Property and Reliability of Waste Data

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Topics in Waste Group

- Strategy to improve reliability of waste data (arisen from SWGA)
- Using surrogate data in emission estimation
- Analysis of carbon flow

Second Session

“Reporting on Country-Specific MSW Flow and GHG Emissions”

a. Mass and carbon flow in waste streams in city, region or country

b. GHG emissions from each SWDS estimated by IPCC spread sheet

Fourth Session

“Short Reporting on Recent Waste Management Technology and Practice in Asian Countries”

Fifth Session Discussion on "What is Appropriate Waste Management in Asia?"

Fifth Session

- Subject 1: **Characteristics of MSW Stream in Asia and How to obtain reliable data from this.**

Fifth Session

- Subject 2: **Advantage and Disadvantage of Technologies/Practice in Waste Management in Asia** (from viewpoint of GHG Reduction and Environmental Protection)

Fifth Session

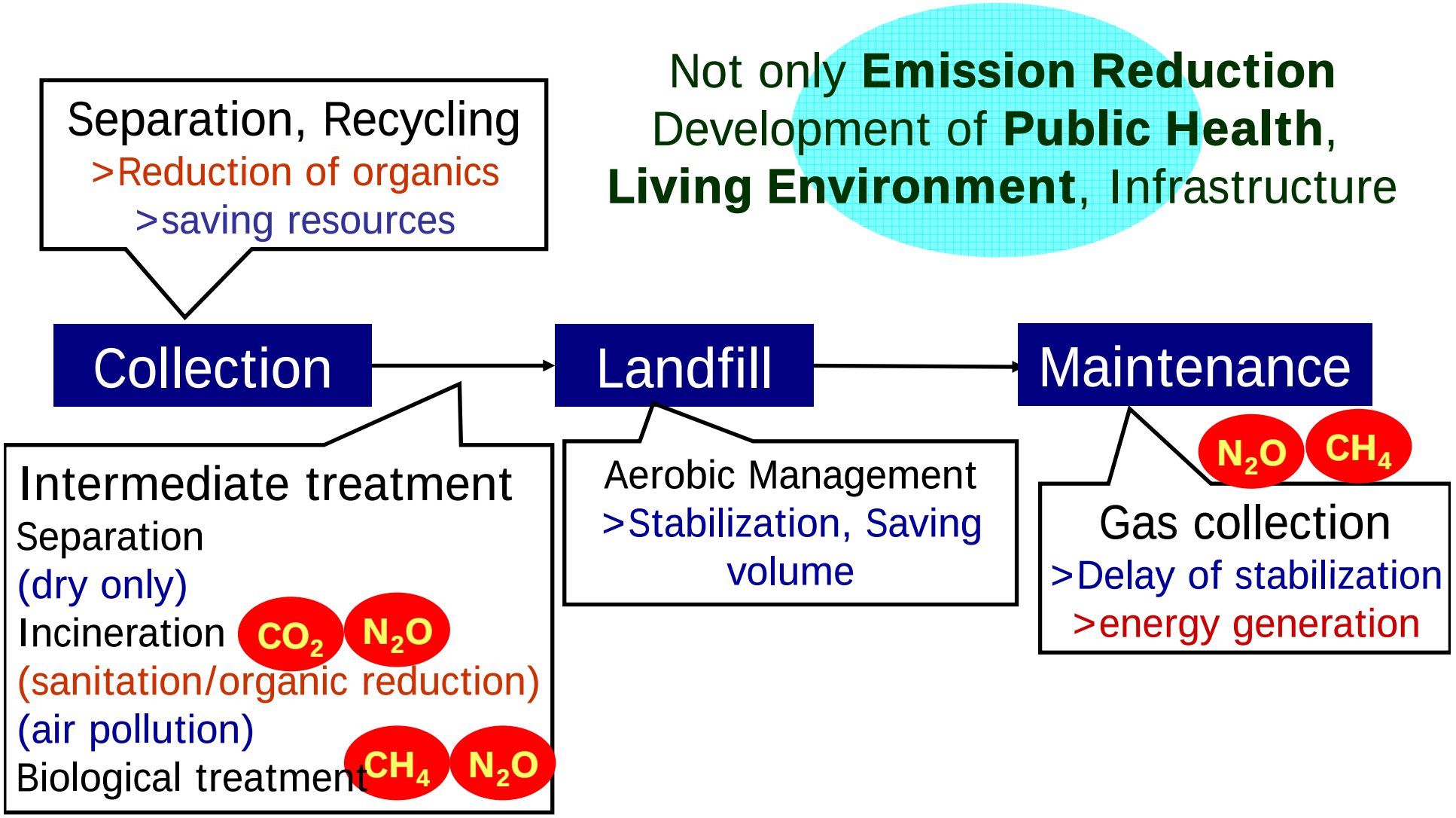
- Subject 3: **What is Appropriate Waste Management in Asia?** : Balance of Environment, Economy and Society

From SWGA: Discussion topics in session 2

1. Difficulty to apply IPCC waste model in Asian countries
   - –Lack of waste historical data
   - –Low accuracy for national calculation：separation in each landfill should be better
   - –Need more researches for parameter evaluation
   - –Add LFGTE calculation in the model
   - –Establish standard for waste data collection

2. If FOD model is not suitable for methane emission calculation, how do we do next?
3. k value

GHGs emission and Waste Management



Data on Solid Waste Management

- **Waste Generation**
- **Waste Stream**
- **Waste Composition**
- **Physicochemical Property**
- **Cost / Revenue**

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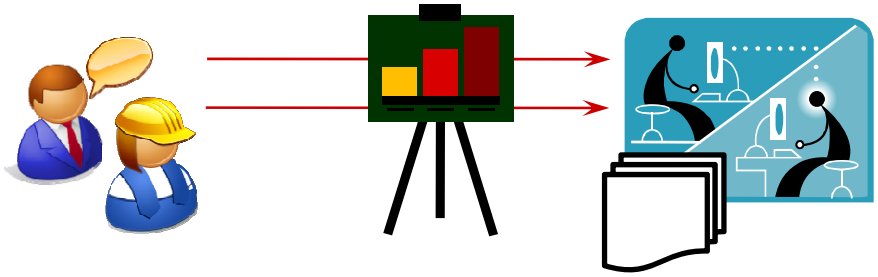
Waste Generation (Rate)
- source and property of data?-

- **Method for Estimation**
  - Weighing every truck on a scale
  - Sampling the representative activity
  - Estimation from Number of truck, Revenue...
  - Base Unit/Population, Economic Drivers or Trends...
- **Unit of Mass**
  - Weight or Volume
  - Precise Density
- **Basis of Measurement**
  - Wet (fresh)
  - Dry (after pretreatment)
- **Time of Estimation**
  - Annual, Some years interval
  - Some case studies...

Survey on Waste Generation and Stream in Japan

- **Municipal**
  - Actual data collection from all municipality
  - Cumulative estimation

- **Industrial**
  - Interviewing/ Basic unit
  - Computational Estimation



Data collection on Municipality

- Questionnaire
  - Population
  - Workers
  - Direct management/commisioned /licensed
  - Collection/Transportation Vehicle
  - Separation Category of Plastic
  - Charge/fee
  - Amount of collection
  - Treatment/Recycle of each categ

収集運搬・処理区分の実施形態など				混合ごみ	可燃ごみ	不燃ごみ	資源ごみ								その他収集ごみ	粗大ごみ
							紙類	金属類	ガラス類	ペットボトル	プラスチック類	布類	生ごみ	その他		
				01	02	03	04	05	06	07	08	09	10	11	12	13
収集運搬	生活系	形態	①直営 ②委託 ③許可 ④無し	01												
		回数	①1回 ②2回 ③3回 ④4回 ⑤5回 ⑥6回 ⑦7回以上 ⑧1回未満 ⑨不定期 ⑩無し	02	(回/週)	(回/週)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)
		方式	①ステーション方式 ②各戸収集方式 ③併用 ④その他	03												
	事業系	形態	①直営 ②委託 ③許可 ④無し	04												
		回数	①1回 ②2回 ③3回 ④4回 ⑤5回 ⑥6回 ⑦7回以上 ⑧1回未満 ⑨不定期 ⑩無し	05	(回/週)	(回/週)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)	(回/月)
		方式	①ステーション方式 ②各戸収集方式 ③併用 ④その他	06												
中間処理		形態	①直営 ②委託 ③許可 ④無し	07												
最終処分		形態	①直営 ②委託 ③許可 ④無し	08												

1 ごみ処理の概要

（1）ごみ分別収集数 09

	01
ごみの分別数 01	

（1－2）ごみの収集区分 10

ごみの組成		混合ごみ 01	可燃ごみ 02	不燃ごみ 03	資源ごみ 04
ペットボトル	01				
容器包装プラスチック（白色トレーを除く）	02				
白色トレー	03				
上記以外のプラスチック	04				
生ごみ	05				

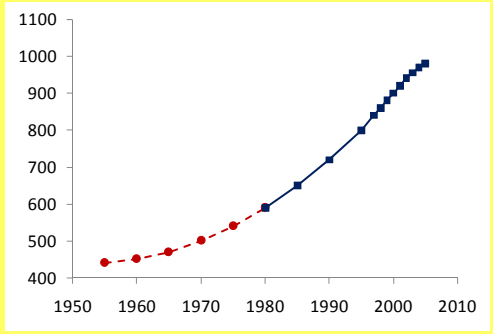
（1）ごみ収集量 13

収集区分＼実施形態		直営 01	委託 02	許可 03	合計 04
混合ごみ	01	t	t	t	※1 t
可燃ごみ	02	t	t	t	※2 t
不燃ごみ	03	t	t	t	※3 t
資源ごみ（集団回収を除く）	04	t	t	t	※4 t
その他収集ごみ	05	t	t	t	※6 t
粗大ごみ	06	t	t	t	※7 t
合計	07	t	t	t	※8 t
家電4品目	08	t	t	t	t

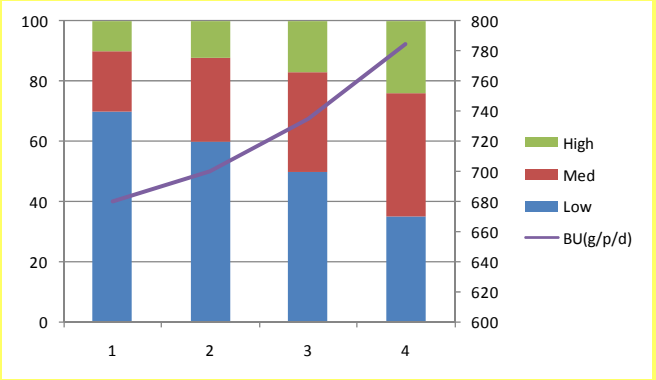
整数で記入すること（四捨五入）

Past Waste Generation (from LF)

- Extrapolation from
  - Trend of existent data on waste generation



  - Base unit for each class (authentic statistics)
    - Residential: income, household composition...
    - Business: sector, annual sales, employee number
  - Temporal variation of each class composition
  - Estimation from available/reliable statistics
    - Population
    - GDP,GNP
    - other economic indicator



- Consideration
  - Data Location
  - Method of Estimation
  - Accuracy, Reliability
  - Continuity (disconnection)

How to make reliable base unit

- Classification of activities
  - Link to available/ Reliable statistics
- Appropriate information collection
  - Total inspection
  - Selection of interviewing party
    - Municipality, Industry, Company, Scale
  - Questionnaire
    - Population, Household, workers for primary/tertiary industries
    - Expenditure, Shipment value

Data on Solid Waste Management

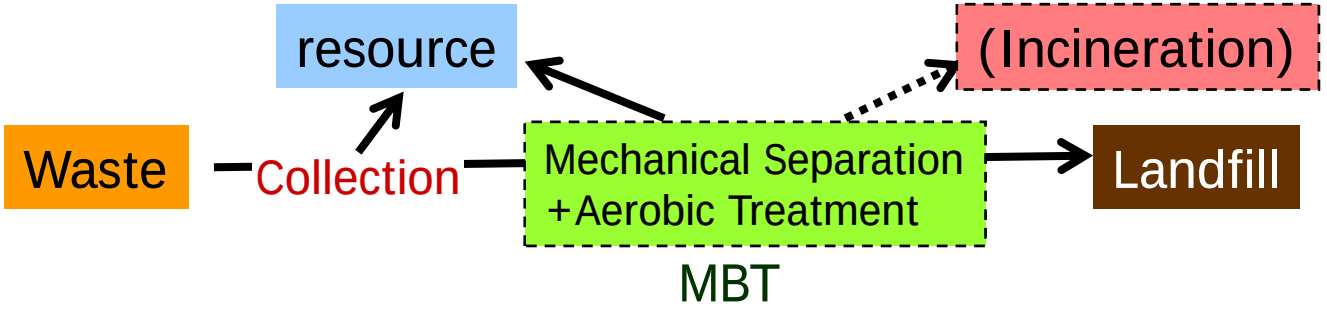
- Waste Generation
- **Waste Stream**
- Waste Composition
- Physicochemical Property
- Cost / Revenue

Waste Stream

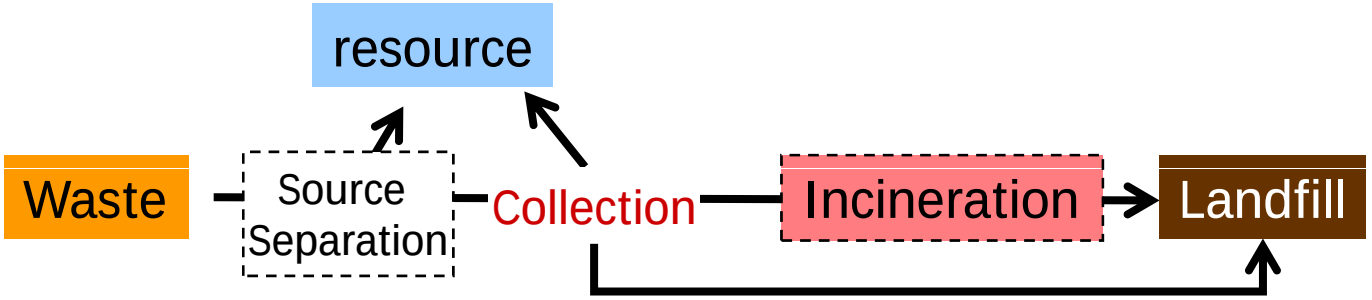
- Waste Generation
- rate of collection
- resource recovery
  - Source/post collection
  - Informal recovery
- land disposal (open burning)
- treatment
  - separation, composting, incineration etc.

Solid Waste Stream

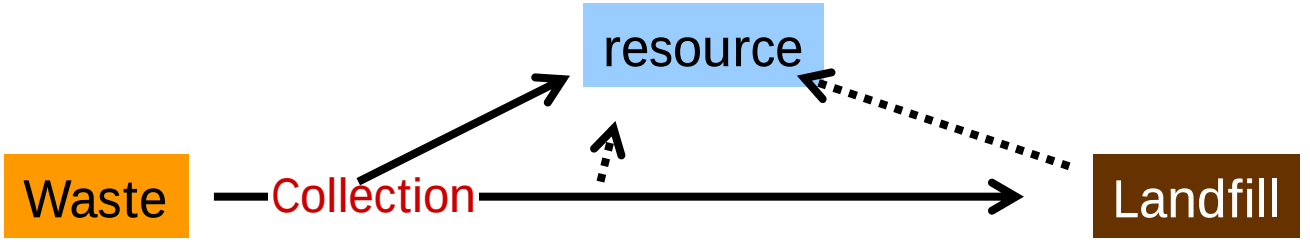
Western Countries: Post Collection Separation & LFG recovery



Japan: Source Separation & Semi-aerobic landfill

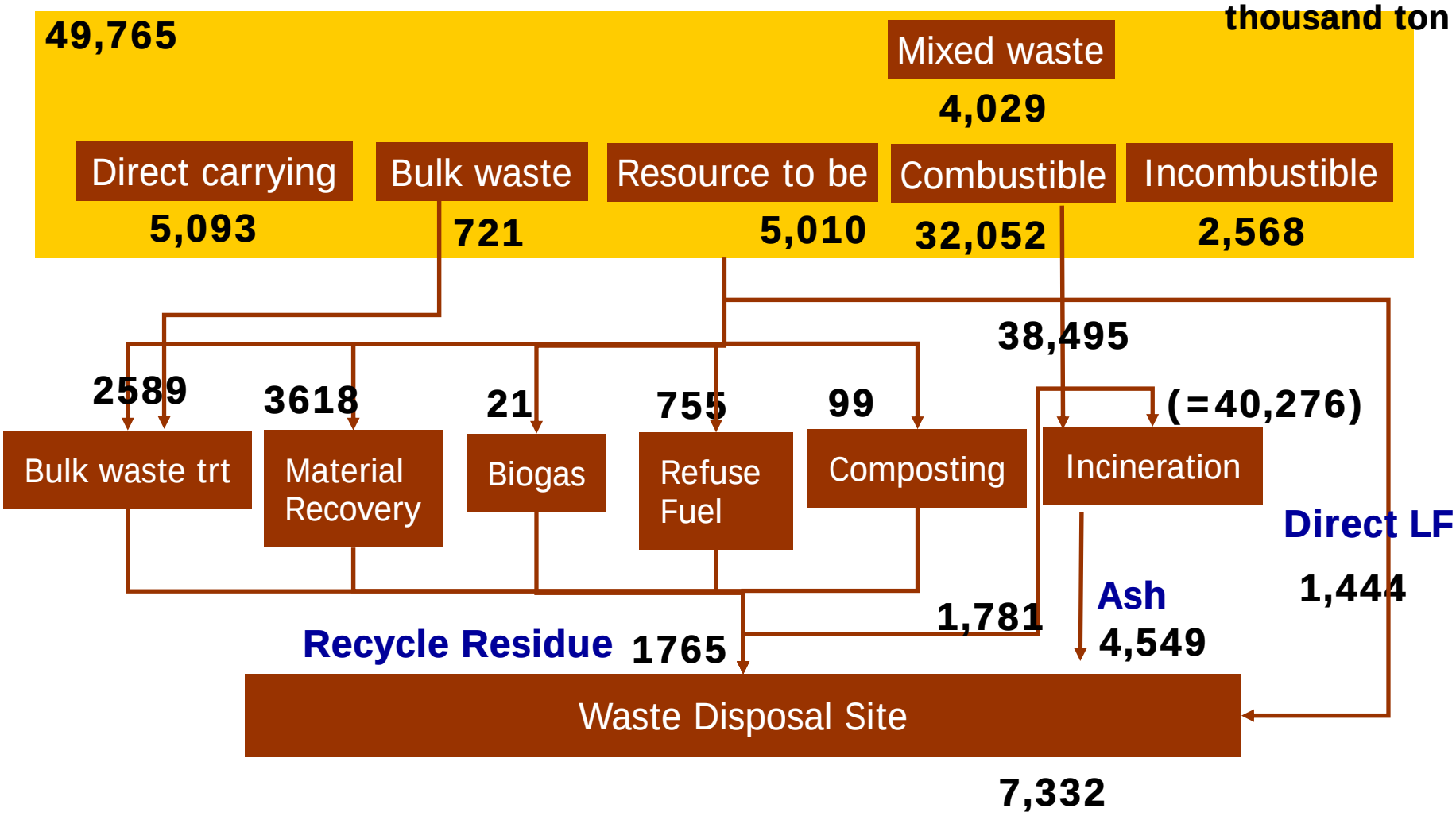


Developing Countries: Informal recovery & Direct disposal



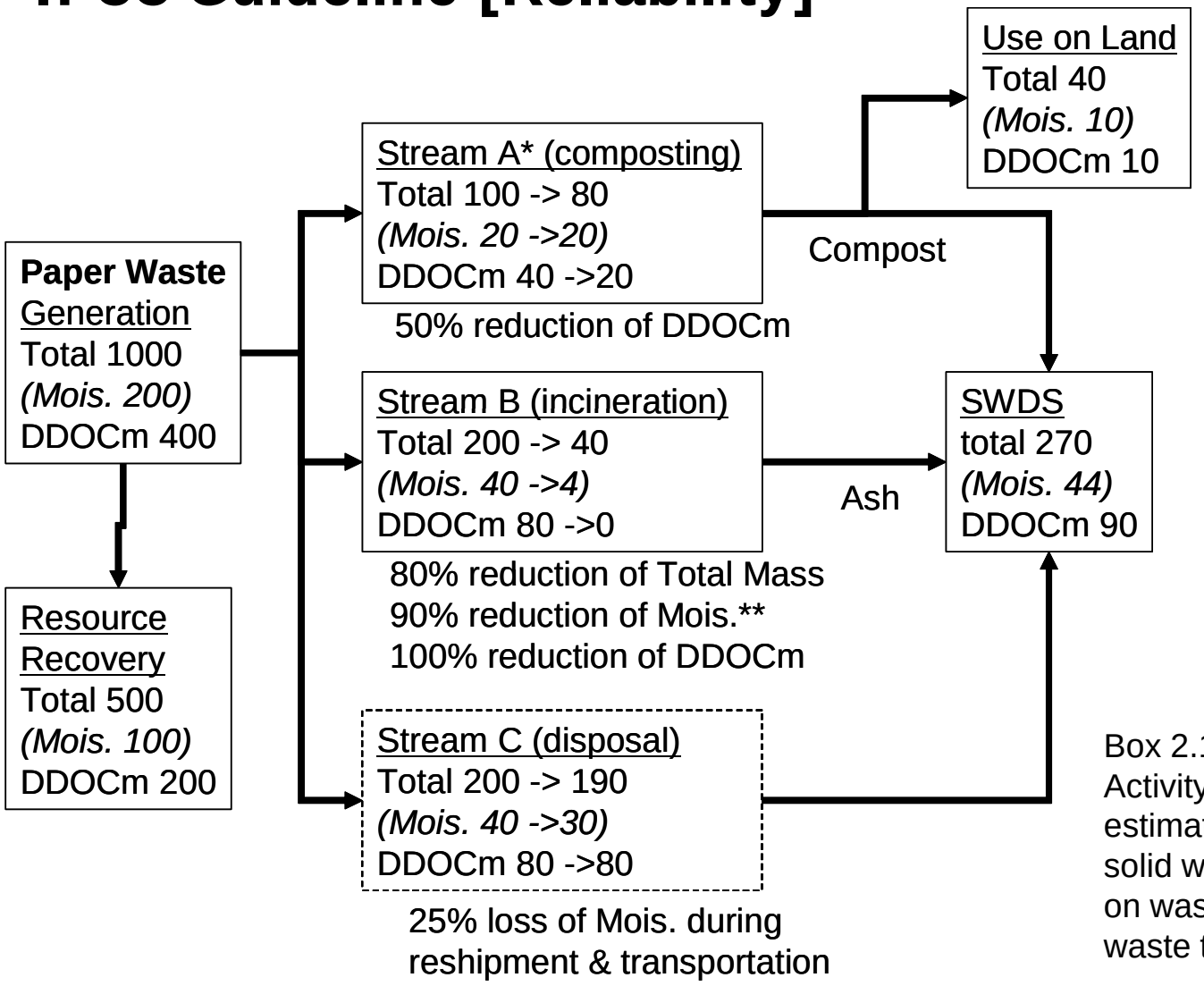
Waste Stream: Mass Flow

Change the quantity/quality during the stream
Necessary but Insufficient for Emission Estimation



Substance Flow

IPCC Guideline [Reliability]



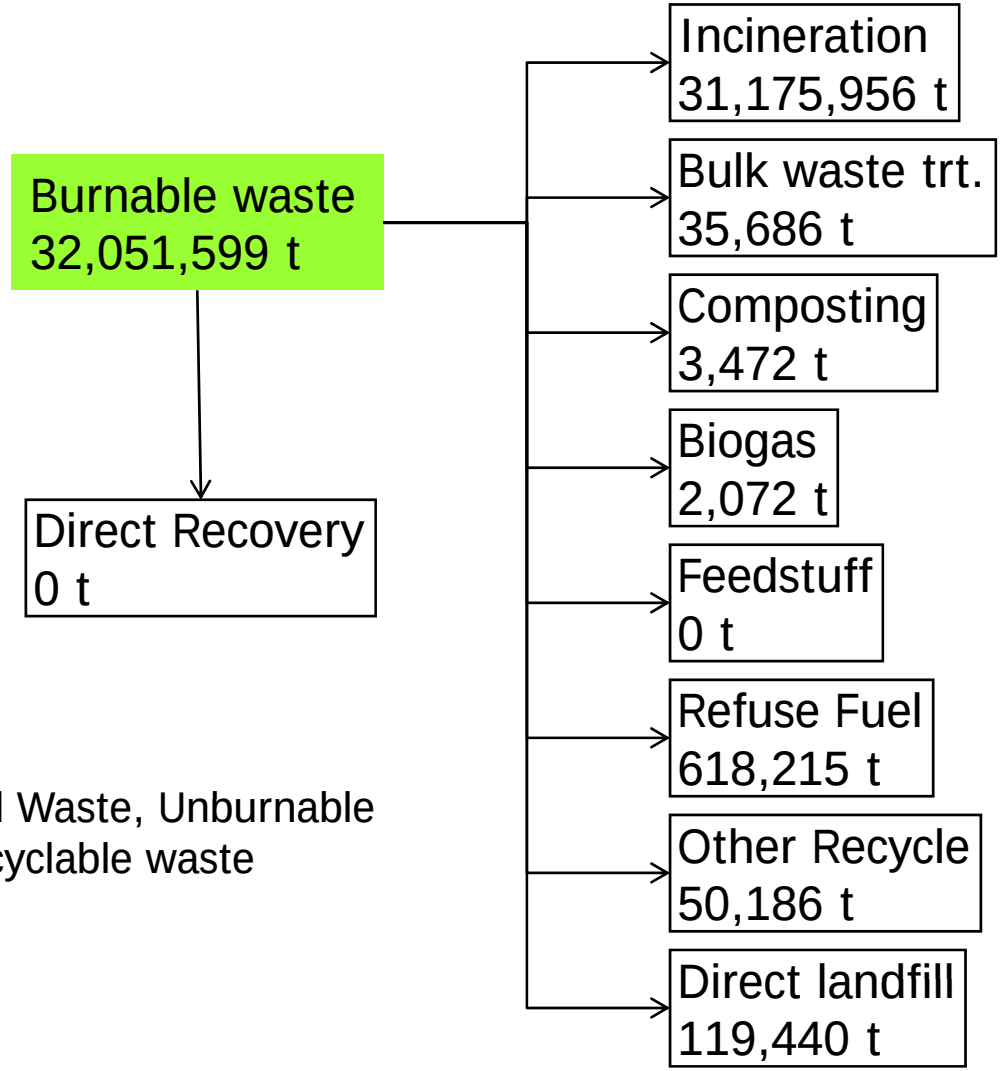
* Compost can be produced not only by paper but also by other organic component of waste such as food, sludge and wood. In this figure, however, changes of mass attributed to paper waste is considered solely.

** Incineration itself can reduce most of moisture. However ash will be re-wetting due to avoid the fly loss during transportation and loading on SWDS.

Box 2.1: An example of Activity data collection for estimation of emissions from solid waste treatment based on waste stream analysis by waste type

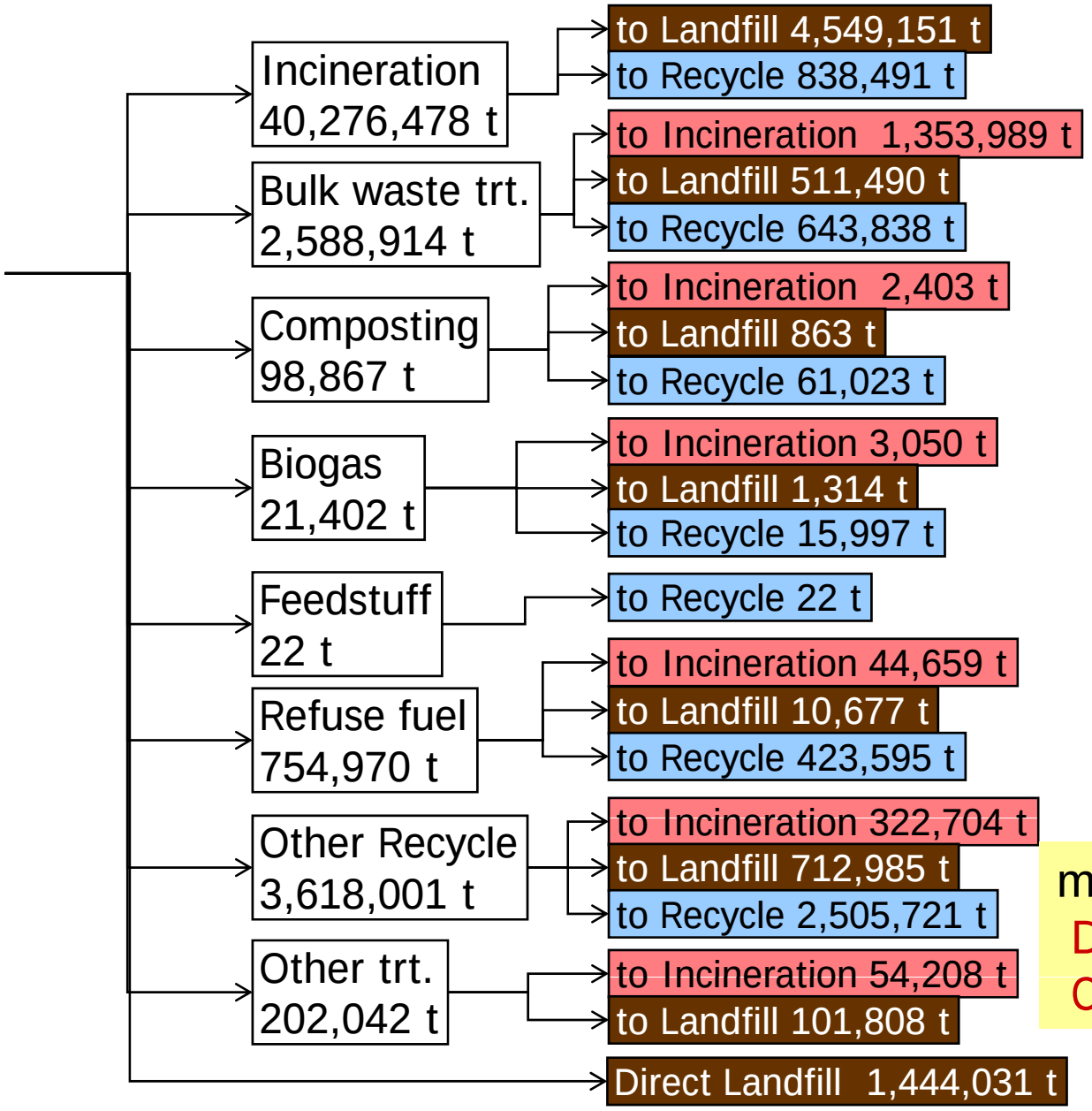
Values in each box explain weight of total mass and compositions of waste as ton, kg or so on.

Stream of Each Category: Where to go



Flow of Mixed Waste, Unburnable
Separated recyclable waste

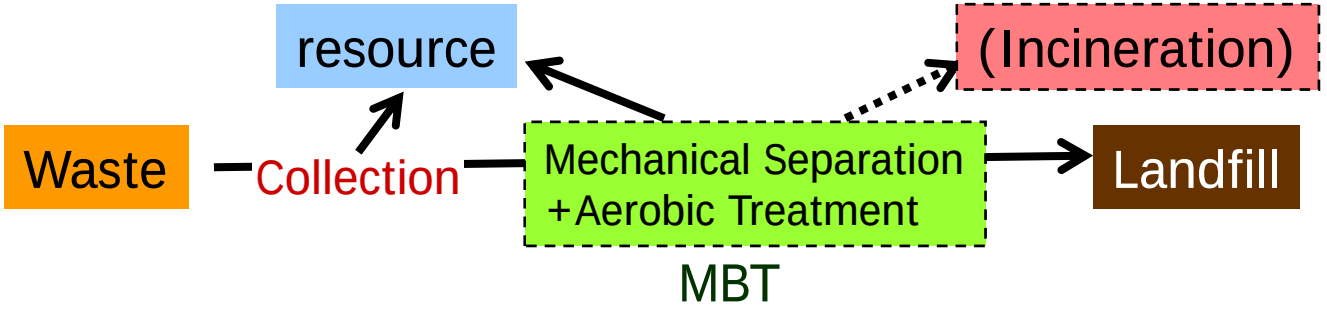
Stream after treatment



more precise stream of
Degradable organics
Carbon/Nitrogen

Solid Waste Stream

Western Countries: Post Collection Separation & LFG recovery



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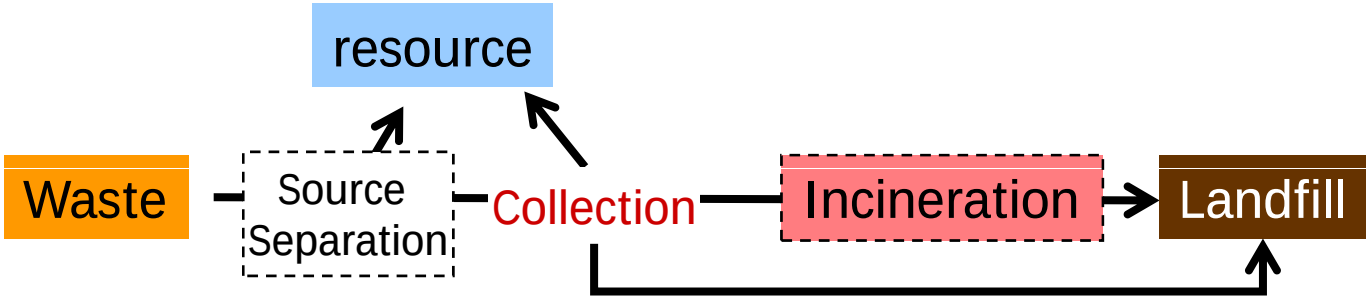

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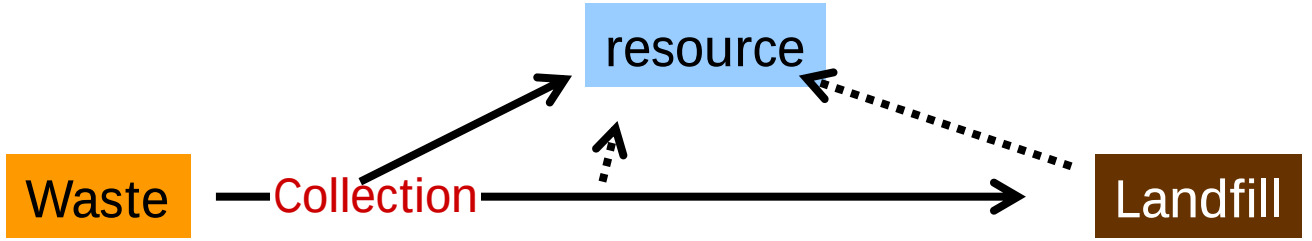


Simple Waste Stream

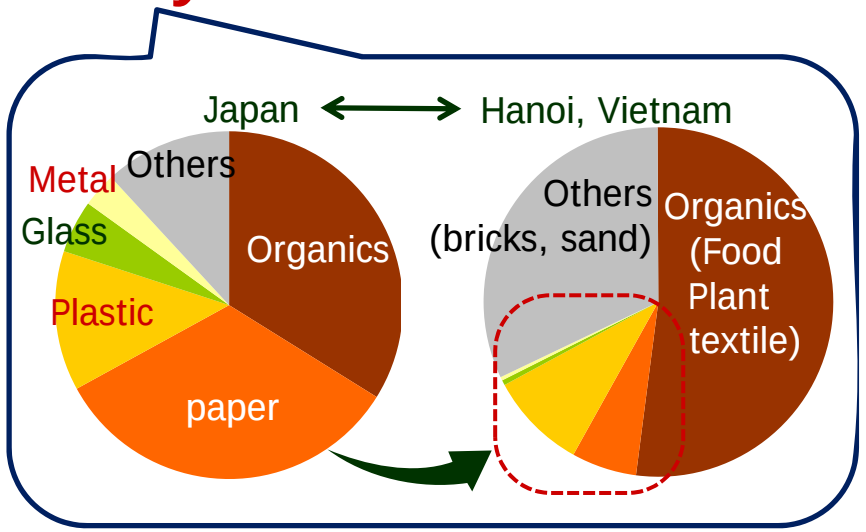
- Waste Generation: Most important data
  - Change of quality/amount between generation and disposal
  - Weight
  - Generator (Municipal, Industrial)
  - Temporal difference
  - Measurement : at landfill, at transfer station
- Current Generation
- Estimation of Past Generation

Data on Solid Waste Management

- Waste Generation
- Waste Stream
- **Waste Composition**
- Physicochemical Property
- Cost / Revenue

Waste Composition

- Category
  - percentage of garbage, paper, plastics, metals
  - Country/ Regional Difference
  - Classification
- Impact of Informal Recovery
- Where to investigate
  - Collection Station
  - Transfer station
  - Incineration/Landfill
- Description of Method

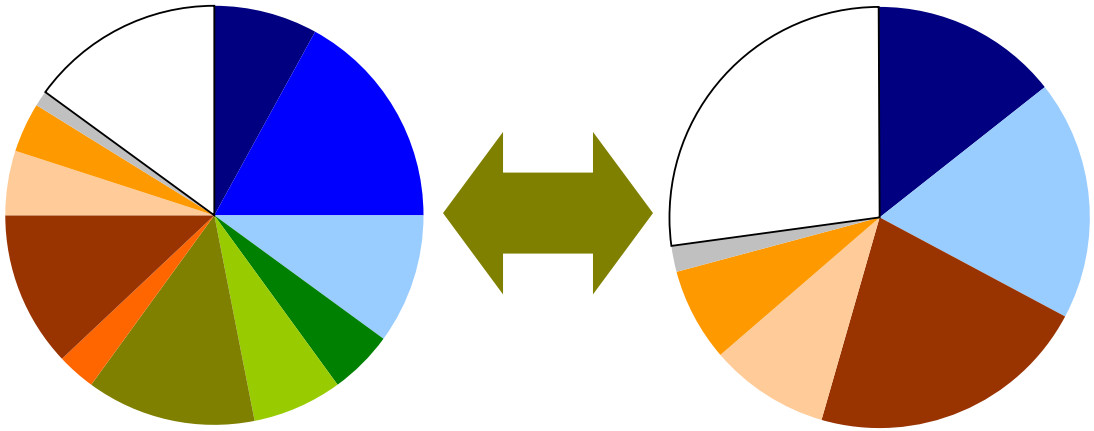


Waste Composition - common categories?

- food waste
- garden (yard) and park waste
- paper and cardboard
- wood
- textiles
- nappies (disposable diapers)
- rubber and leather
- plastics
- metal
- glass (and pottery and china)
- other (ash, dirt, dust, soil)

- Organics
- paper and cardboard
- plastics
- metal
- glass
- Textiles and others

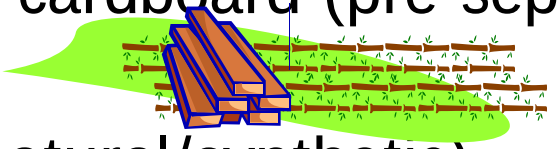
Country difference Re-Categorization



- Food waste
- Plants
- paper
- plastics
- metal
- Pottery
- Textiles
- Soils and others

Waste Composition- Real Contents

- food waste
- garden (yard) and park waste
- paper and cardboard (pre-separated?)
- Wood



- Textiles (natural/synthetic)
- nappies (disposable diapers)
- rubber and leather (natural/synthetic)
- plastics (soft/hard, usage)
- Metal (Fe, Cu, Al)
- glass (pottery and china)
- other (e.g., ash, dirt, dust, soil, electronic waste)

Data on Solid Waste Management

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Physicochemical Property

- How to estimate
  - "**B**io**D**egradable **O**rganic **C**arbon/**N**itrogen"
- Investigation
  - **water content**/ **Ignition loss**/ ash content
  - calorific value
  - Solid phase TOC
  - AT4, GB21
  - Eluates analysis (BOD, DOC)
  - content of **carbon**/ nitrogen/ sulfur/ chlorine
  - heavy metals/ dioxins...

Physicochemical Property - quality of data?-

- Method of sampling (representativeness?)
- Method of pretreatment (drying, grinding, mixing, extracting...)
- Analytical method (common or experimental?)
- Statistical parameters (average, range, error...)
- unity of unit (dry/wet weight, volume, pieces...)
- Purpose of Analysis
  - For appropriate treatment/ disposal/ recycling
  - assessment of pollution/ risk/ GHG emission/ energy

Other factors

- Background information
  - (nature, economy, industry, culture...)
- Legal/economical framework
- History of waste management
- Description of facility/site for waste management
  - (transportation station, treatment plant, landfill...)

How to construct the record structure of database and which is information first?

SUMMARY: To be considered

- Waste Generation
  - Base Unit
  - Past generation
- Waste Stream
  - Mass flow/Substance flow
  - Stream of each category
- Composition
  - Impact of informal recovery
  - Category
  - Real contents

Problem in your country
Priority / Suggestion of other factor
Situation of Waste Data Collection