

SWAT-JWRF Joint Seminar:

“Municipal Solid Waste Management in Thailand-
Challenges and Opportunities –”

Municipal waste management: Current situation and pressing issues

Venue: Mayfaire A, The Berkeley Hotel Pratunam, Bangkok, Thailand

Date: 14:00 – 17:00, January 16, 2020

Facilitated by So Sasaki Ph.D.

Visiting Scholar, Faculty of Economics, Chulalongkorn University

Professor, Faculty of Economics, Chuo University

E-mail : so-s@tamacc.chuo-u.ac.jp



中央大学
CHUO UNIVERSITY
Knowledge into Action

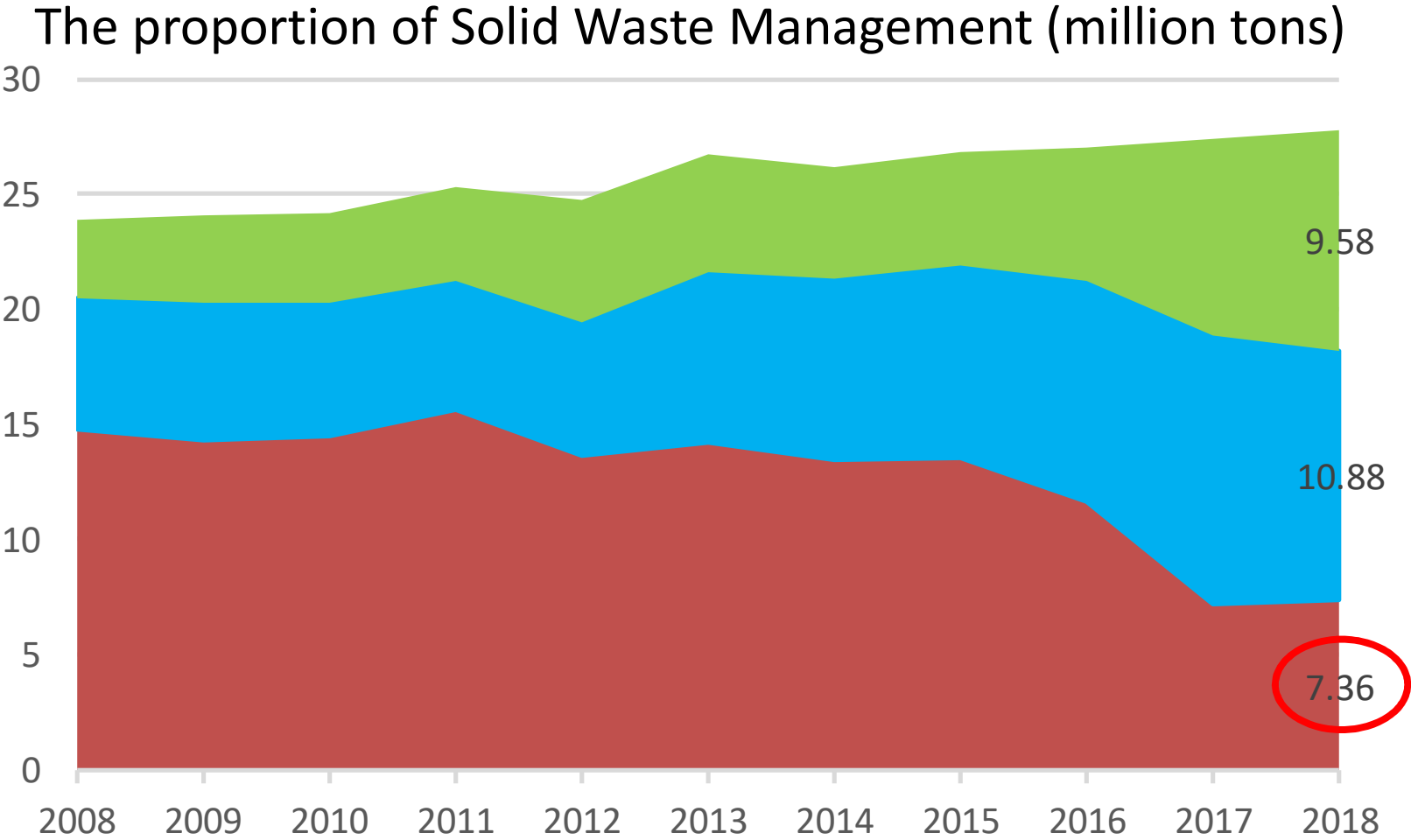
Contents

1. Current situation of
Waste Management in Thailand
2. Current Governmental Measures
3. Current issues of
Waste Management in Thailand
4. Summary / Discussion Points

Current situation of Waste Management in Thailand

Thailand have many problems

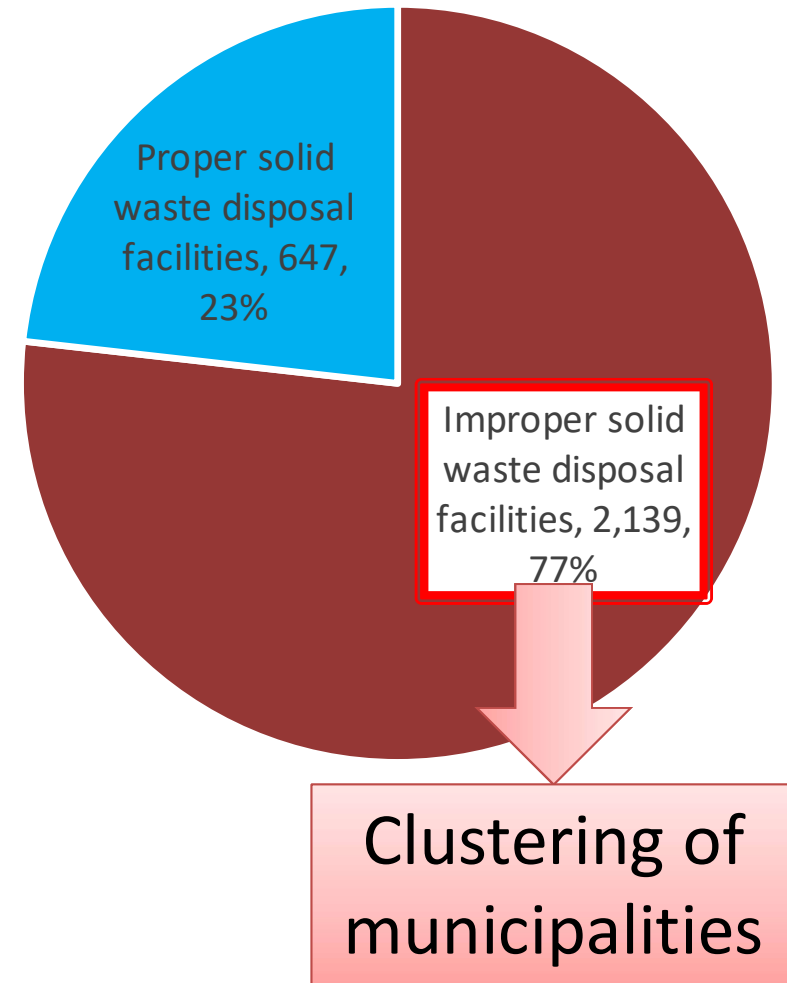
26% of SW has still been improper disposal



Improper disposal Proper disposal Amount of recycling
(source) PCD(2019), "Booklet on Thailand State of Pollution 2018"

77% of facilities has still been improper disposal

Status of municipal solid waste disposal facilities in 2018



(source) PCD(2019), "Booklet on Thailand State of Pollution 2018", photo by Sasaki 5

Informal sectors



Collection workers



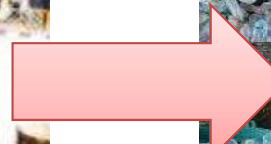
Junk Shops



Private Collection



Waste pickers



Impacts of poor waste management @Lat Phrao Canal on March 2019



(source) Facebook, "FM91 Trafficpro"

Impacts of plastic Debris on Marine Life

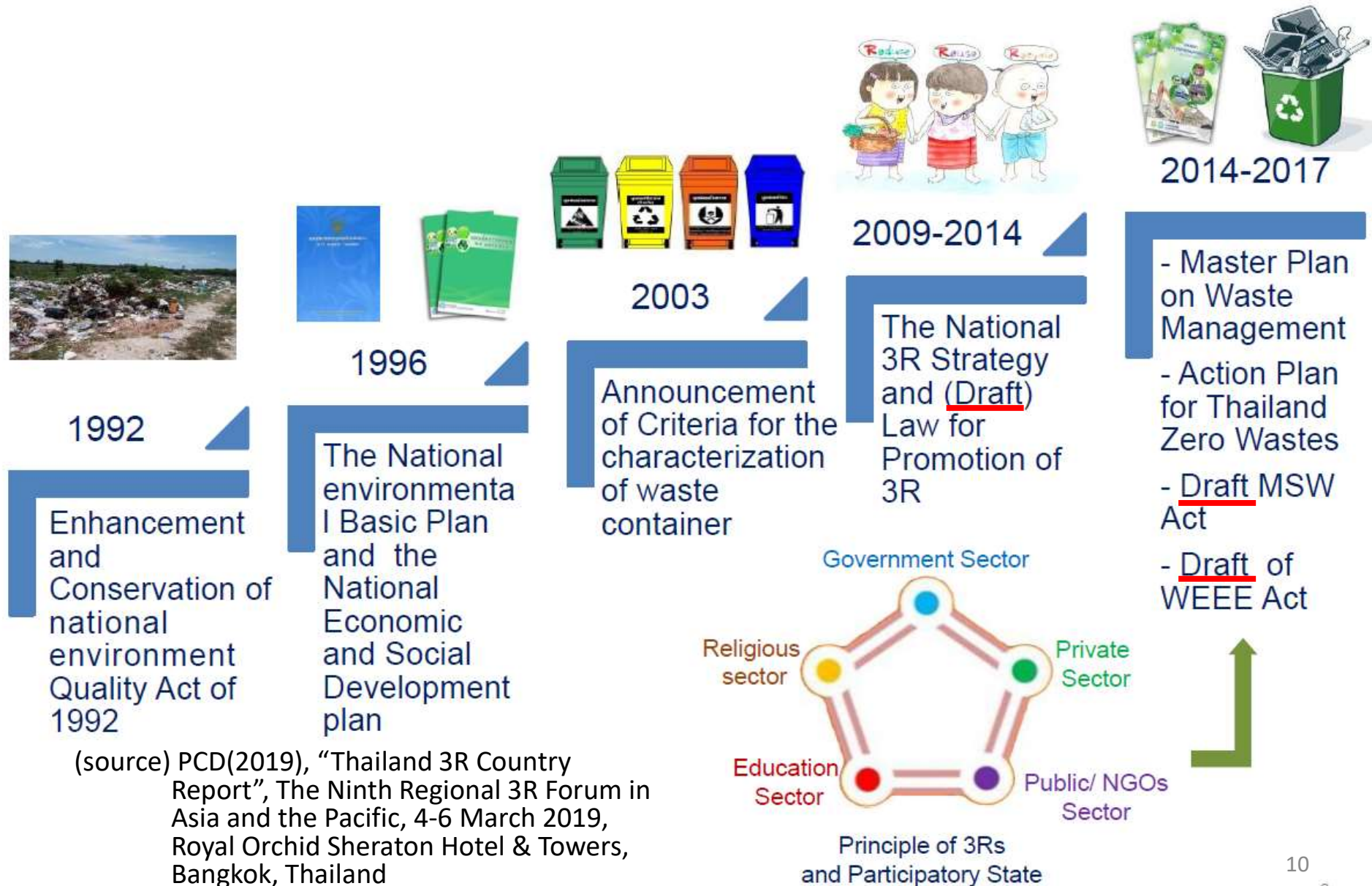


How to improve
waste management
& Marine Plastic in
Thailand?

(source) Sirinarat Pongyart(2018) ⁸

Current Governmental Measures

MSW Management Timeline



The National Master Plan on Waste Management (2016 – 2021)

1. Frame Work

1. Encourage citizens, including children, and the private sector to reduce waste at the source by following the 3Rs concept (Reduce, Reuse, Recycle).
2. Establish proper disposal methods for municipal solid waste and household hazardous waste by using centralized facilities for clusters of municipalities emphasizing waste utilization and waste to energy methods.
3. All relevant sectors participate in the management of solid and hazardous waste

2. Goals (2016 - 2021)

1. More than 75% of municipal solid waste are disposed properly.
2. All accumulated waste are disposed properly.
3. More than 30% of household hazardous waste are collected and disposed properly.
4. All infectious waste are collected and disposed properly.
5. All hazardous industrial waste management collected and disposed properly.
6. More than 50% of local government organizations have systems for waste separation at the source (households)

The National Master Plan on Waste Management (2016 – 2021)

3. Measures

1. Reducing solid and hazardous waste

- Reduce waste generation, maximize the use of products and materials.
- Manufacturers are responsible for their products for the whole product lifecycle.
- Stop using plastic bags and Styrofoam packaging.
- Use environmentally friendly products.

2. Increasing the efficiency of the solid and hazardous waste management system

- Promote and support local government organizations to have a system for solid and hazardous waste management and set up a center for this purpose in a sanitary manner
- Improve , revise and develop laws and rules to facilitate the management of solid and hazardous waste
- Enforce laws

3. Supporting solid and hazardous waste management

- Publicize in all formats for public to know understand and practice proper management of solid and hazardous waste on a continuous basis
- Develop databases on solid and hazardous waste that are up to date and easily accessible
- Promote and support research and development on technology for the management of solid and hazardous waste

Governmental Measures for Domestic Plastics

The Thai cabinet acknowledged the draft **Roadmap for plastic waste management (2018-2030)** on 17 APR, 2019

- To achieve the goal “**reducing plastic marine debris at least 50 % by 2027**”

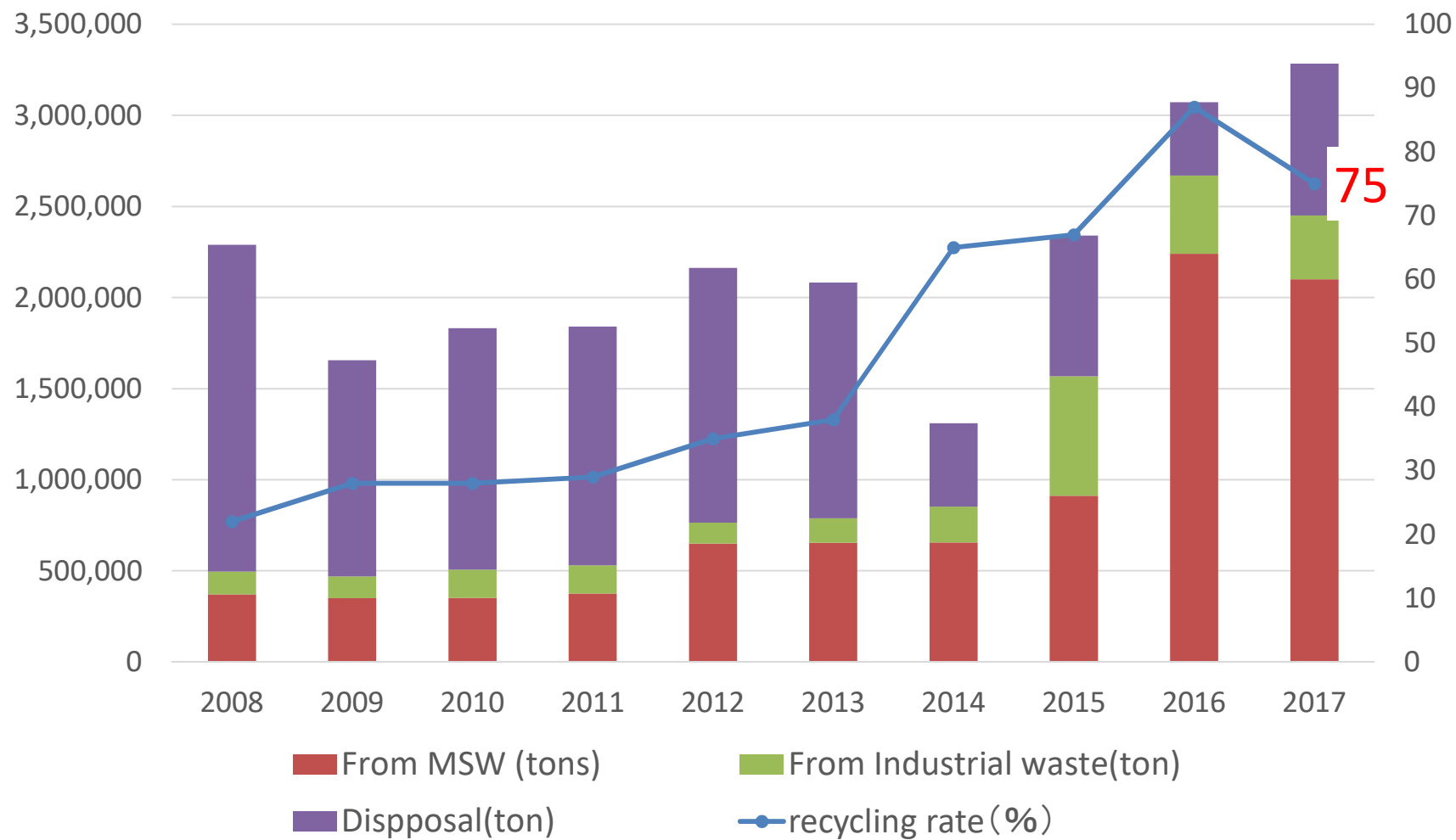
| Goals | Baseline | 2018 | 2019 | 2020 | 2021 | 2022 | 2027 |
|---|----------|------|------|------|------|------|------|
| 1. Waste plastics return into the manufacturing system – Circular Economy | 21% | 22% | 25% | 30% | 40% | 50% | 100% |
| 2. Reduce the usage of 7 plastic packaging targets: | | | | | | | |
| 2.1 Plastic micro bead | | | 100% | | | | |
| 2.2 Cap-seal | | | | | | | |
| 2.3 OXO bag | | | | | | | |
| 2.4 <36 micron shopping bag | | | 25% | 50% | 75% | 100% | |
| 2.5 Foam food packaging | | | | | | | |
| 2.6 Single-use plastic cup | | | | | | | |
| 2.7 Straw | | | | | | | |

(source) <http://www.pcd.go.th/Public/News/GetNewsThai.cfm?task=lt2019&id=18769> [Accessed on APR 22, 2019]

Current issues of Waste Management in Thailand

WTE v.s. 3R ?

Recycling volume & rate of Waste Plastics



(source) PCD, "State of Thailand Pollution Report"

Are WTEs countermeasure?

Status of WTE systems in Thailand

| | SPP | | | VSPP | | |
|---|--------|---------------|------------|--------|---------------|------------|
| | Number | Capacity (MW) | Sells (MW) | Number | Capacity (MW) | Sells (MW) |
| File a request but have not accepted a purchase | 1 | 19.54 | 19.54 | 1 | 9.65 | 8.00 |
| Cancel contract | 1 | 2.50 | 1.00 | 25 | 131.46 | 111.53 |
| Cancel request | 1 | 100.00 | 90.00 | 39 | 230.91 | 202.40 |
| Cancel accept | | | | 6 | 3.03 | 2.93 |
| PPA not signed | 1 | 100.00 | 90.00 | | | |
| PPA signed, COD not met | | | | 18 | 128.69 | 114.60 |
| The project is being considered. | | | | 1 | 0.30 | 0.30 |
| COD met | 2 | 80.00 | 73.00 | 22 | 61.89 | 55.46 |
| Total | 6 | 302.04 | 273.54 | 112 | 565.926 | 495.22 |

(source) Department of Alternative Energy Development and Efficiency (DEDE), Fact Sheet Open Data (in Thai), [Online]. Available at:

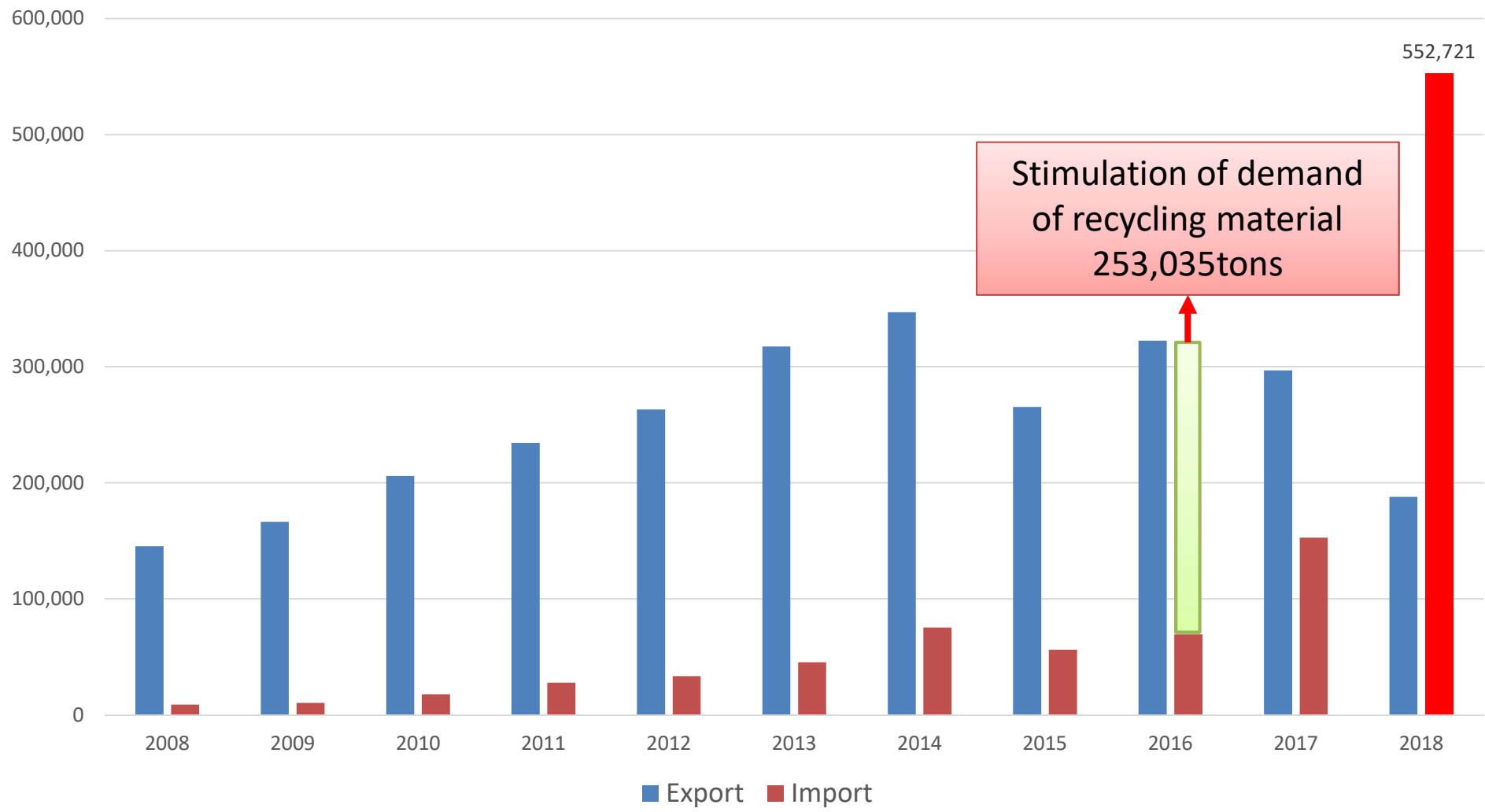
<http://enedss.dede.go.th/OpenData/Index#GarbageOpenData>

❑ NIMBY

❑ →community-owned power (2020-)

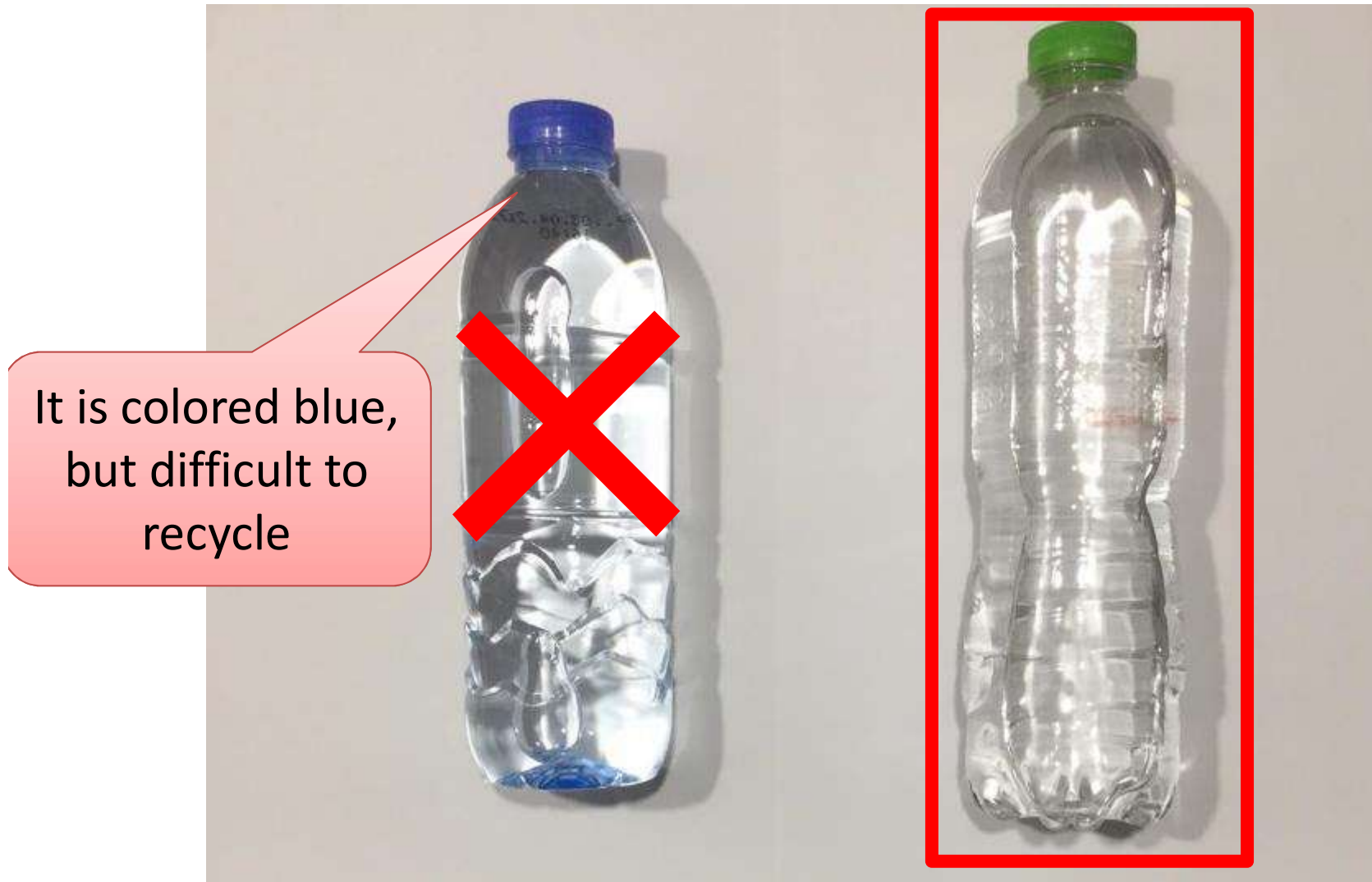
Plastic waste trade by the effect of China's Ban

Thailand's plastic waste trade volume (tons)



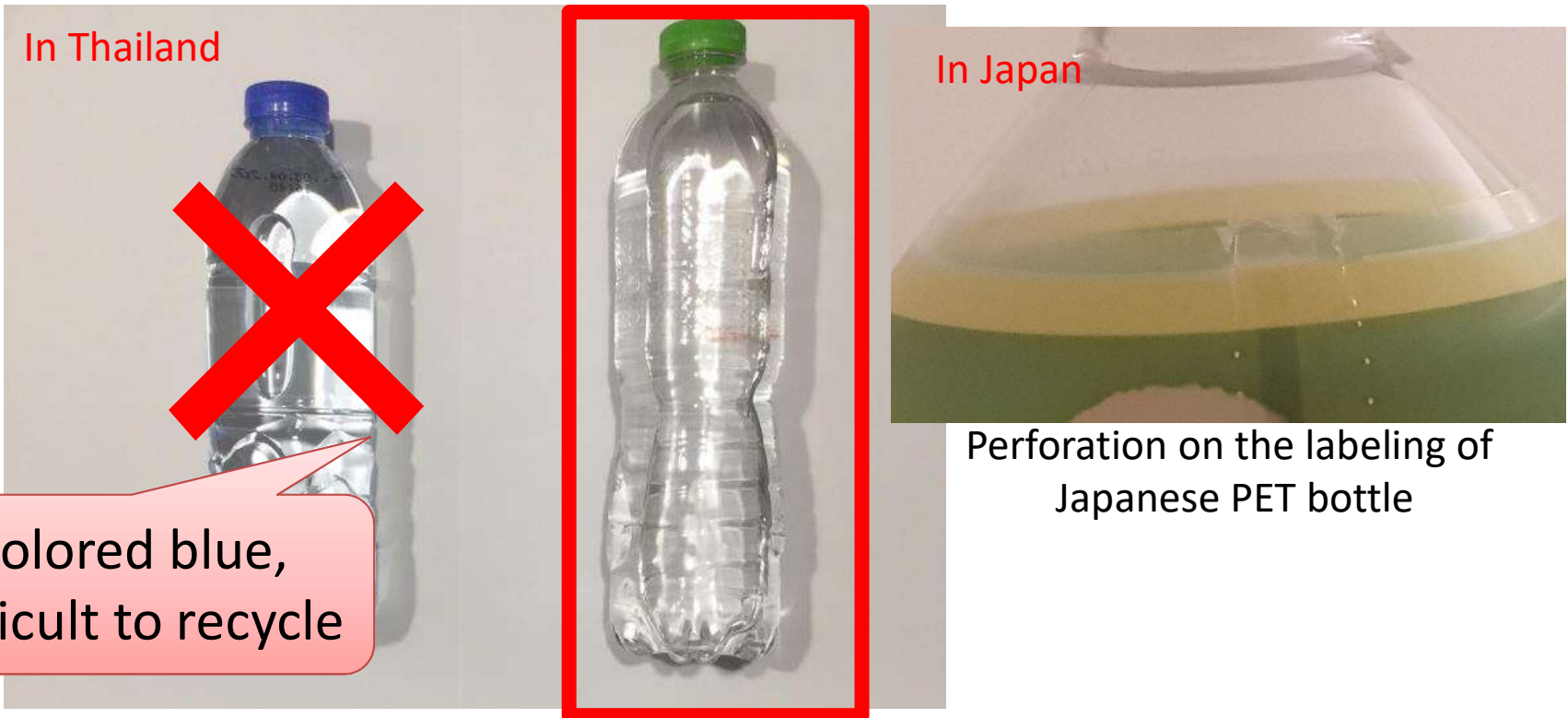
(source) Thai Customs Department Trade Statistics database

Stimulation of demand of recycling material



(see) Voluntary Design Guidelines for Designated PET Bottles(March 1.2016)
<http://www.petbottle-rec.gr.jp/english/design.html>

Stimulation of demand of recycling material



A best practice for PET bottle design is the voluntary standard for the design of PET bottles, developed by Japan's Council for PET Bottle Recycling.

- PE or PP which gravity are less than 1 should be used for caps, in order to sort caps from PET.
- Prohibit coloring PET, because waste PET with color has limited demand of recycling.
- It is also recommended to have perforation on the labeling.

Need to industrial Standards

- It is also important to ensure that demand exists for recycled products. Some recycled products may not satisfy the level of quality desired by customers or defined in conventional industrial standards for products made from virgin materials.
- To ensure an adequate level of quality for recycled products, and to reduce the transaction cost between the suppliers and buyers of recycled products, industrial standards should be developed for recycled goods.

| JIS Code | Title of Japan Industrial Standard |
|-----------|--|
| JIS A5731 | Recycled plastics inspection chambers and covers for rainwater |
| JIS A5741 | Products of wood-plastic recycled composite |
| JIS A5742 | Products of wood-plastic recycled composite – assembled decks |
| JIS K6930 | Reclaimed granulate moulding materials of agricultural polyvinyl chloride film |
| JIS K6931 | Reclaimed plastics bars, rods, plates, and piles |
| JIS K6932 | Recycled plastics stakes |
| JIS A9401 | Recycled plastics medial strip block |
| JIS A9402 | Recycled plastics buffer for parking |
| JIS K9797 | Un-plasticised poly(vinyl chloride)(PVC-U) three-layer pipes with recycled solid core |
| JIS K9798 | Un-plasticised poly(vinyl chloride)(PVC-U) three-layer pipes with recycled foamed core |

Direct Regulation and Market Mechanism

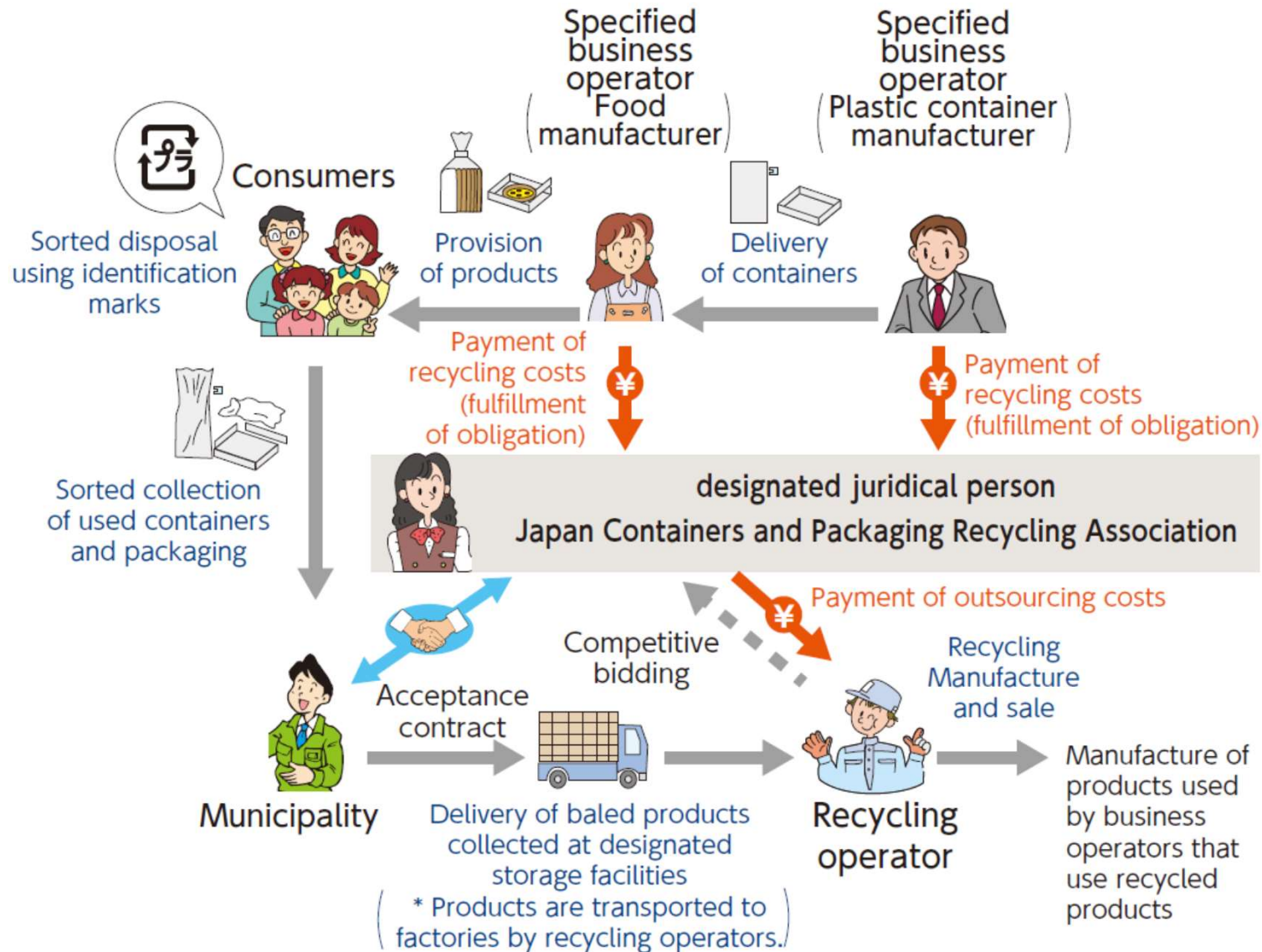
| Methods | Merit | Demerit | Discussed |
|--|--|---|--|
| Direct Regulation <ul style="list-style-type: none"> • Prohibition • Deregulation | <ul style="list-style-type: none"> ✓ Expected effect ✓ Little Unfairness | <ul style="list-style-type: none"> ✓ Huge operation Cost ✓ Lack of flexibility | <ul style="list-style-type: none"> ✓ Prohibition of 7 shingle use Plastics ✓ Deregulation of recycled plastic for food (FDA) |
| Market Mechanism <ul style="list-style-type: none"> • Tax • Subsidy • Deposit • EPR | <ul style="list-style-type: none"> ✓ Low Operation Cost ✓ Flexibility | <ul style="list-style-type: none"> ✓ It is difficult to predict the effect ✓ Unfairness | <ul style="list-style-type: none"> ✓ Tax deduction of biodegradable plastic ✓ EPR / Recycling Low |

EPR = Extended Producer Responsibility,

EPR does not mean to left everything to Producers!

<https://www.oecd.org/development/extended-producer-responsibility-9789264256385-en.htm>

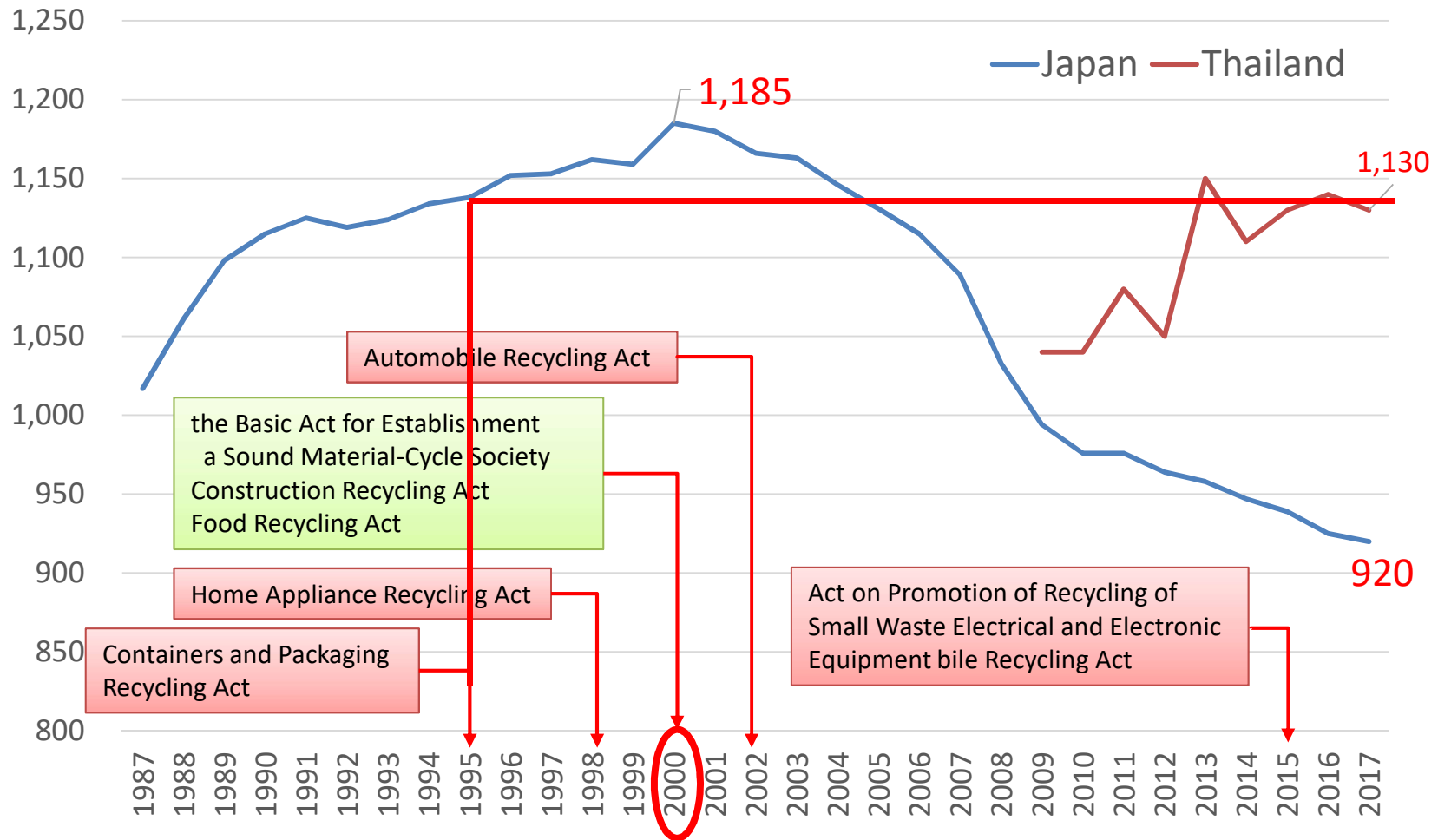
Flows of recycling costs and containers and packaging



Needs cooperation from Consumer



MSW generated per person (g/cap*day)



(source) PCD(2019), "Booklet on Thailand State of Pollution 2018", and MOEJ(2019) "Survey results of general waste treatment"

Separation waste for 3R's in Japan

| | | | | | | | |
|--|--|---|--|--|---|--|---|
| <p>可燃ごみ Combustible garbage</p> | <p>毎週 月 木 曜 Every Monday and Thursday</p> | <p>生ごみ・紙屑・合成皮革類 木屑・吸い殻・マットレス 布団・ビデオテープ ラップ・風呂用品 プラスチック製のおもちゃ等 Kitchen garbage, Waste paper, Artificial leather items, Woodchips, Cigarette butts, Mattresses, Futon, Videotapes, Plastic wrap, Bath items, Plastic toys</p> |  | <p>ペットボトル Plastic PET bottles</p> | <p>毎月 第2 第4 水 曜 The Second and Fourth Wednesdays of every month</p> | <p> このマークのついている物がペットボトルです。 Plastic items bearing this mark are considered plastic PET bottles. ペットボトルは底にへその様な突起があります。 A plastic PET bottle has an umbilication at the bottom.</p> |  |
| <p>茶色ビン Brown bottles</p> | <p>毎月 第1 第3 火 曜 The First and Third Tuesdays of every month</p> | <p>茶色のビン (ビールビン 栄養ドリンクビン等) Brown bottles (such as beer bottles and bottles of nutritious drink)</p> |  | <p>雑誌・紙バック・その他紙 Magazines, Paper packages, Other paper items</p> | <p>「その他紙」の例 Examples of "Other paper items"  段ボールは混入しないで下さい。 Do not mix other paper items with corrugated cardboard.</p> | <p>漫画本・週刊誌 辞書・辞典・電話帳 Comic books, Magazines, Dictionaries, Telephone directories 牛乳パック Milk cartons 包装紙・菓子箱等 Wrapping paper, Confectionery boxes</p> | <p>紙バック Paper packages 雑誌 Magazines その他紙 Other paper items</p>  |
| <p>無色ビン Colorless bottles</p> | <p>毎月 第2 火 曜 The Second Tuesday of every month</p> | <p>無色のビン 白の磨りガラスのビン (無色の一升ビン・牛乳ビン等) 完全に無色のビンのみ Colorless bottles White frosted glass bottles (such as one-shot bottles and milk bottles) Completely colorless bottles only</p> |  | <p>古布 Used cloth</p> | | <p>古着類・シャツ・ズボン セーター・肌着・靴下 シート・カーテン 布団カバー Old clothes, Shirts, Trousers Sweaters, Underwear, Socks Sheets, Curtains Quilt covers</p> |  |
| <p>その他のビン Other bottles</p> | <p>毎月 第4 火 曜 The Fourth Tuesday of every month</p> | <p>無色・茶色以外の色付きビン (青・緑・黒・その他の色) ワイン等の薄い色の ビンも含む Colored bottles other than colorless or brown (blue, green, black, and other colors) including pale colored bottles such as a wine bottle</p> |  | <p>プラスチック容器 Plastic containers</p> | <p>毎月 第2 第4 金 曜 The Second and Fourth Fridays of every month</p> | <p>プラスチック容器・発泡スチロール容器 カップラーメン容器・シャンプー容器 洗剤容器 等 Plastic containers Foamed polystyrene containers Containers for instant noodles Containers for shampoo Containers for detergent</p>     |  |
| <p>不燃ごみ・カン Noncombustible garbage and Cans</p> | <p>毎月 第1 第3 第5 金 曜 The First, Third, and Fifth Fridays of every month</p> | <p>缶類・小さな鉄屑・アルミ鍋 アルミ箔・水道蛇口・乾電池 Cans, Small pieces of scrap metal, Aluminum pans, Aluminum foil, Faucets, Dry cell batteries 瀬戸物・陶磁器類・蛍光灯 コップ・化粧品ビン・板ガラス・鏡等 Crocery, Ceramics, Fluorescent light bulbs, Drinking cups Cosmetic bottles, Sheet glass, Mirrors</p> |  | <p>新聞紙・段ボール News papers, Corrugated cardboard</p> | | <p>新聞紙 チラシ 書類 段ボール Newspapers Flyers Books Corrugated cardboard</p> | <p>チラシ Flyers 新聞紙 Newspapers ダンボール Corrugated cardboard 段ボールの断面 The section of corrugated cardboard</p>  |

Opportunity to promote separation waste



BMA Collection Fee (20 L / Month*household)



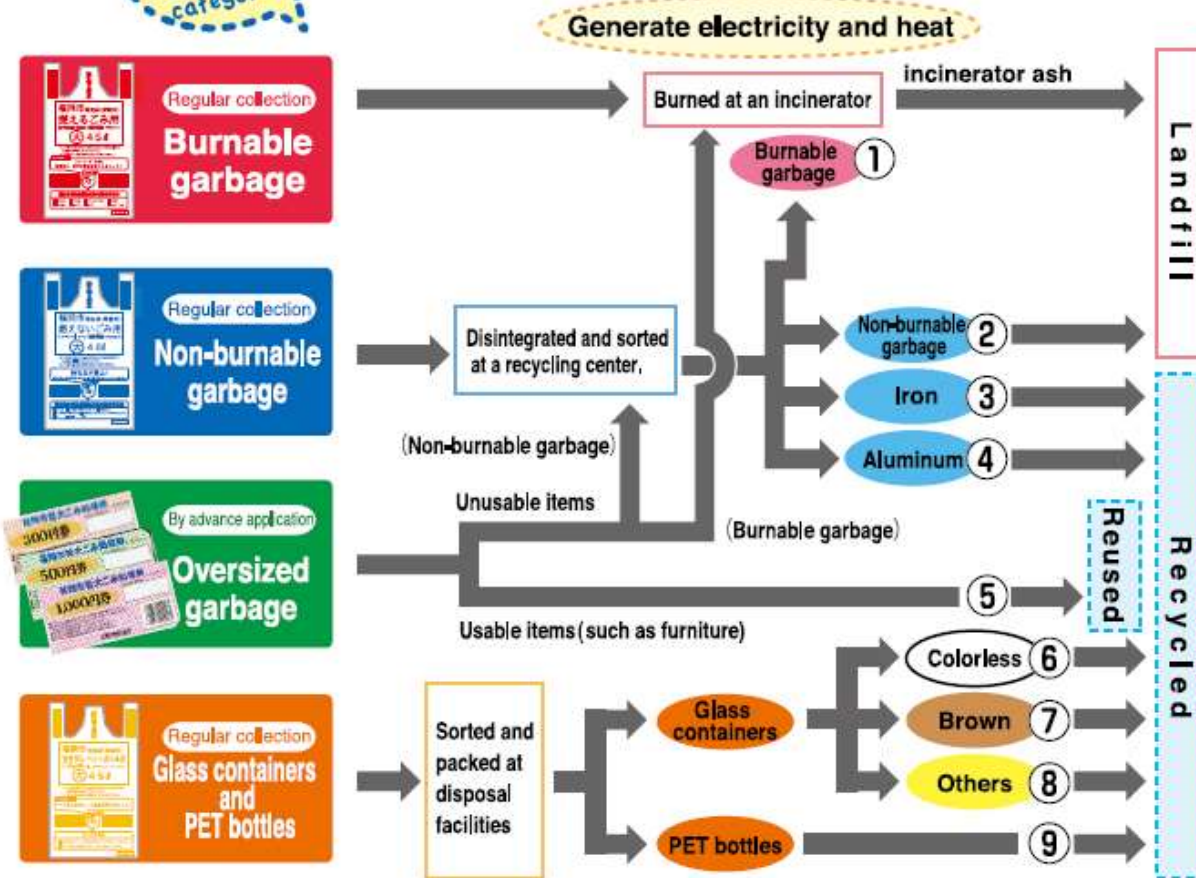
- BMA citizens do not know how much we throw away waste
- Change the collection method for promoting reducing, and separating and recycling waste plastic

Separating waste and collection Fee by the specific bags

Fukuoka City garbage disposal system

Eventually sorted into nine separate categories

In Fukuoka City, garbage collected through four separate means are sorted out into nine categories and recycled or disposed as described below.



WTE V.S. 3R from Shanghai Case



- Shanghai WTE capacity is **9,000 tons / day**
 - 750 tons / day × 12units
- The 4type (Food, Combustible, Recyclable, Hazardous) of **Waste Separation started since July 2019**

| Waste | Target | Actual | Y on Y |
|-------------|-------------------|-------------------|--------------|
| Recyclable | 3,299 tons / day | 5,960tons / day | 4.6 times |
| Hazardous | 500 kg/ day | 1000 ton/day | Over 9 times |
| Food | 5,520 tons / day | 8,710 tons / day | Over 100% |
| Combustible | 21,000 tons / day | 14,830 tons / day | -33% |

(source) 張益「分別時代下固形廢棄物產業戰略」2019年第6回環境企業家年会・発表資料、上海・国家会展中心上海洲示酒店、2019年12月20日

- **The averaged low heat value of MSW has increased from 1700 to 2200-2300kcal/kg-MSW → Long time Plan**

Summary / Discussion Points

Summary / Discussion Points

1. Current situation of Waste Management has many problems

□ Implementation of 3Rs in Thailand

✓ Mr. Patarapol

2. Current Governmental Measures are ambitious

□ Best Practice in Thailand

✓ Mr. Tanaka, Dr. Apipong, and Mr. Takahashi

3. Current issues could be improved by 3R but affects existing facilities

□ Long time plan

✓ Mr. Odera

Thank you for your attention!

ขอบคุณครับ

ご清聴ありがとうございました

To become circular economy in Thailand

Acknowledgement

This presentation is part of the results from the Grant-in-Aid for Young Researchers (A)17H04722 funded by the Japan Society for the Promotion of Science (JSPS).