Waste Management in the European Union
European Union

- 28 Member States
- 500 million of residents
- Countries with different population and size
- EU enlargement process
European Institutions

Citizens, interest groups, experts: discuss, consult

Commission: makes formal proposal

Parliament and Council of Ministers: decide jointly

National or local authorities: implement

Commission and Court of Justice: monitor implementation
Waste Hierarchy

- Prevention
- Preparing for re-use
- Recycling
- Other recovery
- Disposal

EU Waste Management Principles

- Affordability
- Extended Producer Responsibility
- Proximity
- Polluter pays
Figure 1-1: Rates and Effectiveness since Tax Introduction

Typical charge (gate fee and landfill tax)
Wide differences exist between Member States regarding the treatment of municipal waste.

- The share of recycling and composting among waste treatment methods ranges from 64% in Germany to 12% in Malta and Slovakia (the EU average is 44%);
- seven Member States landfill less than 10% of their municipal waste,
- eight Member States landfill over 70% of their municipal waste (the EU average is 28%).
Priority objectives and actions

Incentives to boost CE product design
Innovative and efficient production processes
Durability, reparation and recyclability of products – Ecodesign Directive, EPR
Industrial symbiosis, remanufacturing
Coherent policy framework for products
Tools for SMEs

Increase the use of secondary raw materials, recycled nutrients and water
Safely managed chemicals
Improve knowledge of material flows
Analysis of the interface between chemicals, product, and waste legislation
EU-wide electronic system for cross-border transfers of waste

Better labelling: EU Eco-label, Environmental Footprint
New forms of consumption – collaborative economy, digital platforms
Circular Economy criteria in Green Public Procurement

EU waste hierarchy

Revised EU targets – 65% recycling of municipal waste by 2035 and 70% for packaging waste by 2030
New binding target to reduce landfill to a maximum of 10% of total waste by 2030
Improve waste management, new investments in recycling capacity, avoid overcapacity in incineration
Ban on Single Use Plastics

The following products will be banned in the EU by 2021:

- Single-use plastic cutlery (forks, knives, spoons and chopsticks)
- Single-use plastic plates
- Plastic straws
- Cotton bud sticks made of plastic
- Plastic balloon sticks
- Oxo-degradable plastics and food containers and expanded polystyrene cups

- 90% collection target for plastic bottles by 2029
- Plastic bottles will have to contain at least 25% of recycled content by 2025 and 30% by 2030

- Strengthened application of the polluter pays principle, in particular for tobacco, by introducing extended responsibility for producers, and

- Fishing gear, to ensure that manufacturers, and not fishermen, bear the costs of collecting nets lost at sea.

- Labelling on the negative environmental impact of throwing cigarettes with plastic filters in the street is mandatory
Opportunities

Economic growth
Increasing resource productivity by 30% by 2030 would increase GDP by 0.8% in the EU.
Growth of up to +7% of GDP

Enhanced security of supply
Risks associated with the supply of raw materials, such as price volatility, availability and import dependency, would be mitigated using secondary raw materials.

New quality jobs
Create two million new jobs in the EU
Estimated 170,000 direct jobs created in waste management sector by 2035.

Environmental impacts
Manufacturing that uses fewer resources would have positive impacts on the climate, marine littering, and biodiversity.
Reducing total annual Greenhouse Gas Emissions by 2 – 4%

Energy and cost savings
Up to 600 billion EUR in savings – 8% of annual turnover for business in EU

Encouraging Innovation
Waste Management in Japan
Waste Composition of MSW in Japan (FY2015)

- Paper: 33%
- Kitchen waste: 36%
- Wood, Bamboo, Grass: 4%
- Other: 3%
- Fibers: 3%
- Metal: 4%
- Glass: 5%
- Plastic: 9%
- Rubber, Leather: 1%
- PET bottles: 2%

Data source: [http://www.env.go.jp/recycle/yoki/c_2_research/research_11.html](http://www.env.go.jp/recycle/yoki/c_2_research/research_11.html)
Transition of waste generation and GDP

Data source: MOE (2018)
Transition of waste generation and recycling rate

Data source: MOE (2018)
Legal framework of waste management and recycling

**Basic Environment Act**
- Enacted: Nov 1993
- Objectives: Securing material circulation in society, control of consumption of natural resources, reduction of environmental impacts

**Basic Environment Plan**
- Enacted: Dec 1994
- Revised: Jun 2012

**Fundamental Plan for Establishing a Sound Material-Cycle Society**

**Waste Management and Public Cleansing Act**
- Enacted: Dec 1970
- Objectives:
  1. Reduction of waste generation
  2. Proper treatment of waste (including recycling)
  3. Restrictions on development of waste treatment facilities
  4. Regulations on waste treatment companies
  5. Establishment of waste treatment standards, other

**Law for the Promotion of Effective Utilization of Resources**
- Enacted: Apr 1991
- Objectives:
  1. Recycling of recyclable resources
  2. Devising product design that are easy to recycle
  3. Indications for separation and collection
  4. Promotion of effective utilization of by-products

**Recycling regulations in line with the characteristics of individual items**
- **Containers and Packaging Recycling Law**
  - Enacted: Jun 1995
  - Categories: Bottles, PET bottles, paper and plastic containers and packaging

- **Home Appliance Recycling Law**
  - Enacted: May 1998
  - Categories: Air conditioners, refrigerators, freezers, televisions, washing machines, dryers

- **Food Recycling Law**
  - Enacted: May 2000
  - Categories: Food waste from food-related businesses

- **Construction Material Recycling Law**
  - Enacted: May 2000
  - Categories: Wood, concrete, asphalt

- **End-of-life Vehicle Recycling Law**
  - Enacted: Jul 2002
  - Categories: Automobiles

- **Small Electrical and Electronic Equipment Recycling Law**
  - Enacted: Aug 2012
  - Categories: Small electrical and electronic equipment, etc.

**Green Purchasing Law**
- (National initiative to promote the acquisition of recycled products, etc.)
- Enacted: May 2000

Source: MOE
Breakdown of Treatment and Recycling in Japan (FY2016)

Total amount of waste in FY2016: 41,841 thousand ton

- Incineration: 32,935 thousand ton (80%)
- Recycling: 7,649 thousand ton (19%)
- Landfilling: 426 thousand ton (1%)

Number of Incinerators: 1,120
Treatment capacity: 180,497 ton/day

Data source: MOE (2018)
Total construction cost of WtE facility (CAPEX)

- Subsidy from national government (33%)
- Local government bond (60%)
- City budget (~10%)
- Cost share between national and local governments

- Subsidy from national government (33%)
- Local government bond (60%)
- City budget (~10%)

Cost burdens:

- Cost burden on national government (63%)
- Cost burden on local government (37%)

* Local gov’t can issue bonds maximum 90% of the cost which is not covered by national government.

* Local gov’t bares only about 10% of the total cost when it is constructed.
Financing (Kitakyushu in FY2015)

Cost
- Collection & Transportation: 44%
- Sorting: 4%
- Waste to Energy: 50%
- Shredding: 1%
- Landfill: 1%
- Total: 13.2 billion JPY

Finance
- Designated plastic bag: 14%
- City tax: 44%
- Directly hauled waste: 13%
- Other city's waste: 14%
- Waste to Energy: 12%
- Other: 3%
- Total: 13.2 billion JPY

Data Source: City of Kitakyushu
<table>
<thead>
<tr>
<th>Category</th>
<th>Objective to be measured</th>
<th>Indicator</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Establishing recycling-based society</td>
<td>Waste generation</td>
<td>Waste generation per person · day</td>
<td>kg/person · day</td>
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<td></td>
<td>Recycling rate</td>
<td>Recycling rate from waste</td>
<td>% (ton/ton)</td>
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<td></td>
<td>Thermal recycle</td>
<td>Energy recovery from waste</td>
<td>MJ/ton</td>
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<td></td>
<td>Final Disposal</td>
<td>Proportion of waste sent to landfill-site</td>
<td>% (ton/ton)</td>
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<tr>
<td>Prevention of global warming</td>
<td>GHGs emission</td>
<td>GHGs emission per a person a day associated with waste disposal</td>
<td>kg/person · day</td>
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<tr>
<td>Public service</td>
<td>Residents’ satisfaction for waste treatment</td>
<td>Degree of Satisfaction of residents</td>
<td>–</td>
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<tr>
<td>Economy</td>
<td>Cost-effectiveness</td>
<td>Annual waste treatment cost per a person</td>
<td>JPN yen/person · year</td>
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<td>Cost of recycling</td>
<td>JPN yen/ton</td>
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<td>Cost of thermal recycling</td>
<td>JPN yen/MJ</td>
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<td>Cost associated with waste reduction service</td>
<td>JPN yen/ton</td>
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Waste Management in China
Municipal Solid Waste Mgmt. in China

- Very significant progress over past several years in terms of service levels, improved environmental performance, improved access to information and public monitoring
- New policies on circular economy as a green development measure to promote sustainable economic practices
- Legislative changes to stimulate decoupling of economic growth from consumption and pollution
- New initiatives to test the approach in pilot areas for further replication
Waste Volumes are Expected to Continue to Increase

- Today, China produces between 315-400 million tons of municipal solid waste/annum. Going forward, waste generation will continue to increase most notably in the less developed central and western areas.
- The management of such significant quantities of wastes will create additional pressures on local and provincial capacities and resources.
- The difference between China following a low vs. a high waste generation growth rate is in the magnitude of 200 million tons/annum with significant impact on required new infrastructure, CAPEX and OPEX.
Safe Disposal Rate of MSW is High in Urban and Low in Rural Areas

- 55% of China’s municipal waste comes from the 660 cities with a safe disposal rate of 98%
- In contrast, rural areas nationally have estimated safe disposal rate of 47%
- Landfilling and incineration are currently the main disposal methods. Incineration accounts for 40% of the total, planned to reach 50% nationally
- Estimated recycling rate of household waste is 15% (~6 million waste pickers and dealers)
- Biological treatment of organic fractions (food waste) planned to increase substantially and considered recycled fraction
Cost Recovery May become a Challenge

- Capital costs for WtE and now anaerobic digestors encouraged by national policies and incentives
- Beyond investment costs, waste management operations are expensive
- Upgrading the sector further (MBTs and digestors) will put further financial pressure on local finance
- The cost of service today is estimated at around 1% of disposable income which is in line with international benchmark but also suggests some room for efficiency improvements
Thank you