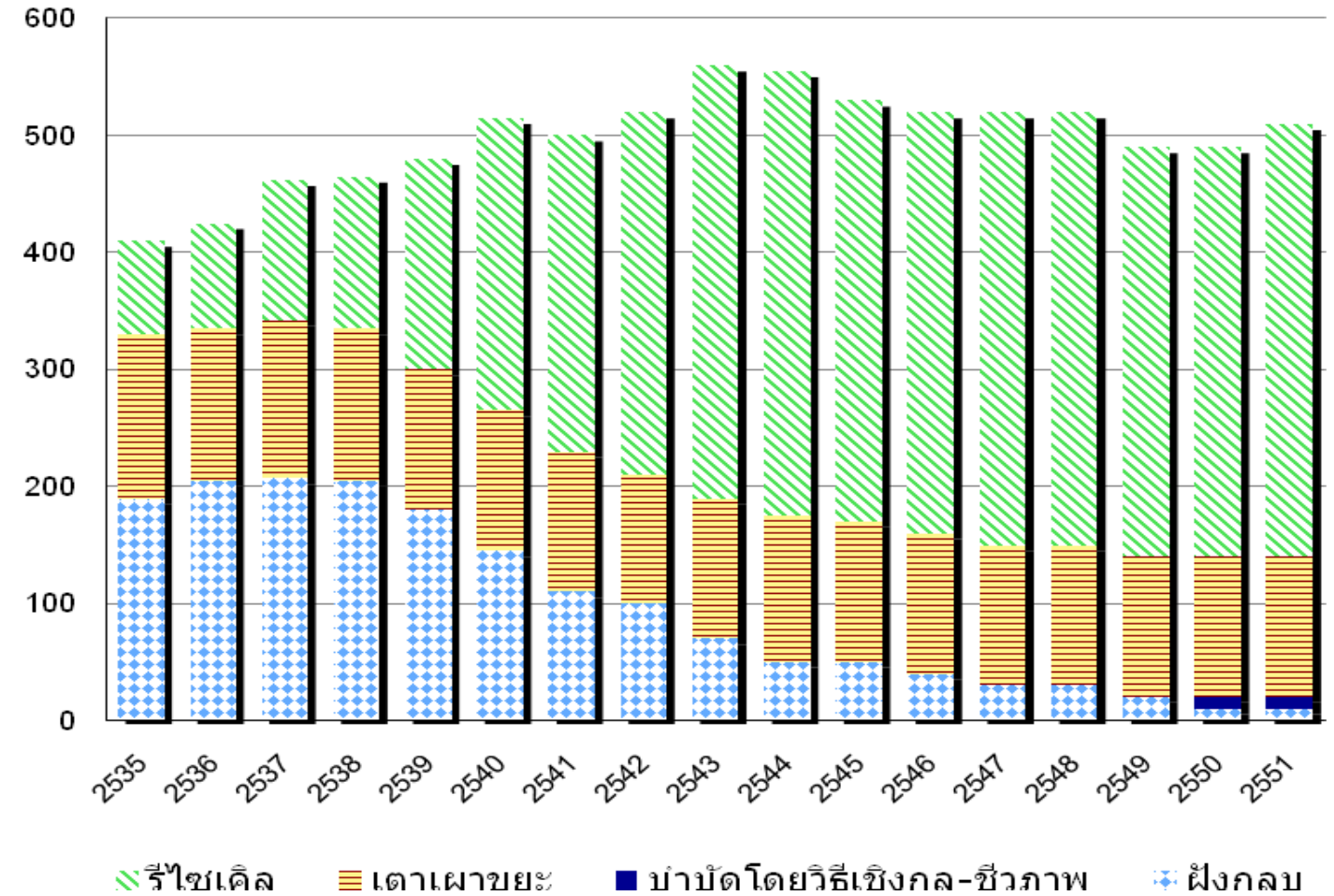
source: EC (2012)

Effect of landfill tax: Belgium case (Flanders Region)

Kg per person

กิโลกรัมต่อคน

Source: Mariën (2009)



2. Pay-as-you-throw schemes

- **Pay as you throw** (PAYT) (also called trash metering, unit pricing, variable rate pricing, or user-pay) is a usage-pricing model for disposing of municipal solid waste.
- Users are charged a rate based on how much waste they present for collection to the municipality or local authority.

Program Design Options

- **Imprinted trash bags w/Town name/seal**
- **Stickers to apply to container of choice or specific items**
- **Barrel/wheeled cart marked with fixed pick-up charge**
- **Bulky waste and appliances**

ภาพประกอบ: Mandarin Taiwan (2010)

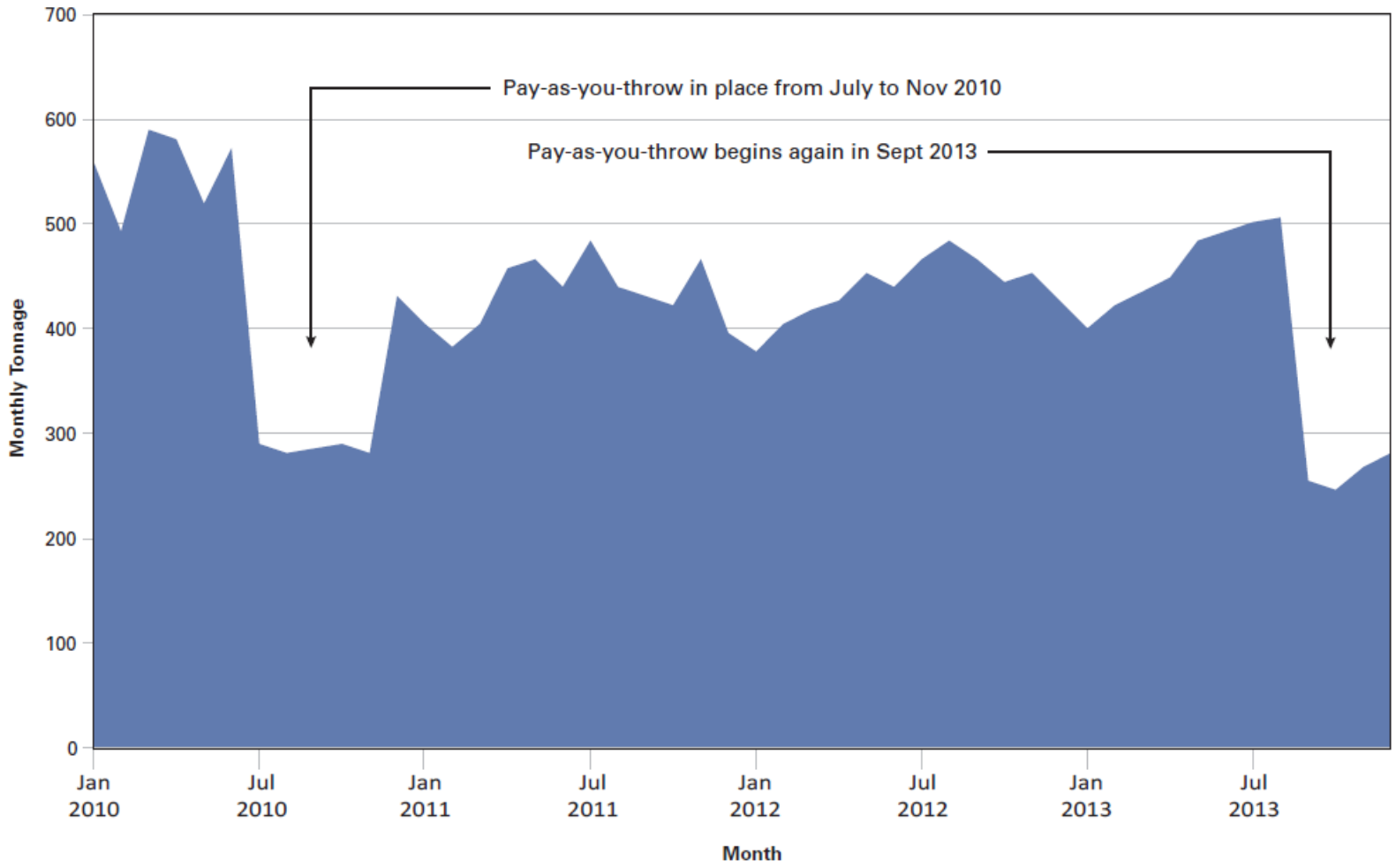
How costs are covered under PAYT

Several Options:

- Residents pay for each container of trash
- "Hybrid" - Flat fee + unit-based
  - Flat fee covers fixed costs (revenue stability)
  - Unit-based fee covers variable costs
  - Basic level of Service
    - 1 container/wk "free" (cost included in flat fee or tax levy) Residents buy additional bags/stickers as needed
- Cart-based program

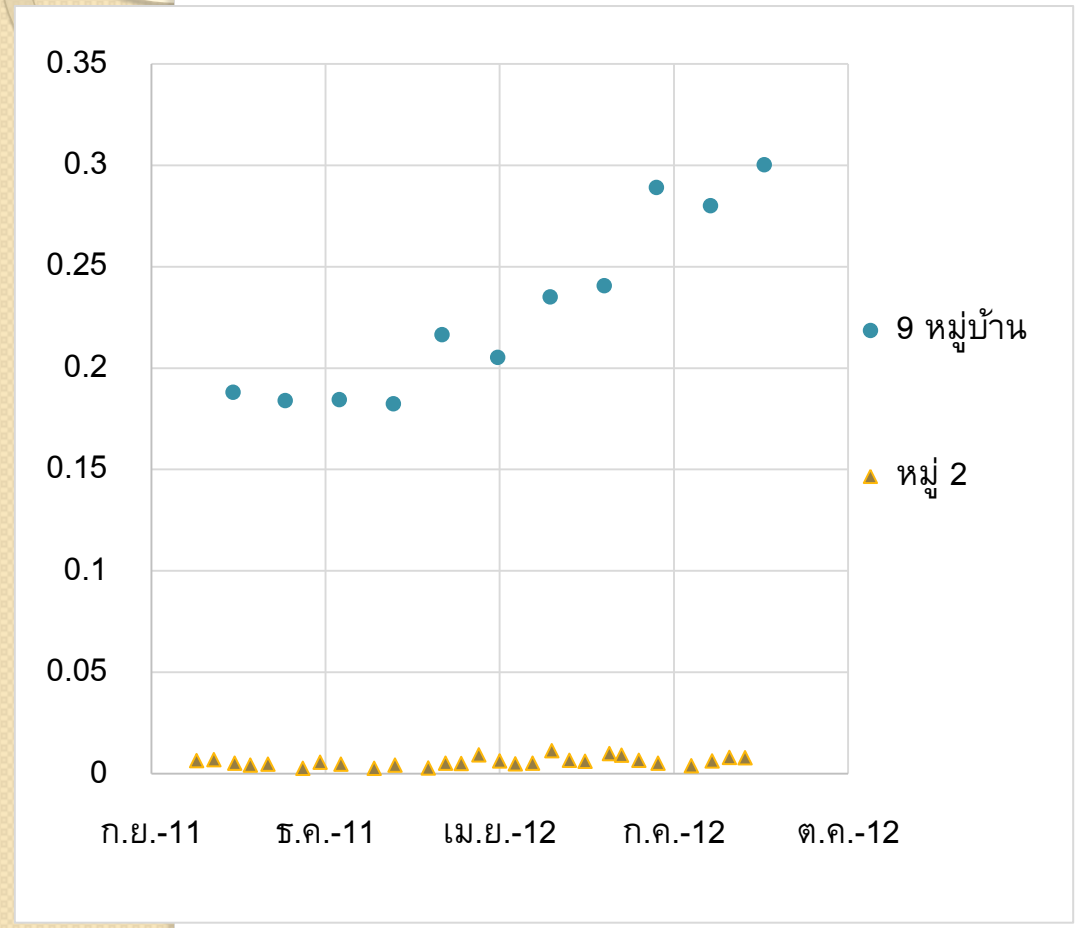
Impact of PAYT in Maine, USA

FIGURE 2: **Waste Tonnages for Sanford, Maine 2010–2013**



Source: Authors' graph, data from Kolling-Perin (2013)

PAYT experienced in a village of Nang Lae *Tambon* (sub-district) Municipality, Chiang Rai



นำร่องจ้างเอกชนเผาขยะกิโลกรัมละ 2 บาท

- พื้นที่ดำเนินการ 9 หมู่บ้าน
- หมู่บ้านมีหน้าที่เก็บรวบรวมขยะไปส่งทุก 10 วัน
- เทศบาลไม่เก็บค่าขยะ แต่จ่ายค่ากำจัดครึ่งหนึ่ง
- เทศบาลให้ทุนธนาคารขยะหมู่ละ 10,000 บาท
- หมู่บ้านเก็บค่าบริการเดือนละ 20–30 บาท
- **ยกเว้นหมู่ 2 ที่ตกลงจ่ายตามน้ำหนักที่แต่ละบ้านทิ้ง**

Source: Panate Manomaivibool (2015)

ภาพประกอบ: ณัฏฐิกาฑ์ เหมภัทรสุวรรณ (กุมภาพันธ์ 2557)

รูปที่ 3-23 การเก็บขนและชั่งน้ำหนักขยะที่หมู่ 6 ตำบลนางแล จังหวัดเชียงราย

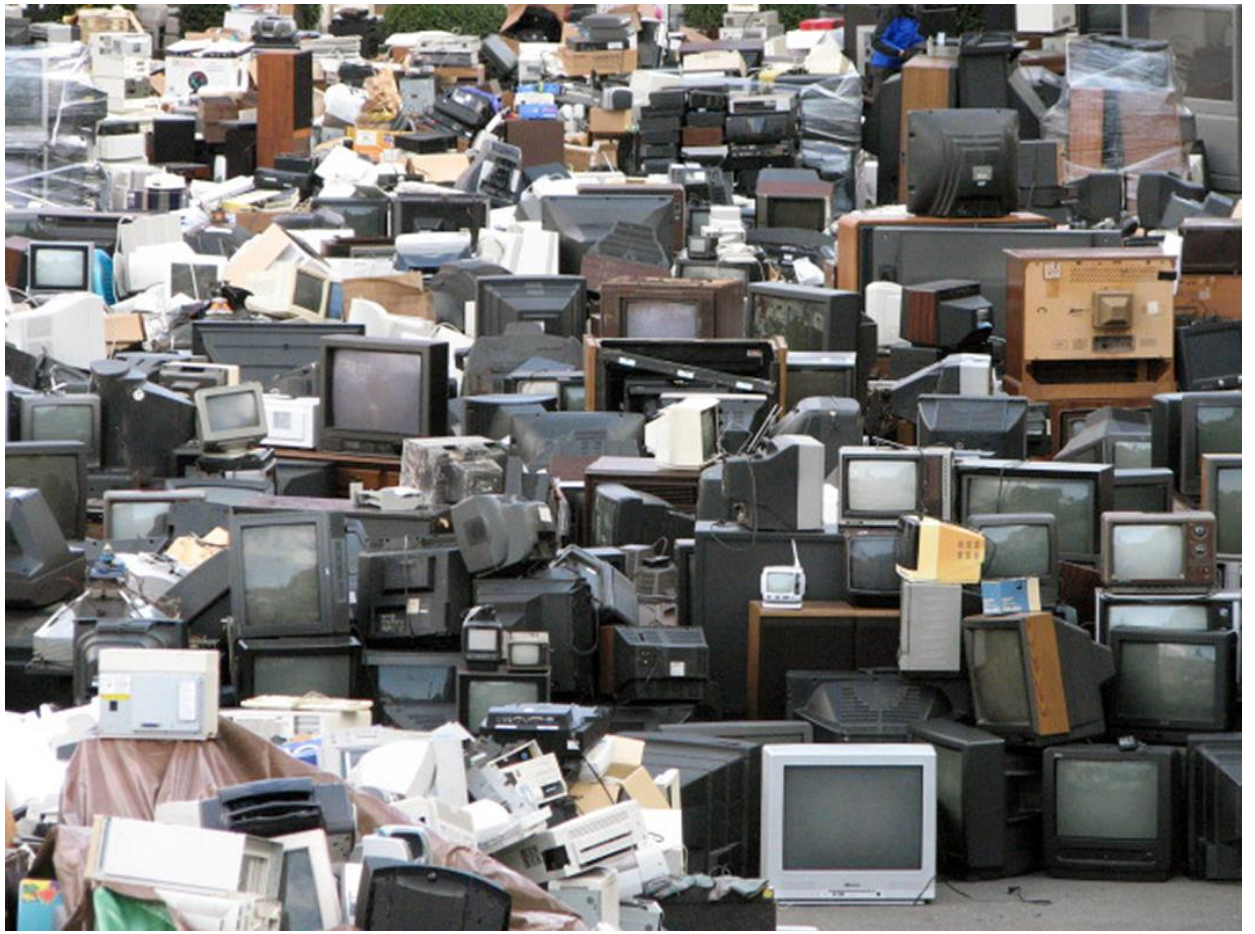
Source: Panate Manomaivibool (2014)

Challenges & Overcoming Them

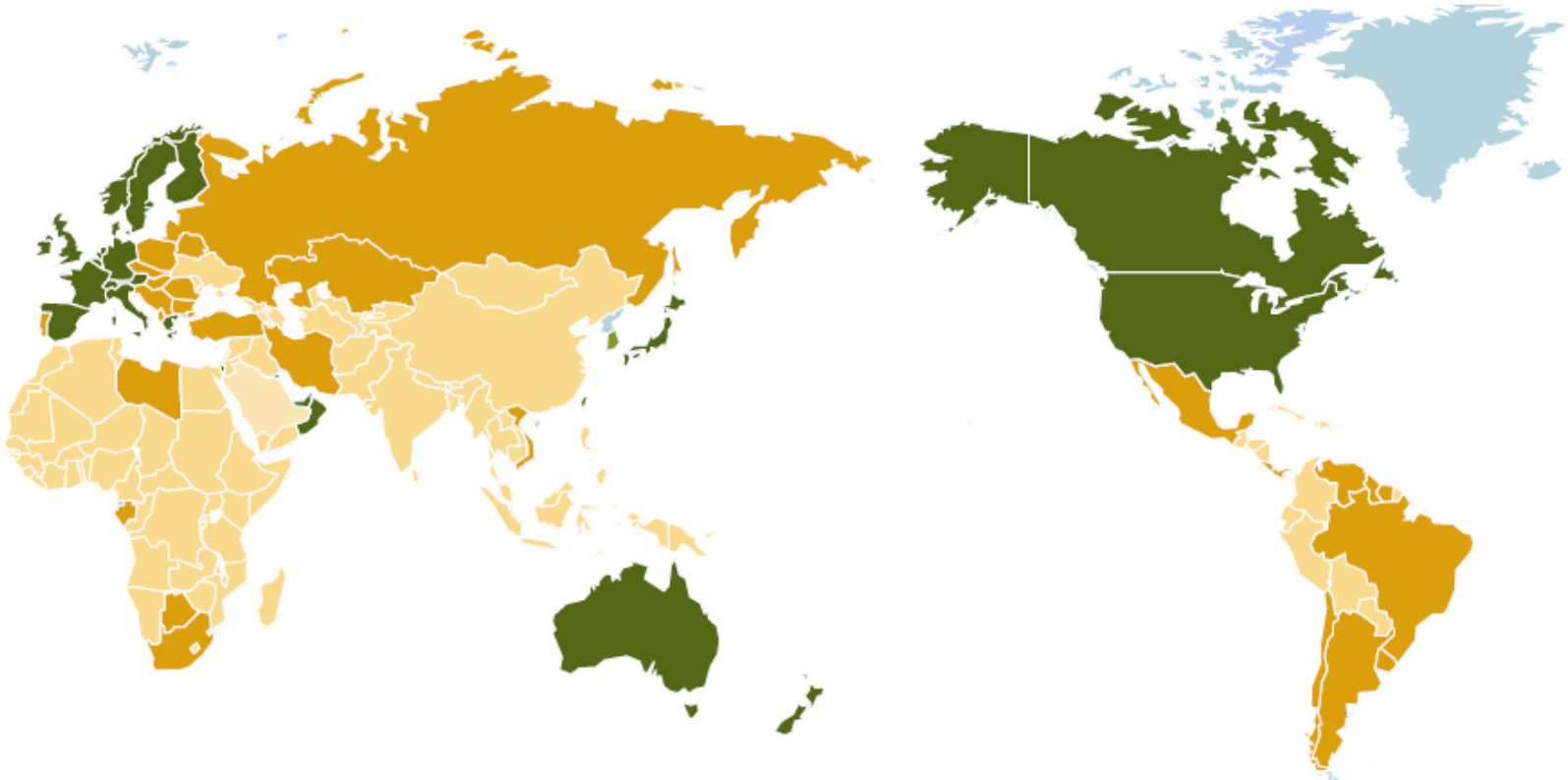
- Public perception fee = tax
  - Consider "Revenue neutral" approach – reduce property tax or flat fee by amt unit-based fees are expected to generate
- Concern for low-income households
  - Like some other programs, PAYT program may also include lowered rates for demonstrated hardship
- Illegal Dumping
  - Reports from PAYT municipalities indicate that the majority do not experience an increase in dumping with implementation
  - **Key** is to have regulations, act promptly, and impose fines if needed
- Start-up Costs

3. Producer responsibility schemes for specific waste streams

- Packaging, WEEE, ELV, batteries



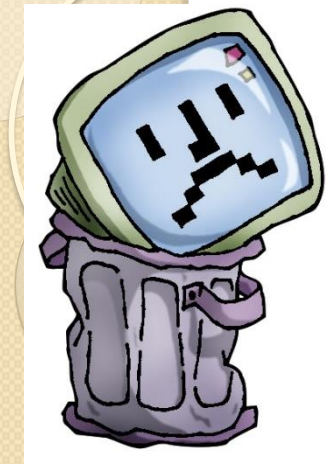
E-waste Generation per year, worldwide

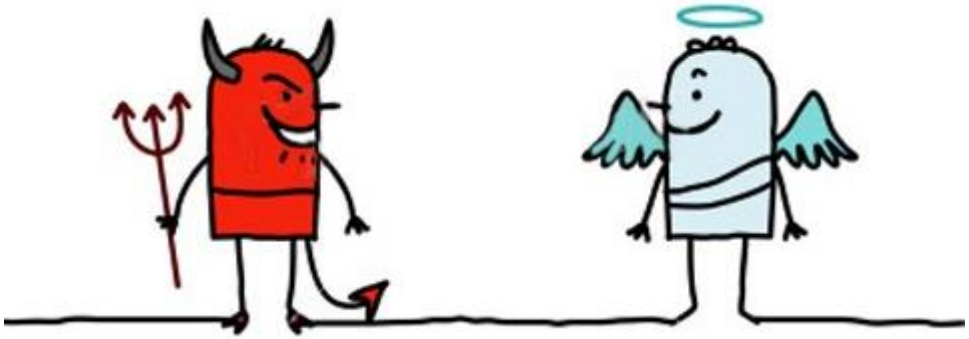


Approx. 40 million tons of E-waste are produced each year.

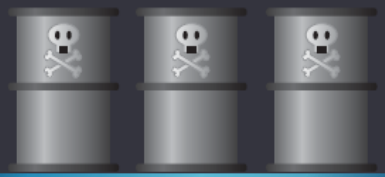
< 5 kg/inh | 5 to 15 kg/inh | >15 kg/inh

Source: UNU-IAS, data for 2012





TOXIC MINE



METALS

Mercury, Cadmium, Chromium

Lead

Lead glass - 2,200 kilotons

COMPONENTS

Batteries - 300 kilotons

CHEMICALS

Poly- / Brominated Flame Retardants in Plastics

Phosphors

PCBs/A Polychlorinated biphenyl (old capacitors)

Hexavalent chromium (PVV)

Ozone depleting substances (CFCs, HCFC, HFC, HCs) - 4.4 kilotons

URBAN MINE

Material	Kilotons	Million Euros
METAL		
Iron, Steel (Fe)	16,500	9,000
Copper (Cu)	1,900	10,600
Aluminum (Al)	220	3,200
Precious Metals		
Gold (Au)	0.3	10,400
Silver (Ag)	1.0	580
Palladium (Pd)	0.1	1,800
PLASTICS		
PP, ABS, PC, PS	8,600	12,300

Backyard recycling by informal sector

Guiyu in Guangdong, China

Source: Basel Action Network, http://www.ban.org/

WEEE flow in Thailand

ครัวเรือน/หน่วยงาน

ขายให้พ่อค้ารับซื้อของเก่า

ขายต่อ

ทิ้ง

บริจาคให้วัด/
มูลนิธิ

รถของวัดมารับถึงที่

ซ่อมแซม ใช้ซ้ำ

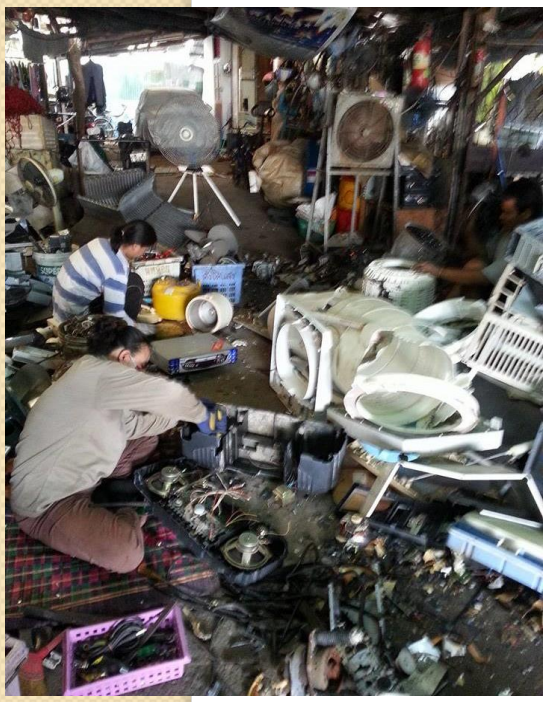
WEEE flow in Thailand (cont'd)

แกะ แยกวัสดุแล้วขายต่อ
ร้านค้าของเก่ารายใหญ่/โรงหลอม

แผ่นวงจรอิเล็กทรอนิกส์
ขายต่อให้กับพ่อค้า

พ่อค้าขายต่อโรงงานเถื่อน
ในประเทศ, ต่างประเทศ

ทหารทลายโรงงานอ.เขาย้อย ลอบใช้ 'ไซยาไนด์' สกัดทอง
จากแผ่นวงจรฯ ไทยรัฐออนไลน์ 15 ส.ค. 2557



ชาวบ้านคัดแยกขยะอิเล็กทรอนิกส์

เผาสายไฟเพื่อ
แยกทองแดง

เศษแก้วปนเปื้อนตะกั่วที่ทุบทิ้งตามที่รกร้างหรือบ่อขยะชุมชน

National Integrated WEEE Management Strategy

(draft) Strategy (2014-2021)

1. Strengthening of import/export control
2. Promotion of eco-friendly e-products with the focus on public procurement
3. Development of WEEE database
4. Development of WEEE segregation, collection, storage and transport for local government
5. Upgrade of dismantling and recycling, disposal facilities
6. Promotion of public awareness on WEEE

- Preventive measures
- Implementation of Extended Producer Responsibility (EPR)
- Use of economic instruments in the WEEE management
- Prepare all stakeholders for WEEE law

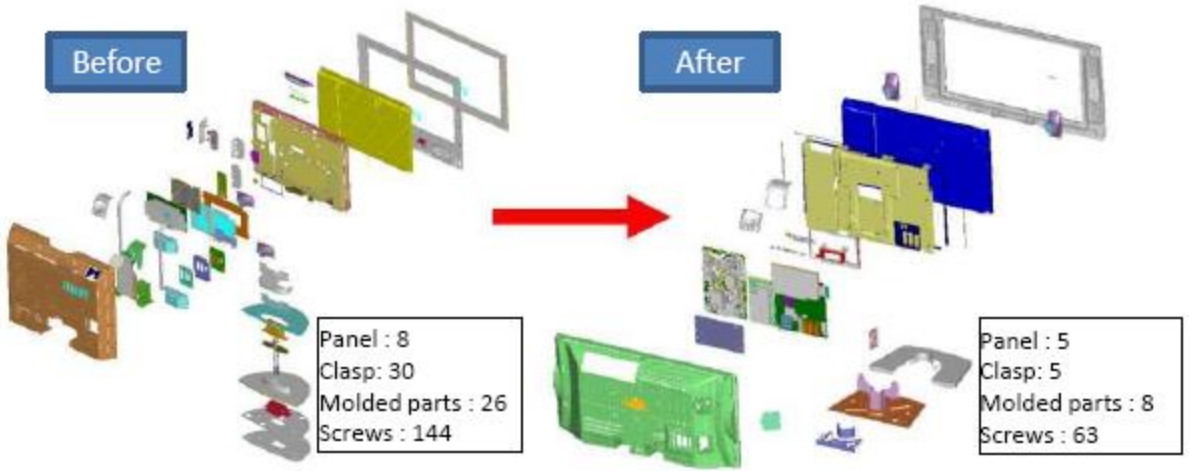
EPR concept for managing post-consumers waste

- Extended producer responsibility (EPR) is an environmental policy principle
- It views waste management as an integral part of a product's life cycle
- This principle suggests reallocating responsibility from municipalities and taxpayers to producers and consumers of the products

- Downstream objective: to promote an environmentally sound waste management
- Upstream objective: to encourage internalizations of end-of-life costs and improvements in the design of products

Movement of “Design for Environment”

- Producer voluntarily practices :
  - Design of ease-to-dismantle for recycling
  - Use ease-to-recycle material
  - R&D for environmental friendly design and production considering the lifecycle of products

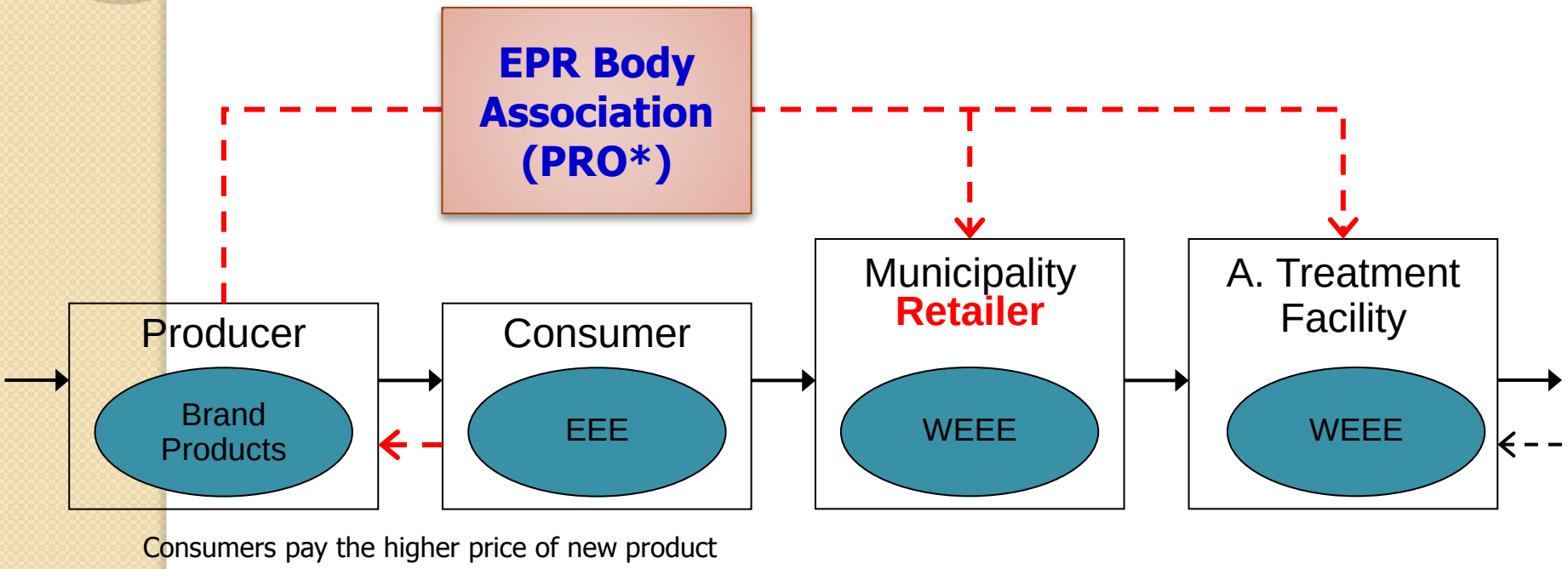


Source: Sakina Isobe (2014)

12 case studies reviewed in the PCD (2014) report

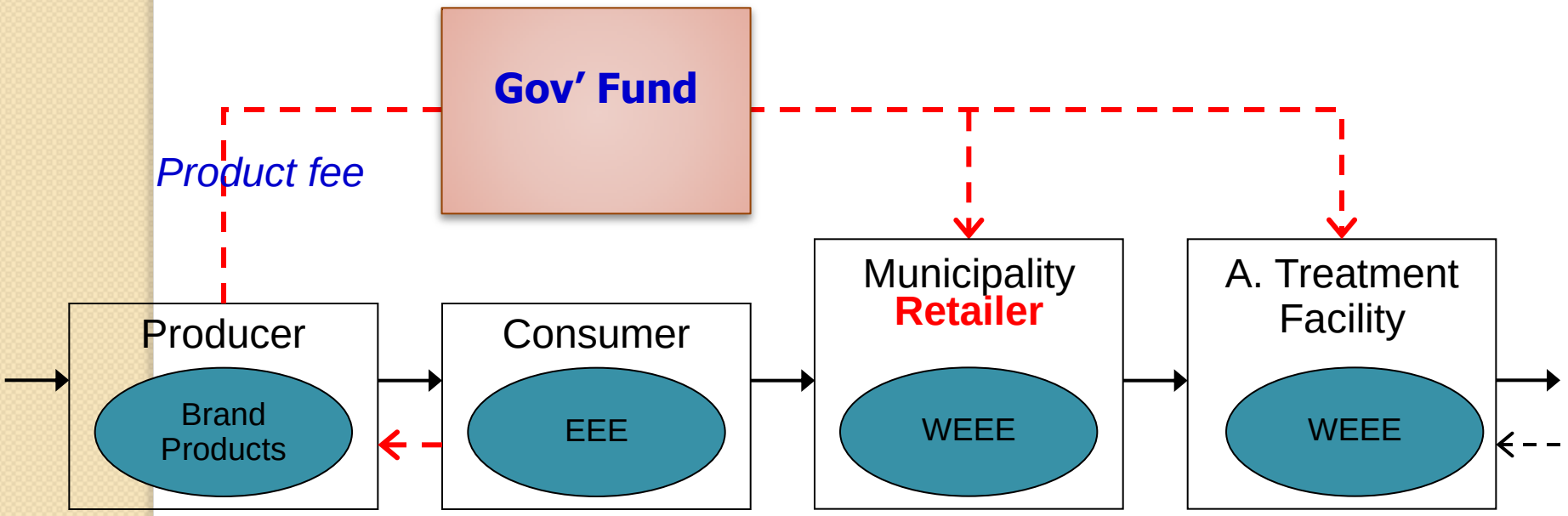
Case Studies	WEEE Management Scheme
1. European Union	Full EPR
2. Japan	Full EPR
3. South Korea	Full EPR
4. Taiwan	Product Fee scheme
5. US -California State	Product Fee scheme
6. US -Minnesota State	Full EPR
7. Canada -Alberta	Product Fee scheme
8. Canada -Ontario	Full EPR
9. Australia	Full EPR
10. India	Full EPR
11. China	Product Fee scheme
12. Vietnam	Full EPR

Typical EPR model



* PRO = Producer Responsibility Organization

Governmental Fund Model (Partial EPR) (Taiwan, China, Thailand – 2011 draft)



Consumers pay the higher price of new product

Product flow

Financial flow

Findings from Legislation reviews

- **EPR laws globally**
  - **> 59 countries have WEEE related EPR laws in place (76% full EPR scheme)**
  - **4 developing countries in Asia: China (2009), India (2011), Taiwan (1997), Vietnam (2013)**

- **Key components of the WEEE law (for successful management scheme)**
  - **Registration system (to keep track and to prevent WEEE leakages)**
  - **Take-back providers (retailers, local authorities)**
  - **Collection targets (to ensure compliance)**
  - **Information, reporting and monitoring system**

- **Avoid mistake/loopholes found in other countries' experiences**

Policy considerations in Thailand context

- Management scheme options
  - Full EPR vs. Product Fee (Government Fund)
- Prevent WEEE leakages (legal loopholes)
- How to deal with informal sector?
- How to enhance strict law enforcement?
- Can we offer incentives to comply with the law?

Analysis of Pros and Cons of the two different schemes in Thailand context

- **Full EPR scheme**
  - Pros: faster start-up, cost effectiveness, flexibility
  - Cons:
    - lack of third-party org. (now there is an association)
    - low collection rate if no incentive provided to end-users

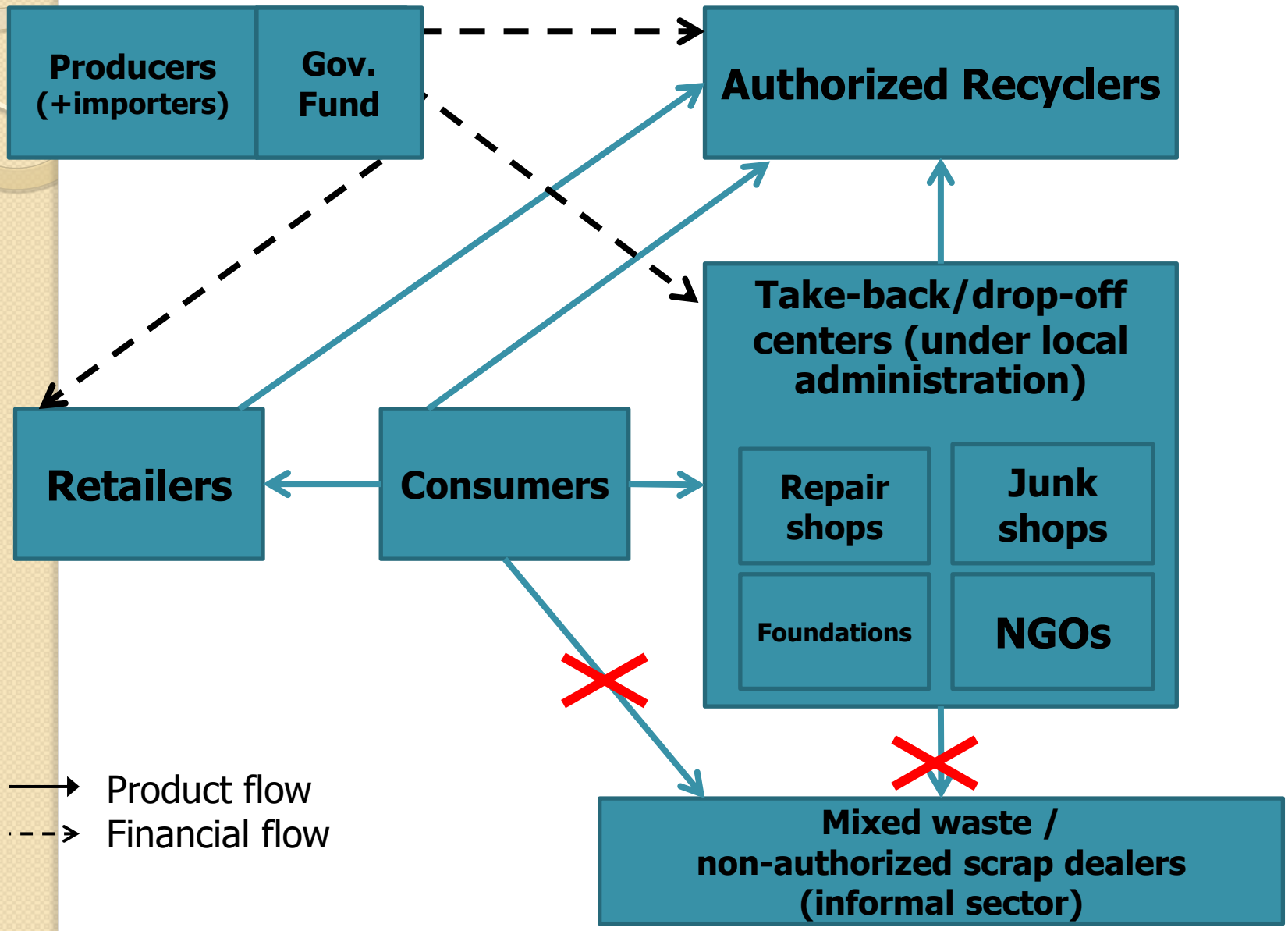
- **Product Fee-Government Fund scheme**
  - Pros:
    - potentially higher collection rate if buy-back mechanism can be used
    - recycling subsidies given to recyclers are relatively certain
  - Cons:
    - involve several agencies which may cause delay in the implementation
    - higher administrative and monitoring cost
    - risk of political intervention

The Proposed Thai-WEEE Act: Key Features

- A framework law: aims for flexibility
  - List of regulated products will be issued in a sub-ordinate law
  - Support **full EPR scheme** but allows a government fund scheme be established if needed
- A National Board based on multi-stakeholders
- Clear roles and responsibilities assigned to each stakeholder
- Allow informal sector to join the system as take-back networks (register with the local authority and meet the minimum requirement)

Proposed WEEE Management System in Thailand

(Draft Thai WEEE Act of 2014, submitted to Cabinet, 19 May 2015)



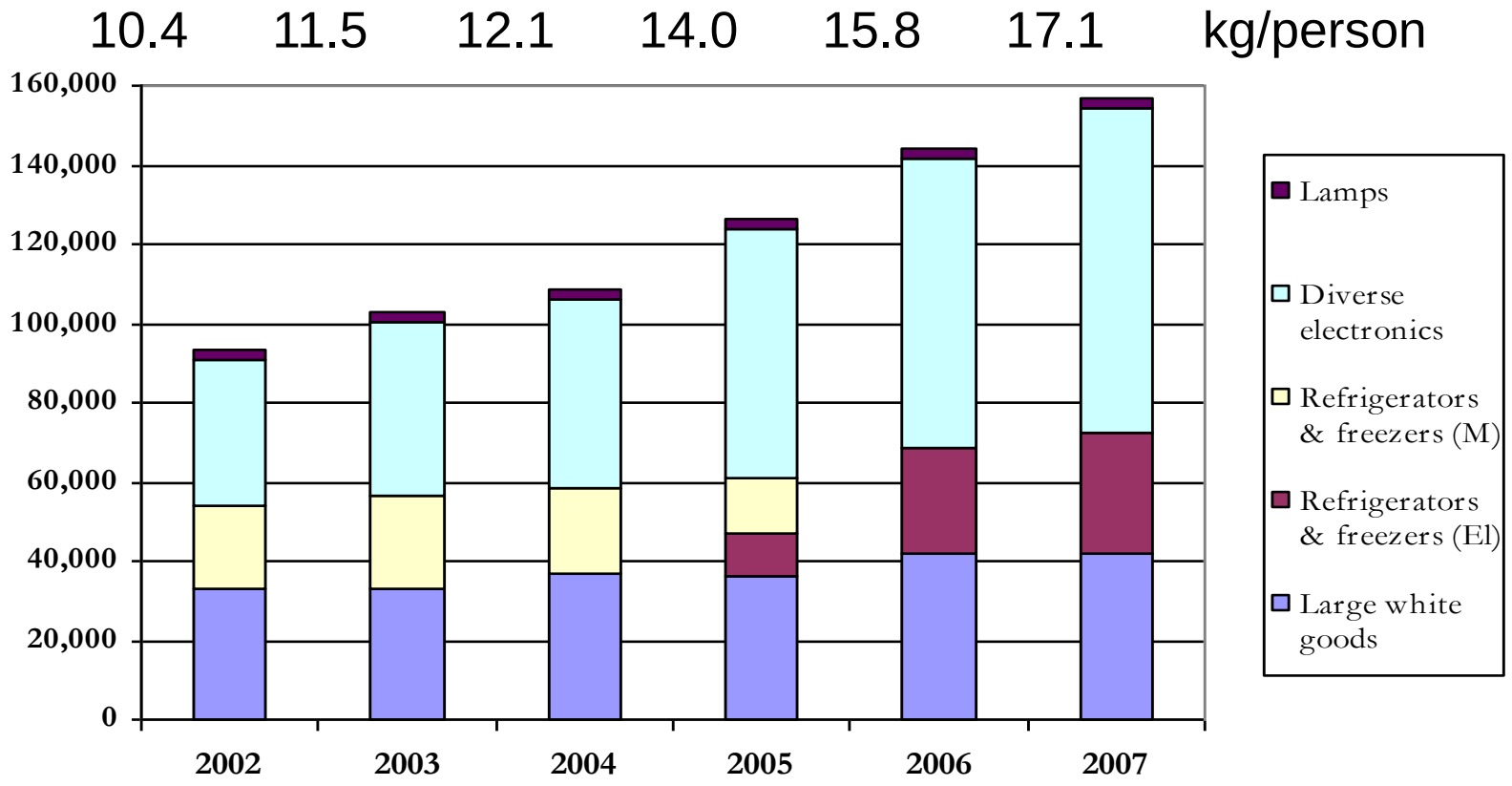
Example of drop-off stations in Europe

Photo: Manomaivibool

Example of a drop-off station in Sweden

Performance in Sweden

- High and increasing collection rate: 17 kg/person (2007)



Source: El-Kretsen (2009), “Arkiv Statistik & rapporter”.

Concluding Remarks

- Economic instruments have potential in improving waste management practice.
- EIs must be used in an appropriate mix and appropriate timing with other instruments (social and legal instruments)
- Social instruments such as public relations campaigns may need to stimulate the awareness of the public on environmental impact on health. These will help reduce resistance and increase support for pollution tax
- At the same time, command and control activities remains important as a complementary means for monitoring and auditing