

Wastewater flow and solid waste stream in Thailand

Sirintornthep Towprayoon

Joint Graduate School of Energy and Environment,
King Mongkut's University of Technology Thonburi



General description of Thailand



Location : latitude 5'40" N to 20'30"N
longitude 97'70" E to 105'45" E

Area: 513,114.6 square kilometers
27 % remain under forest

Climate: wet and dry seasons
annual mean temperature 27° C

Population : approx. 64 Million

Wastewater Flow

- Location of Source
 - Metropolitans
 - Municipalities
 - Cities
- Type of Source
 - Household
 - Building
 - Restaurant
 - Industry
 - Agricultural farm
- Activity data
 - Wastewater generation rate
 - Amount of wastewater
 - BOD per head



Domestic Wastewater

Domestic Wastewater Generation

Region_	Wastewater generation (l/capita/day)					
	1993	1997	2002	2007	2012	2027
Central	160-214	165-242	170-288	176-342	183-406	189-482
North	183	200	225	252	282	316
Northeast	200-253	216-263	239-277	264-291	291-306	318-322
South	171	195	204	226	249	275

Source : OEPP 1995

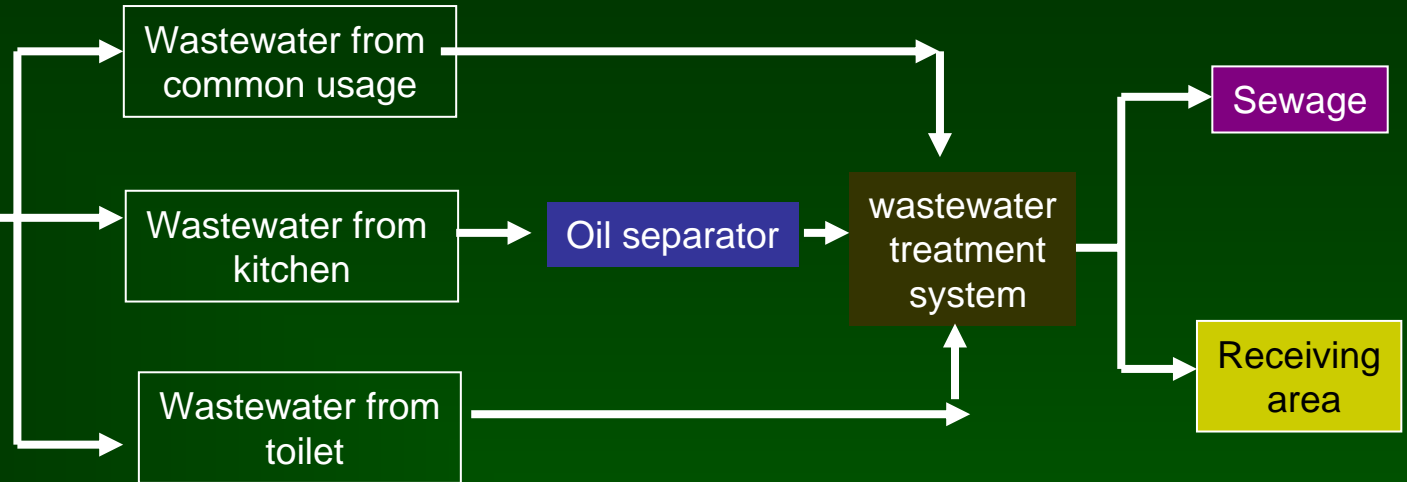
Domestic Wastewater

Region	(gm BOD/capita/day)				
	1997	2002	2007	2012	2017
Central	30	34	36	38	40
North	30	34	36	38	40
Northeast	35	40	43	47	50
South	35	38	42	46	50

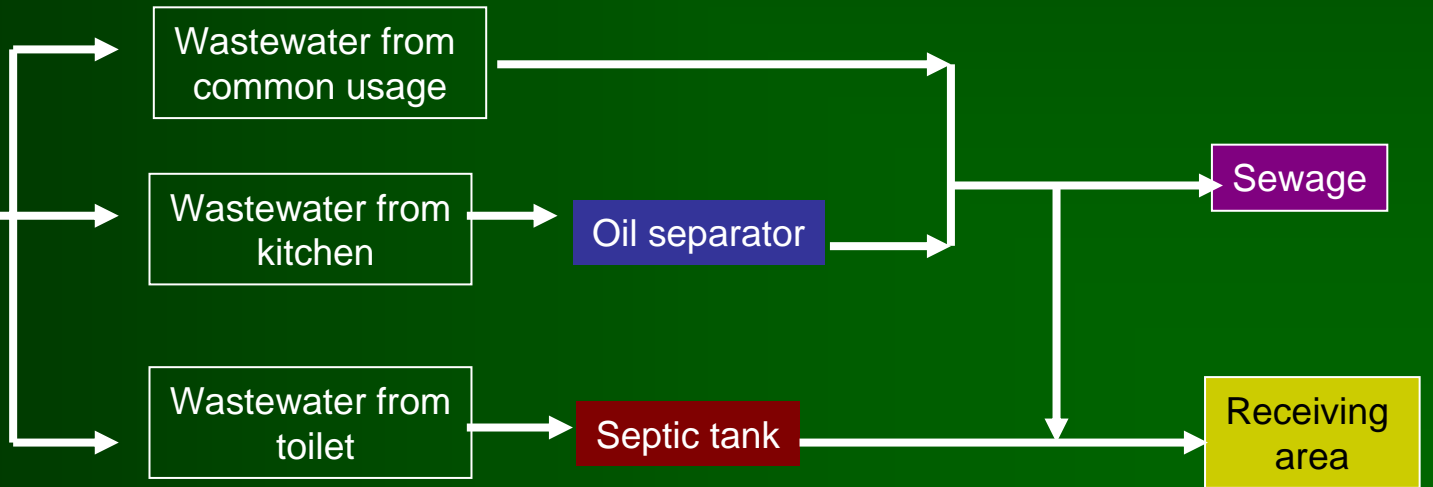
Source : OEPP 1995

On site Wastewater Treatment

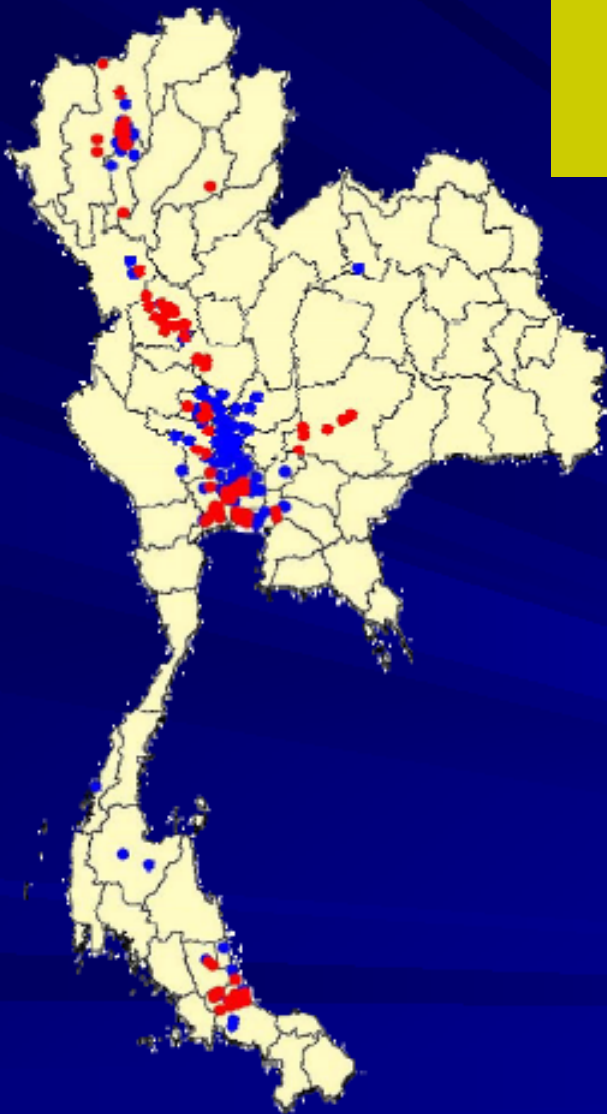
New household and building



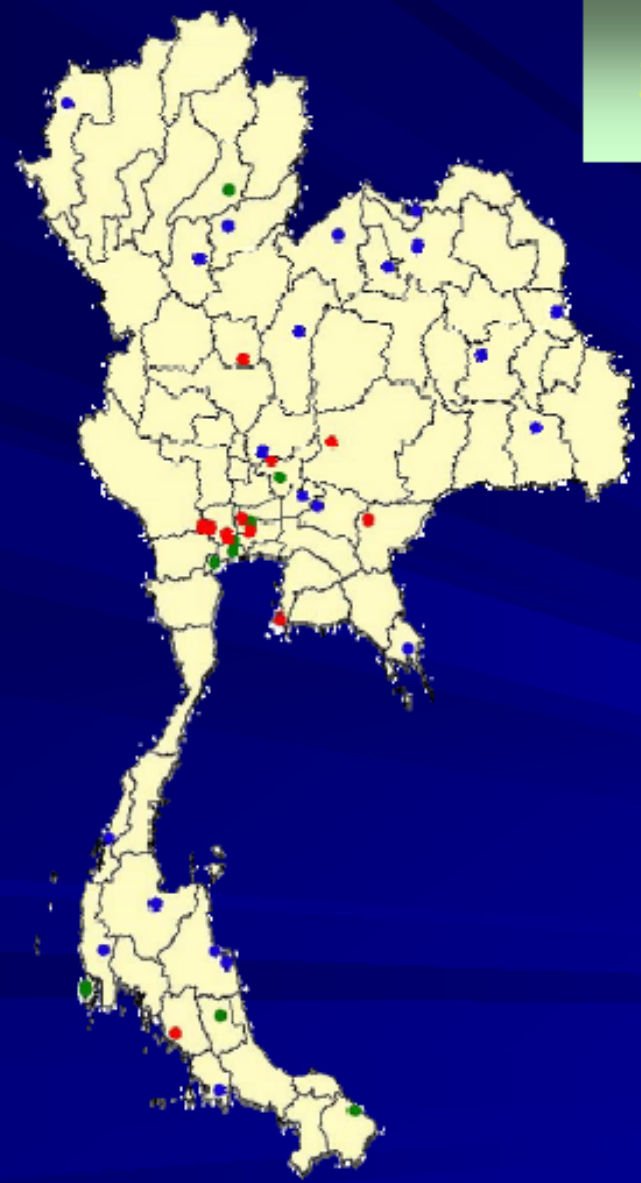
Old household and building



Wastewater Management



Small community :
Cluster treatment plant
to reduce sewage collection



Dense population area, tourist
Province and in area with poor
Water quality : Central treatment plant

Domestic Wastewater Treatment in Bangkok

Ongoing Wastewater Treatment Projects Status in 2002

Wastewater Treatment Project	Service Area (km ²)	Capacity (m ³ /day)	Status
1. Si Phraya	2.7	30,000	Operation
2. Rattanakosin	4.1	40,000	Operation
3. BMA-1	37.0	350,000	Under construction
4. Chongnonsi	28.5	200,000	Operation
5. Nong Khaem-Phasicharoen	44.0	157,000	Construction Completed,
Ratburana	42.0	65,000	Operation Test
6. BMA-4	33.4	150,000	Under construction
Total	191.7	992,000	

Source : Department of Drainage and Sewerage, BMA, 2002

Listing of the Future Wastewater Treatment Project

Wastewater Treatment Project	Service Area (km ²)	Capacity (m ³ /day)	Status
1. Thonburi	51	520,000	Preparation for the Feasibility Study
2. Phrakanong - Klong Toei	71	480,000	Completion of Feasibility Study
3. Nong Bon	55	125,000	Listed in the 5th BMD Plan
Total	177	1,125,000	

Source : Department of Drainage and Sewerage, BMA, 2001

Wastewater Central Treatment Plant in Thailand

<i>Location</i>	<i>Number of Plants</i>	<i>Status of treatment plants</i>				<i>Capacity (m³/day)</i>
		Under operation	Under Repair	Under Construction	Delay construction	
<i>Bangkok</i>	7	7	-	-	-	992,00
<i>Central region</i>	21	15	5	-	1	812,10
<i>Eastern region</i>	15	11	3	1	-	293,90
<i>Northern region</i>	17	9	5	3	-	236,08 8
<i>Northeastern region</i>	18	9	3	6	-	277,08 2
<i>Southern region</i>	17	8	4	5	-	358,32 0
<i>TOTAL</i>	95	59	20	15	-	2,969, 490

As of 2006 Data from BMA

Solid Waste Stream

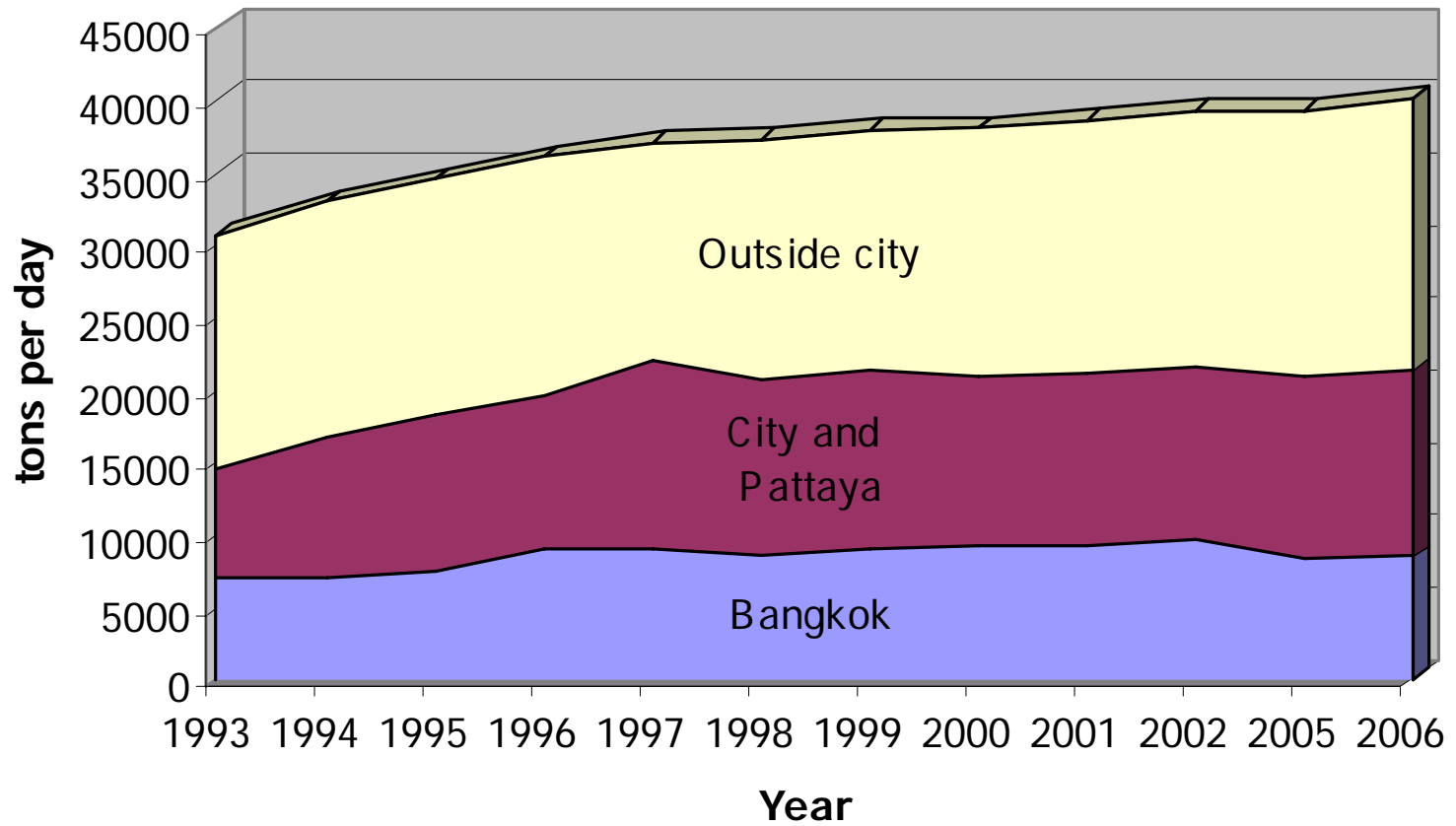
- Waste generation rate
- Waste composition
- Waste recycle



Waste generation and waste generation rate

Area	Population	Waste generation (tons/day)	Waste generation rate (kg/cap/day)
1 Bangkok	5,844,607	9,350	1.6
2. City and Pattaya	12,203,425	14,661	1.2
2.1 Central- Western region	3,585,595	4,650	1.3
2.2 Northern region	2,264,406	2,825	1.25
2.3 North-east region	3,239,281	3,134	0.97
2.4 Eastern region	1,246,151	1,901	1.53
2.4 Southern region	1,867,992	2,151	1.15
3. Outside City	44,871,653	17,930	0.4
	63,655,45	41,941	0.66

Waste generation in Thailand



Solid Waste 2005

Bangkok
8,340 (21%)

City and Pattaya
12,635 (32%)

Municipalities
18,295 (47%)



Recycle
3.1 Million tons
(22%)

Treat and Disposal
11.2 Million tons
(78%)

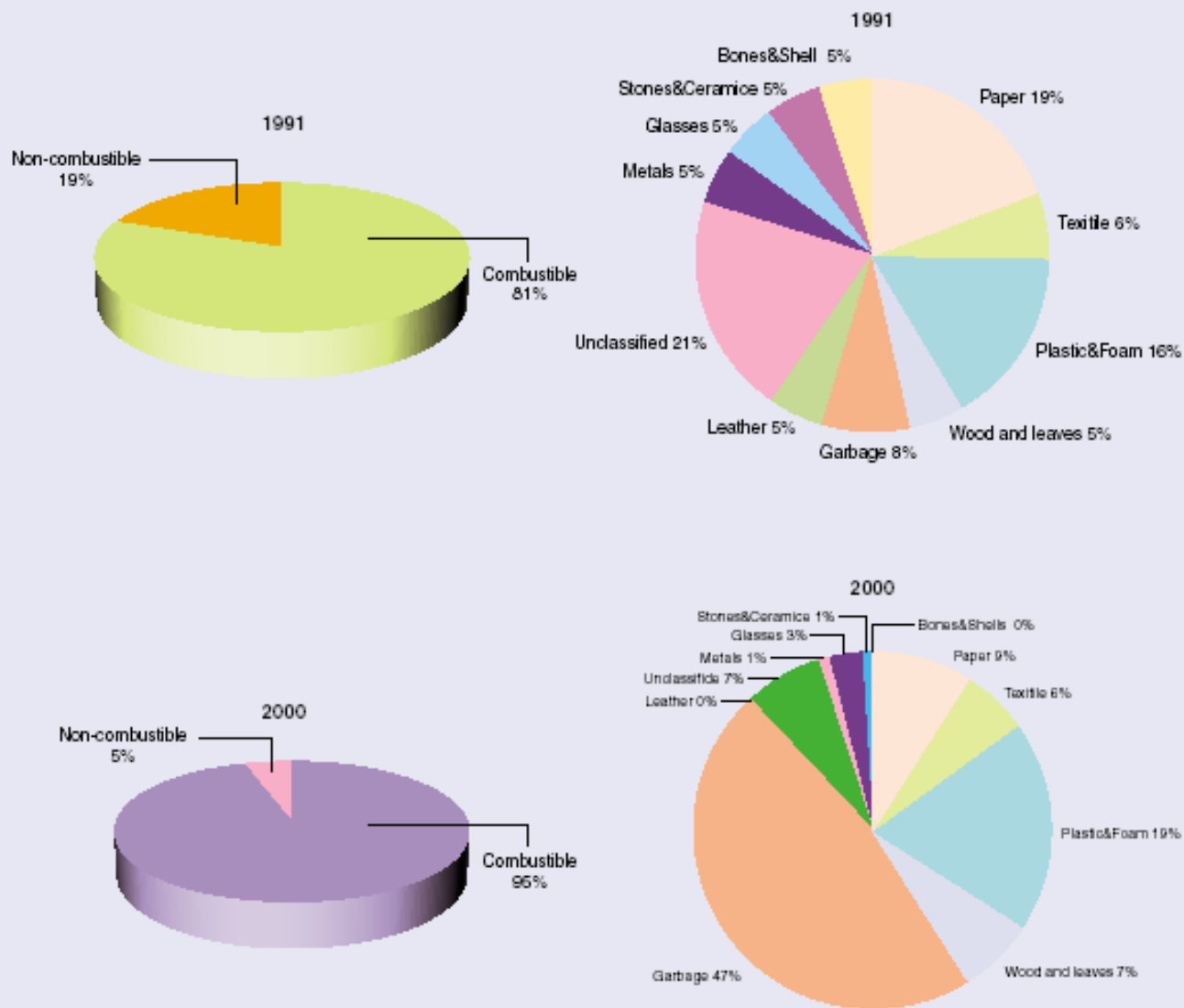
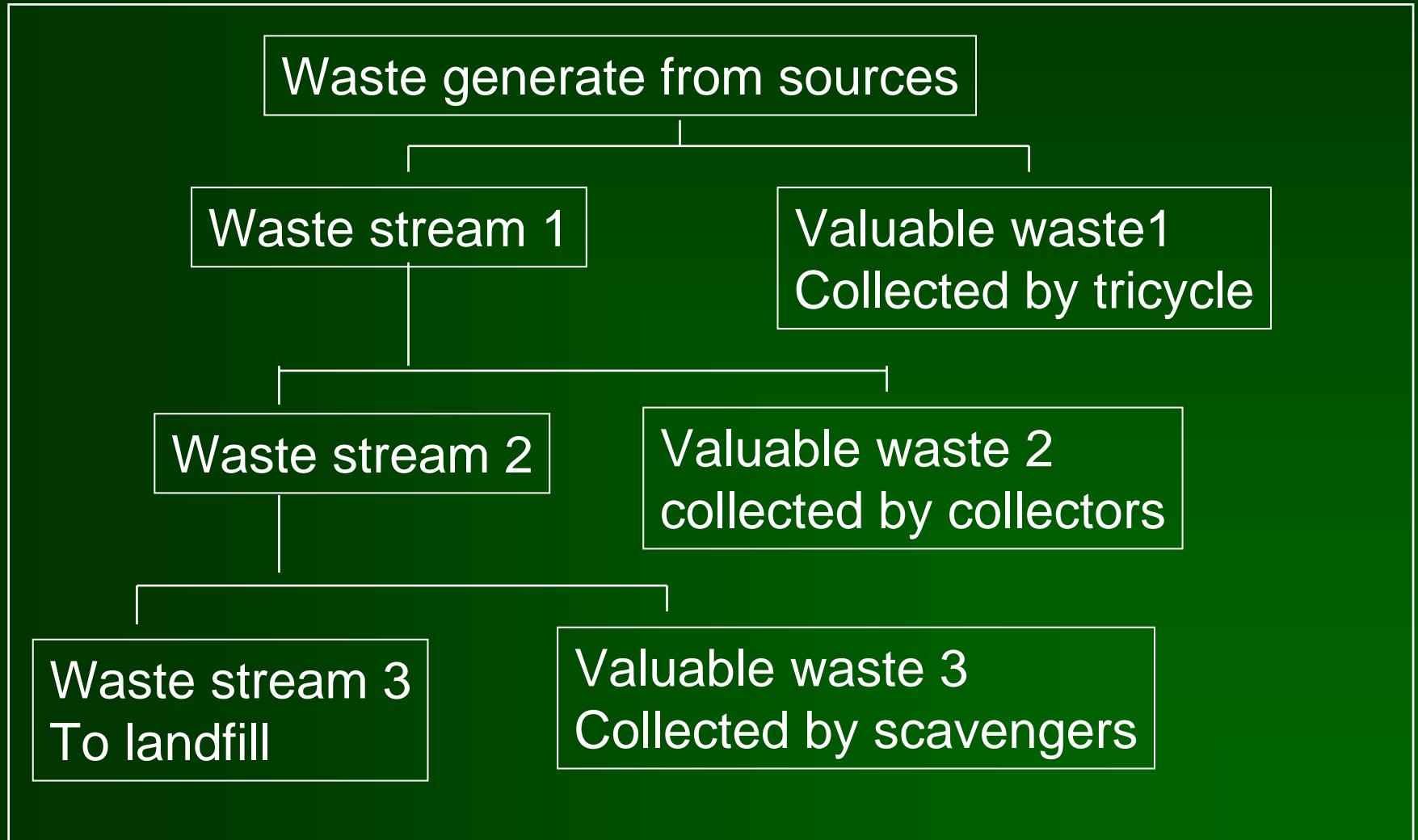
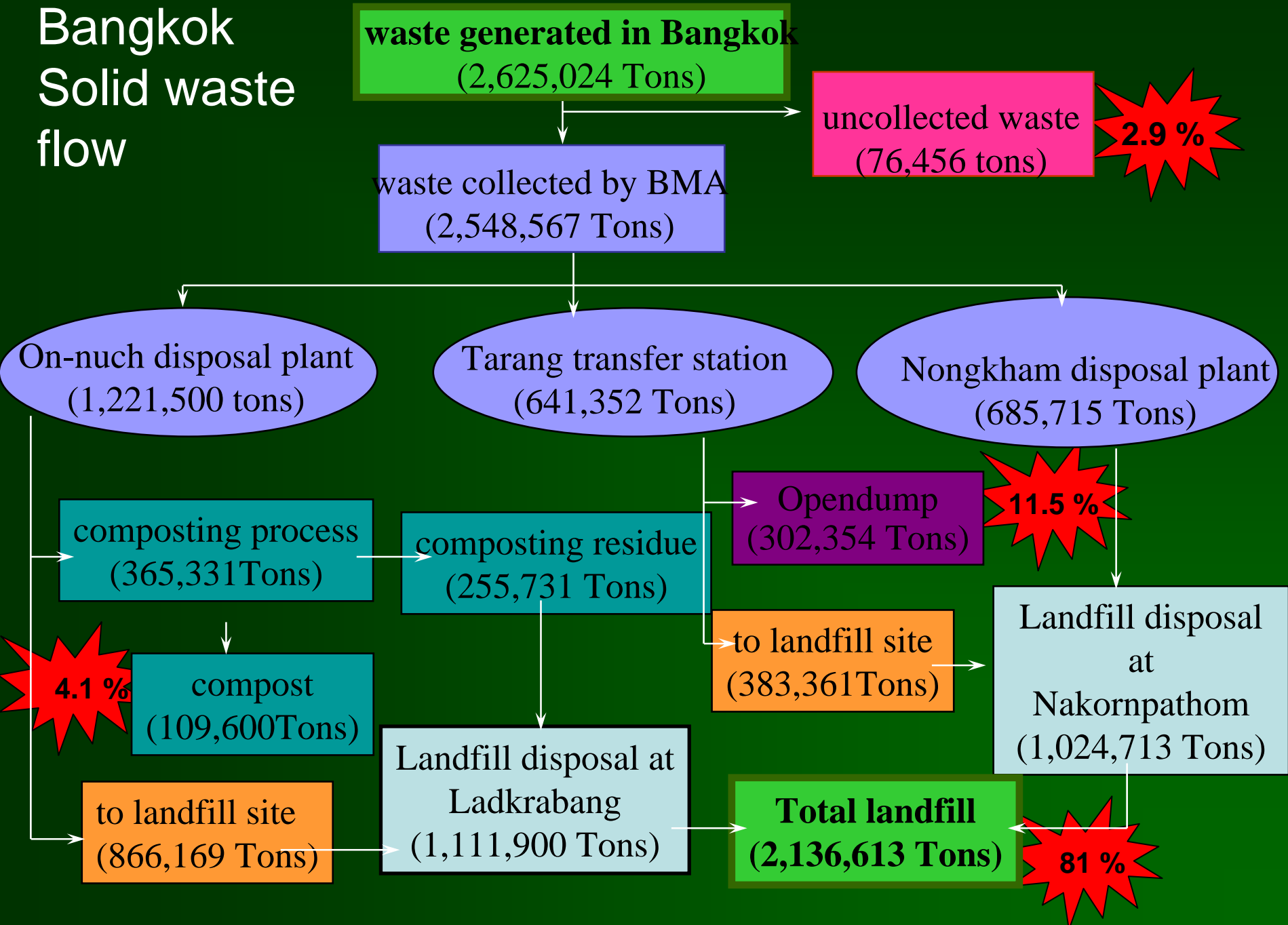


Figure 4.6 Type of Solid Waste composition 1991 and 2000
 (Source : Department of Public Cleansing, BMA,2000)

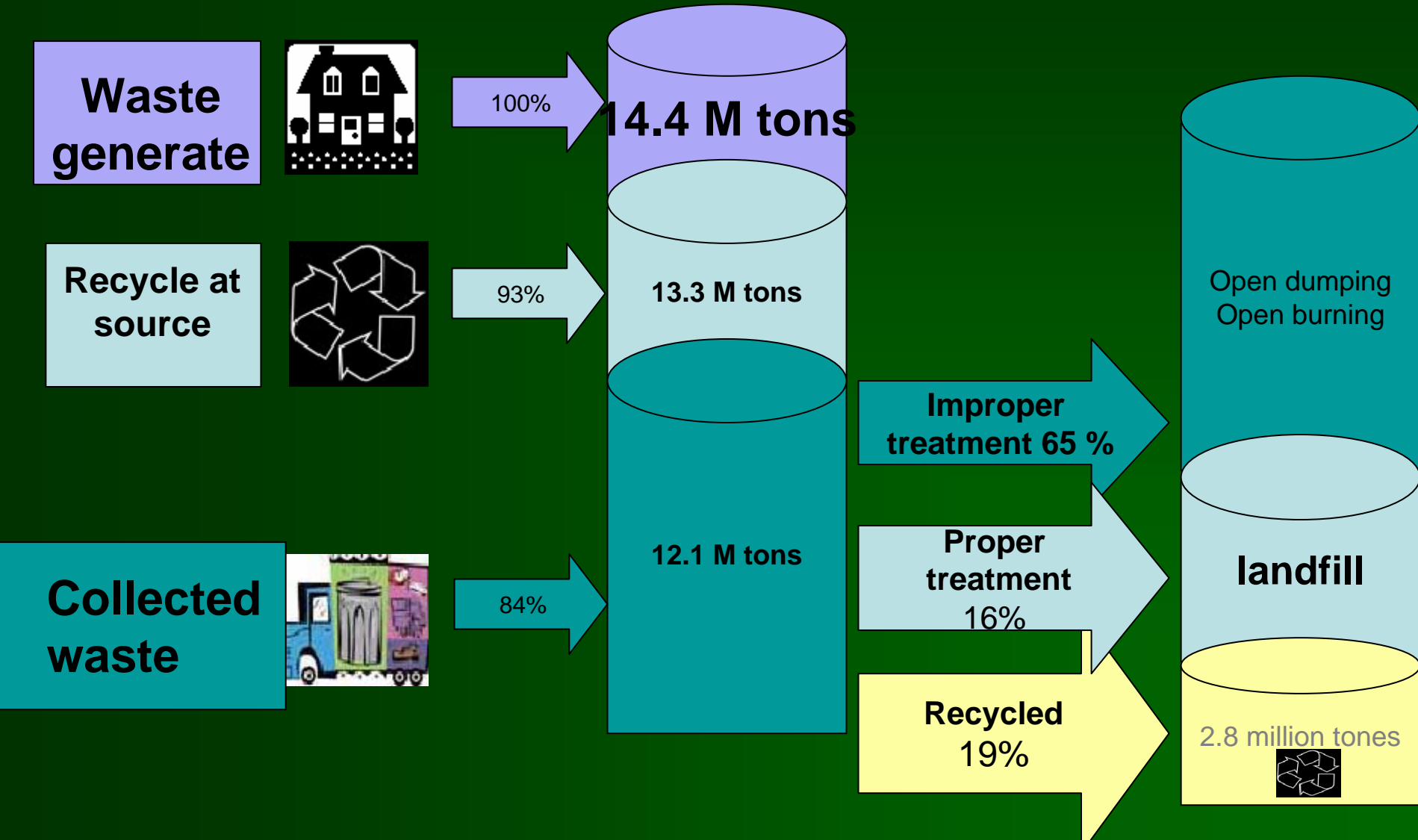
Current MSW flow

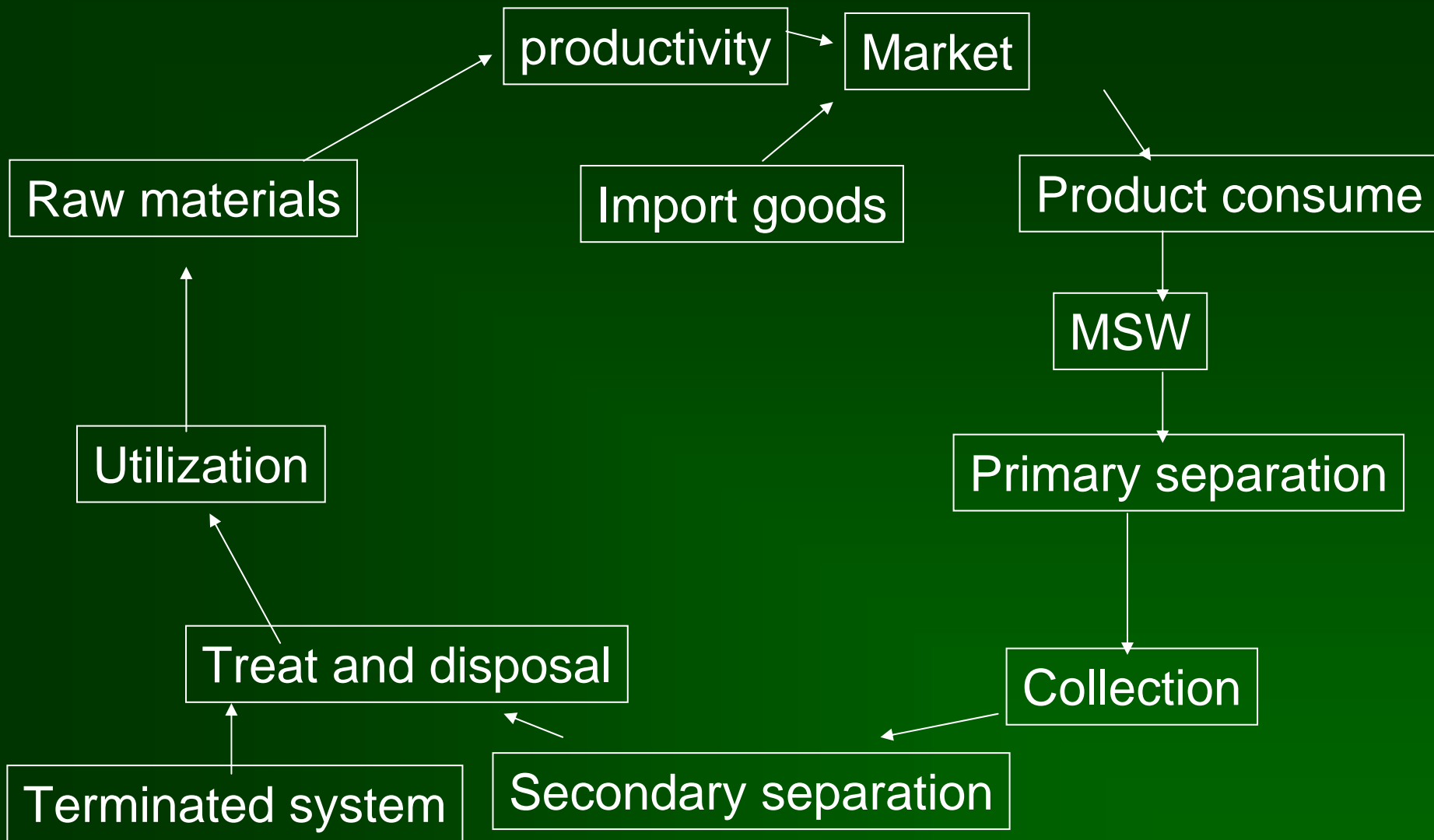


Bangkok Solid waste flow



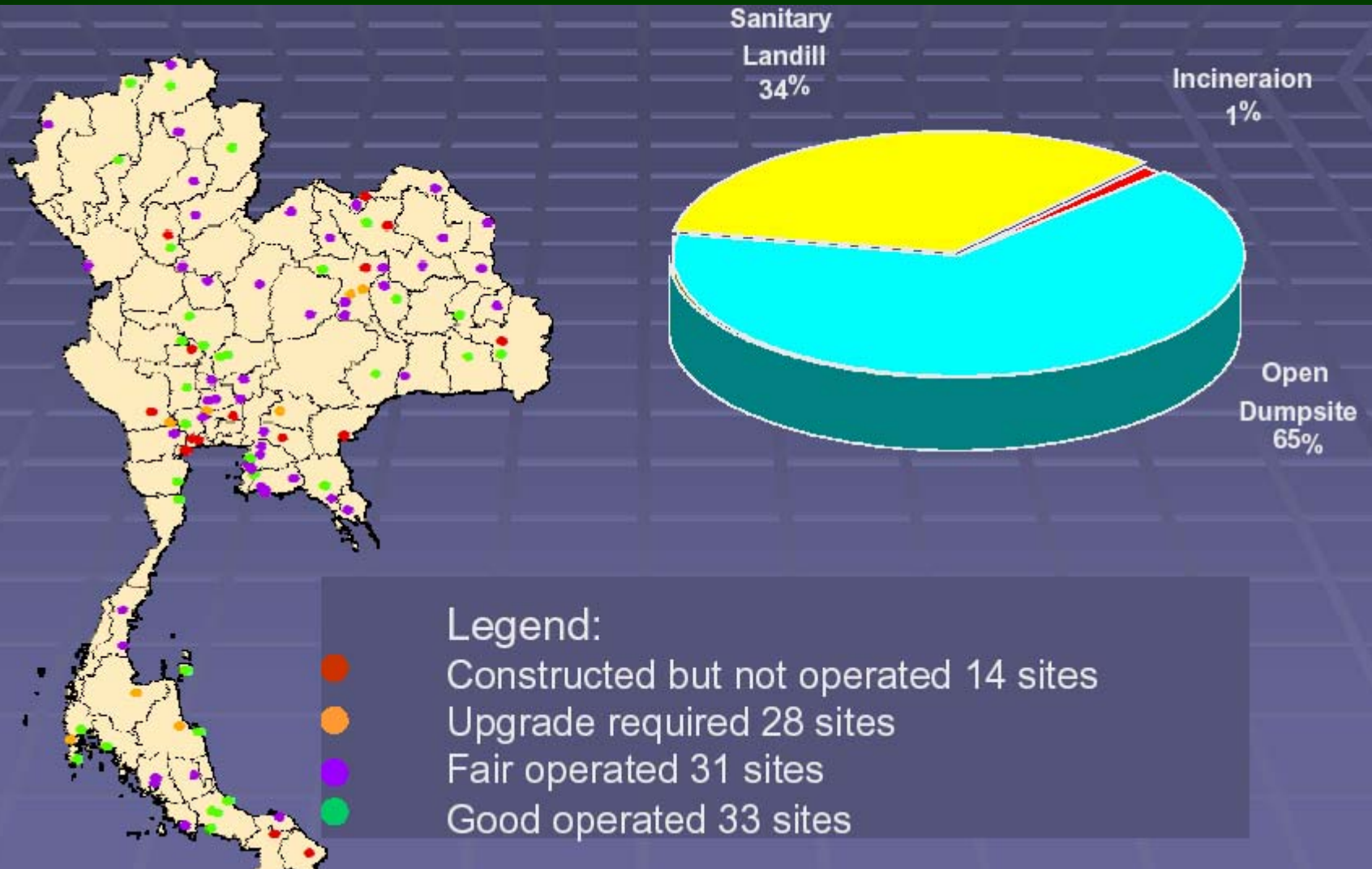
Waste management in city





National MSW management plan

Solid waste treatment in Thailand 2003



Treatment Technology

- Bangkok :
 - Landfill at Kamphangsai, Rachadhewa,
- City and Pattaya :
 - Sanitary landfill 104 sites,
 - Incinerators 3 sites,
 - Combined technology 10 sites

Waste to Energy

- Incineration :
 - Phuket 2.5 MW
- Landfill :
 - Kampangsan 870 kW
 - Rachadhewa 935 kW
- Anaerobic Digestion :
 - Rayong 625 kW
 - Chonburi 1MW



วิจิตรศิลป์
๑๕ มกราคม ๒๕๕๗

วิจิตรศิลป์

*Thank you for your attention
And
Sawasdee Ka*