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Inventory Improvement for MRV Mitigation Actions in Waste Sector

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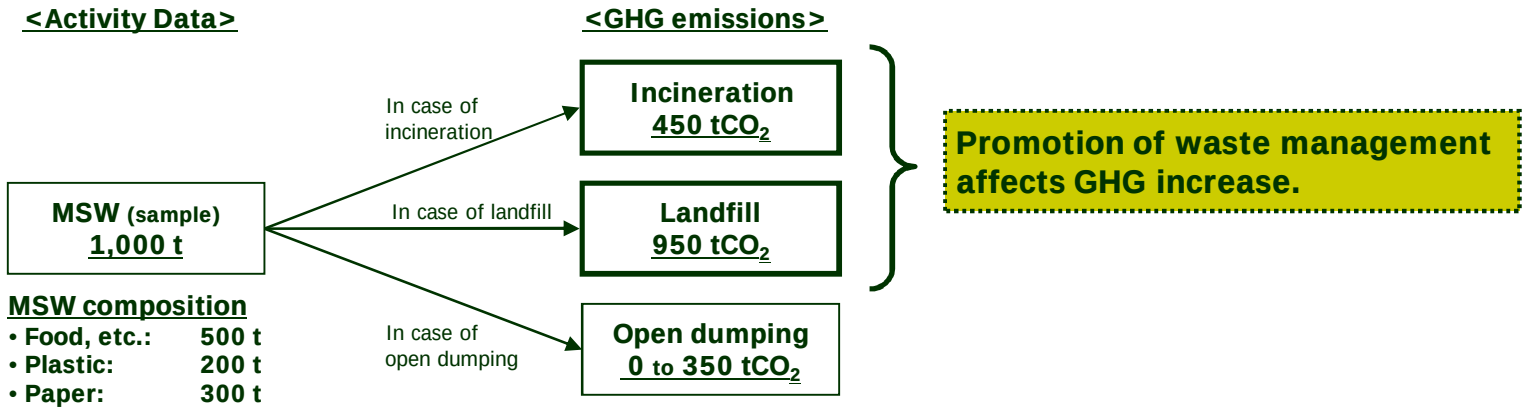
Waste management and GHG (1)

- **Waste management policy should be given higher / highest priority for environmental protection.**
  - **Against disease, fires, odor, contamination of water and soil, air pollution, accidents, landslides, resource problem, scenery…**

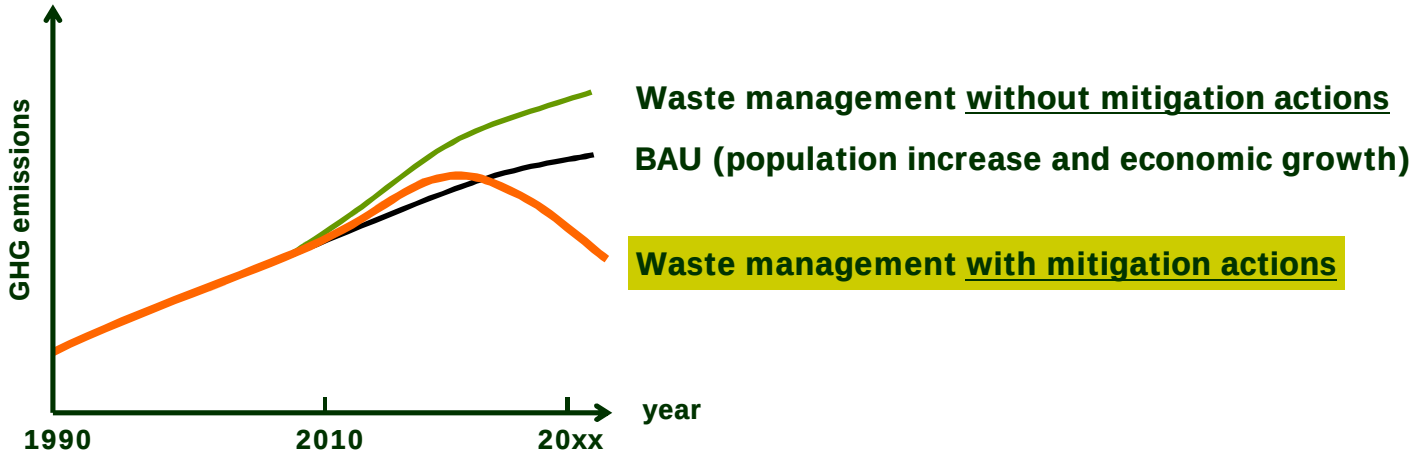
- **However, in general, waste management leads to GHG emissions increase in waste sector.**



Difference of GHG emissions in each waste treatment

Waste management and GHG (2)

- **For GHG reduction in waste sector, mitigation action consistent with national waste management policy should be taken into consideration.**
  - **GHG emissions in waste sector could increase with population increase, economic growth, and promotion of waste management.**



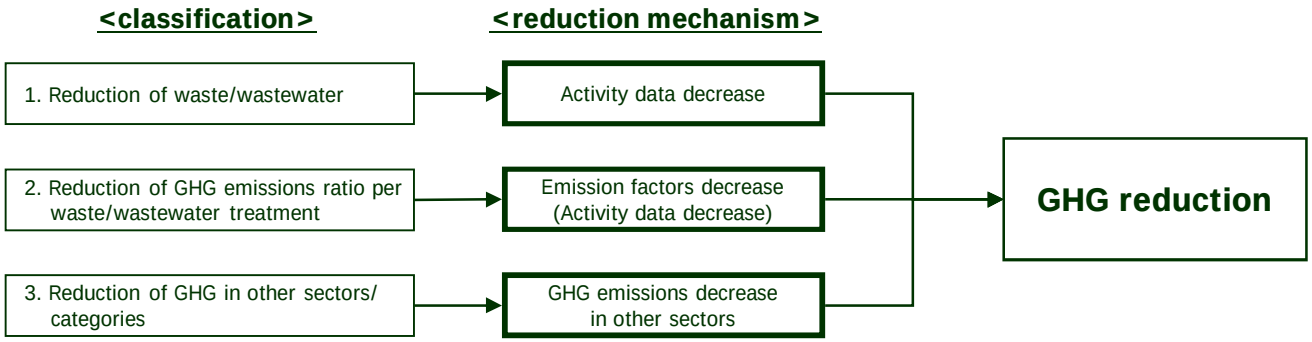
Possible future pathway of GHG emissions in waste sector

Mitigation actions in waste sector

- **Mitigation action in waste sector could be classified into 3 ways by GHG reduction mechanism.**

  - **Mitigation actions for …**
    1. **Reduction of waste / wastewater.**
    2. **Reduction of GHG emissions ratio per waste / wastewater treatment.**
    3. **Reduction of GHG emissions in other sectors / categories by utilization of waste as raw material or energy.**

"3" is the waste sector specific GHG reduction mechanism and could reduce more GHG than "1" or "2".



Mitigation action classification in waste sector

Mitigation options in waste sector (1)

1. Reduction of waste/wastewater

- **GHG reduction mechanism**
  - Reduction of Activity data (treated waste).
- **Mitigation actions in Japan's waste sector**
  - Actions during manufacturing production (reducing over-manufacturing and production loss, long-life design, etc.).
  - Actions in sales and purchase (reducing over-wrapping, avoiding plastic bags, prevention of expired food, reusing bottles, green purchasing, etc.).
  - Actions in consuming (long-term using, car sharing, repairing, paperless working, etc.).
  - Actions in disposal (recycle-market, auction, reducing food waste moisture by squeezing, etc.).
  - Municipal solid waste charging by local government.

Source: MOEJ (http://www.env.go.jp/recycle/report/h22-05/index.html)

Mitigation options in waste sector (2)

2. Reduction of GHG emissions ratio

- **GHG reduction mechanism**
  - Reduction of Emission Factors and Activity data.
- **Mitigation actions in Japan's waste sector**
  - General (energy-efficient waste/wastewater treatment equipment, fuel-efficient and/or hybrid vehicle, bio-fuel, etc.).
  - Actions for waste collection (modal shift, eco-driving, rebuilding waste collection route, etc.).
  - Actions for landfill (semi-aerobic landfill, landfill gas collection, prohibition of direct landfill of organic waste, appropriate water-level control of leachate, etc.).
  - Actions for sewage plant (high temperature combustion, sludge digestion and gas recovery, sludge derived fuel, etc.).
  - Actions for F-gas (high-efficient HFC collection device).

Source: MOEJ (http://www.env.go.jp/recycle/report/h22-05/index.html)

Mitigation options in waste sector (3)

3. Reduction in other sectors/categories

- **GHG reduction mechanism**
  - Reduction of GHG emissions in other sectors/categories by utilization of waste as raw material or energy.
- **Mitigation actions in Japan's waste sector**
  - Material recycling (Iron, Aluminum, Copper, other metals, glass, plastic, PET, etc.).
  - Chemical recycling of plastic waste.
  - Feeding of food waste.
  - Composting of organic waste.
  - Waste to fuel (bio-diesel, bio-ethanol, bio-gas, bio-coke, RDF, RPF, plastic, waste oil, wood, waste tire, etc.).
  - Power generation and/or heat recovery at waste incinerator.
  - Cooperation between producer and recycler.

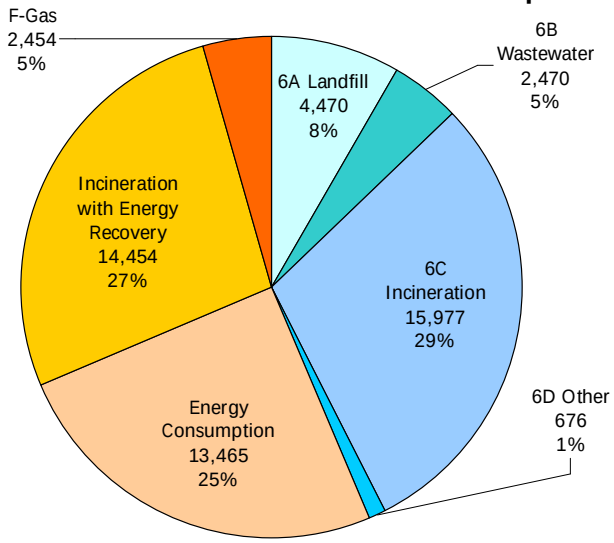
Some mitigation actions need source separation.

Source: MOEJ (http://www.env.go.jp/recycle/report/h22-05/index.html)

For effective Mitigation actions (1)

- **GHG from waste/wastewater treatment activities must be compared in order to find reduction targets.**
  - **GHG emissions from "waste/wastewater treatment activities".**
    - GHG reported in IPCC Category-6 waste sector (6A, 6B, 6C and 6D)
    - GHG from waste incineration with energy recovery (1A)
    - GHG from fuel and electricity consumption at treatment plants and vehicles (1A)
    - F-Gas from waste products (air-conditioner, refrigerator, etc.) (2F)

GHG not included in Category-6



GHG emissions from waste/wastewater treatment activities in Japan, FY2007 (total: 53,966 $GgCO_2$)

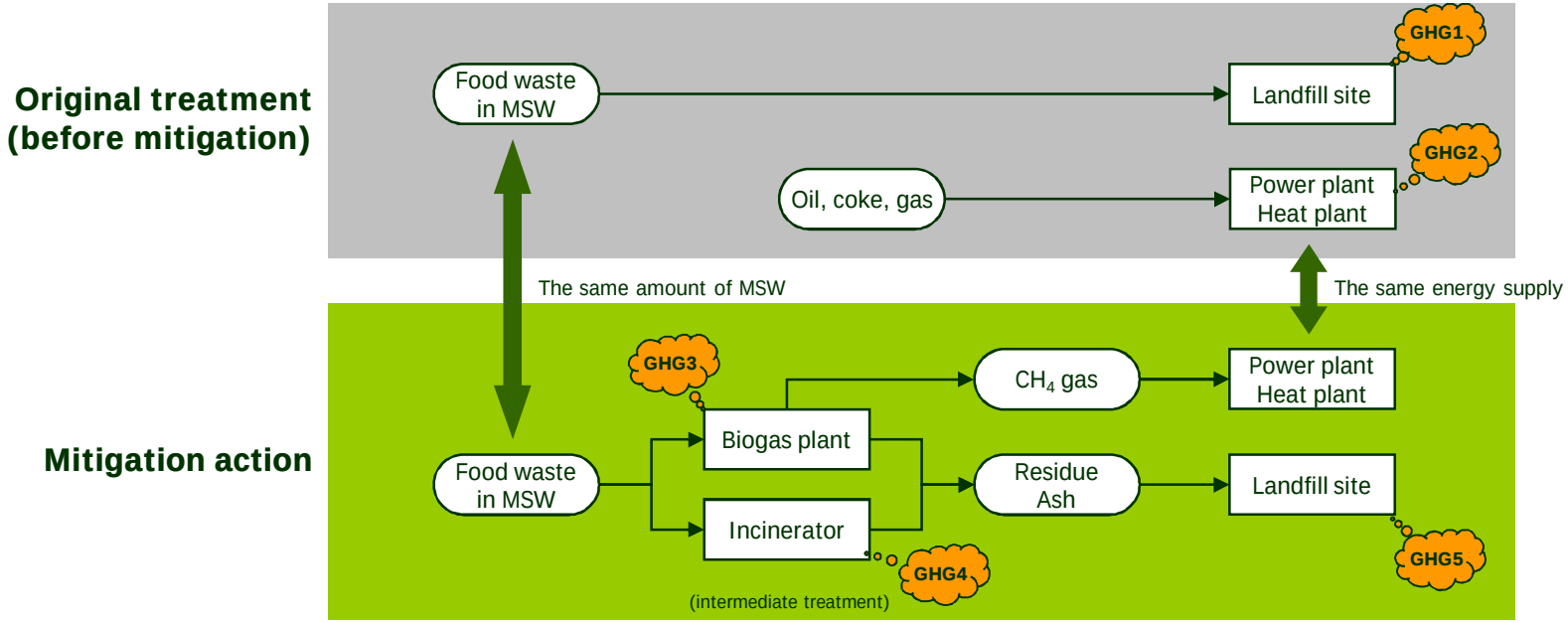
Japan's case

GHG emissions not included in Category-6 amounts 57% of GHG emissions from waste/wastewater treatment activities.

GHG emissions from waste/wastewater treatment activities are important targets of waste sector's mitigation actions.

For effective Mitigation actions (2)

- **Potential GHG reduction in each mitigation option must be evaluated in order to select best mitigation.**
  - **Life cycle assessment (LCA) for GHG emissions is an useful tool.**



Potential GHG reduction of this mitigation action = (GHG3 + GHG4 + GHG5) – (GHG1 + GHG2)

LCA example: the mitigation action of "prohibition of direct landfill of food waste in MSW"

"Direct" means "without intermediate waste treatment".

Mitigation actions and Inventory

- **Effect of mitigation actions should be reflected to Inventory accurately, completely, and transparently.**

Because Inventory is the only tool for national GHG estimations.

Japan's case

- **Frequent improvement of Emission Factors**
  - IPCC default EFs → country specific EFs
  - Monitoring of EFs data
- **Frequent improvement of GHG estimation methodologies**
  - Tier1 → higher (country specific) Tier
  - Subdivision of categories
- **Frequent improvement of statistics for Activity Data**
  - Revision of statistical survey, or establishment of new statistics
  - On time compilation of waste statistics

Continuous improvement of Inventory contributes to promote measurability, reportability, and verifiability of mitigation actions.

For next WGIA9 Waste WG

- **Information exchange**
  - **will help continuous improvement of Inventory and promotion of MRVility of mitigation actions in waste sector.**
  - **Information exchange about…**
    - **Mitigation options in waste sector.**
      - Experience/future plan of mitigation actions in Asian countries.
      - Comparison of GHG emissions from waste/wastewater treatment activities.
      - Target categories for mitigation actions.
    - **Good practices of Inventory improvement in terms of MRVility.**
      - Experience of Inventory improvement according to mitigation actions.
      - Measurement and verification methods for accurate GHG reduction.
      - Concrete EFs and/or Activity dada based on mitigation actions.

Thank you for your attention.

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