

Second Workshop for the Finalization of City Waste Management Strategy and Action Plan

for

Mandalay

**in collaboration with
Mandalay City Development Committee (MCDC),**

**Ministry of Natural Resources and Environment Conservation (MONREC) of the
Government of Myanmar,**

**United Nations Environmental Programme (UNEP) and
Institute for Global Environmental Strategies (IGES)**

8 December, 2016, Mandalay City Development Committee



Reported

By

Environmental Quality Management (EQM) Co., Ltd

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ACRONYMS/ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of South East Asian Nations
BOT	Build –Operate- Transfer
CCET	IGES Centre Collaborating with UNEP on Environmental Technologies (CCET)
CDCs	City Development Committees
CSOs	Community Services Organizations
CSR	Corporate Social Responsibility
DISI	Directorate of Industrial Supervision and Inspection
ECD	Environmental Conservation Department
EQM	Environmental Quality Management
ESC	Environmentally Sustainable Cities
GAD	General Administrative Department
IGES	Institute for Global Environmental Strategies
INGOs	International Non-Government Organizations
JICA	Japan International Cooperation Agency
LECD	Local Environmental Conservation Department
MCDC	Mandalay City Development Committee
MDY	Mandalay
MOE	Ministry of Education
MONREC	Ministry of Natural Resources and Environmental Conservation
MRG	Mandalay Regional Government
MWAF	Myanmar Women Affairs Federation
NDC	Nay Pyi Taw Development Committee
NGOs	Non-Government Organizations
PET	Polyethylene terephthalate
PPP	Polluter Pays Principle
PPP Development	Pubic Private Partnership Development
RDF	Refuse Derived Fuel
UNEP	United Nations Environmental Programme
UASB	Up flow- Activated Sludge Blanket
USBOP	Urban Services Business Operation Plan
WB	World Bank
YCDC	Yangon City Development Committee

1.1 Background

Myanmar's Second Workshop on its City Waste Management Strategy and Action Plan was organized in collaboration with the Mandalay City Development Committee (MCDC), the Ministry of Natural Resources and Environment Conservation (MONREC) of the Government of Myanmar, with support from the United Nations Environmental Programme's International Environmental Technology Centre (UNEP-IETC) and Institute for Global Environmental Strategies (IGES) Centre Collaborating with UNEP on Environmental Technologies (IGES-CCET) and with the facilitation of local consultants from Environmental Quality Management (EQM).

Mandalay is not only Myanmar's second largest city but also a major trading and communications hub located in the central part of the country. The city's increasing population (1.6 million as of 2016), economic growth and rapid urbanization and industrialization have been accompanied by escalating challenges related to waste management. Institutional and infrastructural gaps, together with human and financial resource constraints are contributing to the insufficient management of waste and resulting in adverse environmental impacts. In this context, all waste related responsibilities are maintained by MCDC.

This workshop brought together national and local policy makers, public waste management providers and related stakeholders including industries, academic and civil society groups to discuss and provide technical inputs towards the finalization of a city-level waste management strategy as well as the identification of a future pilot project in Mandalay.

1.2 Planning meeting before the second workshop

In preparation for the workshop, consultation meetings were held with MCDC, IGES and EQM to discuss the organization and agenda for guiding city level dialogue on waste management.

1.2.1 The main outcomes of these meetings included:

- Development of program agenda for the second city level workshop
- Further understanding on how a holistic waste management approach can address multiple waste streams from different sectors, including market waste and domestic waste generated from railway and bus terminals.

1.3 Selection of target audience / participants, venues

A number of participants including the representatives of MCDC, as well as relevant stakeholders from industries, academic and civil society groups were invited to the second workshop. The workshop hosted a total of (35) local and (5) international participants. (Refer to Annex (I)).

1.4 Workshop methodology

1.4.1 Policy maker's presentation

(i) Mayor Dr Ye Lwin opening Speech

**Excellencies, Distinguished Guests, Ladies and Gentlemen,
Mingalarbar!**

- Wishing all attendees including Dr. Premakumara and Mr. Matthew from IGES, the officials from Kitakyushu City, Director U Ko Ko Aye and the officials from Mandalay Environmental Conservation Department, Mandalay City Development Committee, community leaders as well as CSO well-being and serenity.
- Mandalay's economy has progressively grown over time due both to expanding domestic trade within the country as well as with neighboring countries such as China and India
- Manufacturing and services in Mandalay are also growing and resulting in changing life styles and consumption patterns.
- At the same time, these developments are also contributing to environmental impacts including a rising generation of solid wastes, waste water, and air pollution.

MCDC is making an active effort to become a clean and green city, which includes a focus on waste management consistent with international standards and guidelines.

- For instance, MCDC is collaborating together with ADB in conducting a scenario analysis in preparation for developing a sustainable waste collection system. Further, MCDC is being involved in ASEAN ESC Model Cities Programme exchanging experiences with SoutheastAsian countries and as well as supporting the implementation of several initiatives.
- Since 2014, Kitakyushu City and MCDC have been cooperating on the promotion of environmental education with a particular emphasis on waste management. Accordingly, academic curricula has been prepared for basic education level working in collaboration with Myanmar's Ministry of Health.
- In early 2016, the first city waste management strategy workshop was held in Mandalay. Supported by UNEP-IETC and IGES, this workshop led to the drafting of a waste management strategy and action plan for Mandalay, outlining relevant objectives, targets and proposed activities. Today's meeting will discuss the current draft with a view to finalize the strategy and identify a corresponding pilot project.
- In conclusion, the Mayor encouraged participants to actively engage in workshop discussion and proceedings to assist Mandalay in realizing its vision of becoming a clean, green and sustainable city.

(ii) Welcome Message from Dr. Kumara, IGES-CCET

- Dr. Kumara repeated the Mayor's opening remarks that the aim of the workshop would be to discuss the current draft of the strategy and explore options for identifying a future pilot project for Mandalay.
- Dr. Kumara emphasized that the guiding principles of the waste management strategy would be applied to the selected pilot project as well.
- The strategy is holistic in nature, covering all wastes including solid, liquid and gaseous wastes.

- IGES and UNEP engaged in extensive consultations with MONREC, YCDC, MDCD and NCDC from the beginning of 2016 in support of developing both the national and city-level strategies.
- Similarly, a rapid assessment/quick study on waste management in Myanmar was undertaken and completed within March and June 2016.
- From 13-17 June, the first series of National and City-level workshops on for developing the strategies were delivered in Nay Pyi Taw and Mandalay, respectively.
- In September 2017, the first drafts of the strategies were completed and feedback was compiled from various stakeholders aimed at revising the strategies.
Informed by those comments, IGES-CCET developed the current drafts of national and city-level waste management strategies, aimed to be finalized within early 2017.

1.4.2 Participants' Presentations

Presentations by IGES focused on outlining the roadmap for development of Myanmar's national/city-level waste management strategies and action plans, as well as highlighting the country's main issues and challenges with regard to waste management, including: poor waste segregation practices, institutional overlaps with regard to the management of industrial wastes, issues in procuring the requisite land space for addressing domestic waste, and CDC challenges in securing necessary budget issue for waste management, among others.

Kitakyushu City, Japan shared information on the development of its current waste management system, dating from 1930 until the present, and focusing on the design of its master plan for pollution control, successful cooperation between government and the greater public as well as the implementation of waste to energy.

1.4.3 Group Discussions

Participants were divided into 2 groups to discuss solid waste management and waste water management issues respectively based on their field of interest.

Group discussions thus served as a participatory exercise aimed at reexamining the goals, actions, responsibility, time frame and budget decided upon in the first national and city waste management workshops towards the finalization of respective strategies and action plans.

1.4.4 Workshop materials /resources

- Presentations (please refer to Annex V)
- Moderators, facilitators and interpreter assisted in guiding group discussion
 - IGES personnel led the workshop as moderators
 - 4 facilitators experienced with waste management assisted the participants along with translation in Myanmar language

1.5 Main challenges identified and lessons learned

No significant challenges were identified that impeded the delivery of the workshop.

1.6 Discussion proceedings

During the workshop, current challenges with regard to solid and waste water waste management in Mandalay were reviewed and considered in line with the proposed action plan which also informed discussion on how to proceed the implementation of a city-level pilot project.

1.6.1 Group 1 discussion on solid waste management plan

U Min Aung Phyo (Cleansing Department, MCDC) led the group comprising U Ye Kyaw Swar (Cleansing Department, MCDC), U Ko Ko Aye (ECD, MDY), U Aung Kyaw San (Cleansing Department, MCDC), U Hla Win (Private sector), U Myint Htay (Merchant), Daw Thandar Phone Win (MWWAF), Daw Htar Htar Oo (MWWAF), Khin Zaw Win (EQM) and Dr. Twae Mu Mu Myint (EQM)

(i) Current situation of solid waste management

(ii) Waste generation and disposal

- At present, 95% of households possess dust bins of which contents are transported to temporary storage areas, by vehicles, carts and tricycles, etc..
- 5% of wastes are currently openly dumped in drains.
- 20% of previously-segregated wastes have been found to be dumped.
- 80% of non-segregated wastes are dumped.
- Group 1 identified that the greater public, entrepreneurs, MCDC, other public bodies and private medical clinics are responsible for the majority of Mandalay's generated waste. A reported 40% of participants in Group 1 indicated their satisfaction with current waste practices; options for improvement include promoting waste separation, recycling as well as carrying out public awareness-raising activities.

(a) Proposed activities

- Group 1 discussed the following proposed activities for reducing waste generation and disposal:
 - Supporting awareness-raising through public announcements
 - Promoting the free distribution of separate coloured waste bags to encourage waste segregation, and conducting monitoring in collaboration MCDC, NGOs and other concerned stakeholders (in pilot project area)
 - Encouraging the separation of two types of wastes: wet (kitchen) and dry
 - Extending neighbouring township or ward to better organize waste management processes
 - Ensuring waste management rules and regulations are strictly enforced
 - Provision of the coloured bags free during the project period and public will have to buy themselves after the pilot project
 - Conducting education and awareness-raising at the household level
 - Establishing a Waste Management Committee in selected wards within the designated pilot area

(b) Responsible stakeholders:

- Responsible stakeholders for these activities include:

Ward Waste Management Committees

Township Administrative Offices

- Ward Administrative Office
- Volunteers
- NGOs, CSO, MAAF
- MCDC
- Public Health Department
- Education Department

(c) Proposed budget

- Proposed budget for these activities would be sourced from the following:–
 - Regional Budget
 - Private sector CSR budgets (mandated by law) from local and foreign ventures
 - Fines/penalties for those who do not comply after a one-month trial period

(iii) Collection/Transport

- MCDC currently collects and transports 70% of household waste, 20% of commercial waste and 10% of other waste, respectively
- With regard to industrial waste, MCDC collects upwards of 60% with the remaining 40% being collected by the industries themselves
- In terms of medical waste, MCDC collects an estimated 50%; wastes from small medical clinics are currently not covered by MCDC; responsible stakeholders involved in managing these wastes include MCDC, the private sector, members of the general public, entrepreneurs as well as the private clinics themselves.

Only 40% of participants in Group 1 are satisfied with the waste collection rate; discussion on how to improve waste collection focused on increasing the number of vehicles (particularly compactors), promoting human resources as well as upgrading available technology

(a) Proposed activities for collection/transport:

- Establishing a regularly-scheduled collection system for wet waste and dry waste, (i.e., daily collection for wet waste and twice weekly for dry waste)
- Upgrading collection and transport vehicles (compactor trucks)
- Promoting door-to-door collection but also designating secondary waste collection points
- Encouraging involvement of the private sector
- Supporting public participation in waste management

(b) Responsible stakeholders:

- MCDC
- Ward Waste Management Committee
- Private waste collectors for dry waste

(c) Proposed budget:

- Regional budget would be utilized to support the abovementioned activities

(iv) Recycling

- At present, household wastes are recycled both formally and informally.
- There currently is no recycling or treatment of industrial and medical wastes.
- Responsible stakeholders for recycling include the general public, the private sector, MCDG, and other relevant government agencies.
- Participants in Group 1 indicated zero levels of satisfaction with the current status of recycling; discussion focused on opportunities to raise awareness on the importance of source segregation of waste, the need to identify available budget support, acquiring the necessary land and technology for recycling activities, and the role of monitoring in carrying out such activities.

(a) Proposed activities:

- Mandating waste segregation among factories both for dry wastes such as recyclables (paper, plastic, tin/can, PET, glass) and prospectively non-recyclables targeted for RDF
- Establishing community-based composting facilities for wet waste
- Utilizing recycled glass for road construction

(b) Responsible stakeholders:

- MCDG
- Private waste collectors for dry waste
- Volunteers/NGOs/ CSOs/MWAF

(c) Proposed budget:

- Regional budget
- Fines/penalties
- Budget from tender of recyclable materials

(v) Final Disposal

Household and industrial wastes

- At present, household and industrial wastes are openly landfill
- There is no onsite leachate treatment at resulting in bad odour, air pollution and underground water pollution
- Medical wastes are incinerated at local cemetery.
- Responsible stakeholders for final disposal include the general public, the private sector, MCDG, and other relevant government agencies.

(a) Proposed activities:

- Establishing public composting facilities for wet waste
- Establishing a controlled landfill

(b) Responsible agencies:

- MCDG

(c) Proposed budget:

- Regional budget

(vi) General discussion on future pilot project:

Participants discussed the design of a waste management pilot project in Mandalay with a duration of at least one year. During this period, regular consultations will be held aimed at monitoring progress and addressing challenges.

1.6.2 Group 2 discussions on water and wastewater management plan

U Khin Maung Thin (Water and Sanitation Department, MCDC), U Than Htut (Cleansing Department, MCDC), U Min Thein (ECD, Mandalay), Daw Myat Myat Phwe (GAD- Chan Aye Thar San), Daw Aye Myat Khaing (Water and Sanitation Department, MCDC), Daw Aye Mya Shwe (Household Leader) , U Zaw Min Thant (Water and Sanitation Department, MCDC), Dr. Myat Lay Nwe (Chemistry Department, Mandalay University), U Soe Maung Hla (Water and Sanitation Department, MCDC), U Htay Win (GAD – Aung Myay Thar San), Phyo Thet Khaing (EQM) and Thiha Htut (EQM)

(i) Current situation of wastewater management

At present, MCDC differentiates between two types of wastewater: domestic wastewater and industrial wastewater. Domestic wastewater comprises both gray water and black water.

(ii) Generation and Disposal

Domestic waste water

MCDC estimates that the volume domestic wastewater currently being produced per day comprises 35-55 gal/per cap/day. There are a number of challenges related to wastewater management, including

- No proper flow due to clogged drains
- Poor drainage system design
- Blockages resulting from discharge of solid waste into drainage systems
- Infrequent maintenance of wastewater systems
- Lack of public participation
- Absence of relevant laws and regulations

Industrial Waste Water

With regard to the management of industrial wastewater, challenges include:

- No available data for industrial waste production
- Insufficient land area designated for wastewater treatment by industry owners
- Complaint of owners due to their lack of sufficient budget among industries for installing pre-treatment systems
- Lack of knowledge about best available practices with regard to wastewater treatment
- Poor compliance with laws, rules, regulations and ordinances Participants in Group 2 expressed zero percent satisfaction with how wastewater is currently being managed in Mandalay.

(a) Proposed activities

Domestic Wastewater

In order to address the domestic wastewater issues highlighted above, particularly with regard to public drainage the proposed action plan will emphasize the following interventions:

- Developing a topographic map of the city drainage system
- Preparing a proposed schematic for an upgraded drainage network
- Installing a sewer pipeline and drainage system
- Procuring vacuum truck
- Constructing an appropriate wastewater treatment and collection system Regularly monitoring environmental water quality

Potential funding sources for supporting the implementation of this action plan include:

- International donor funding (JICA, ADB, World Bank)
- State Budget
- Public Private Partnerships
- Fines/levies
- Urban Services Business Operation Plans (USBOPs), supported by UN-Habitat, designed with a view to mobilize donor funding

Industrial Wastewater

Currently, MCDC is working on addressing issues related to industrial wastewater management. Business entrepreneurs, factory owners, Mandalay's local ECD office and Industrial Zone Committees are cooperating in this effort.

With regard to issues concerning industrial wastewater, Group 2 proposed a number of interventions, listed as follows:

- Mandating the construction of pre-treatment systems for every industry
- Constructing a centralized industrial waste water treatment plant with connection to the city's existing pipeline system
- Improving management of generated wastewater volume capacity
- Ensuring only treated wastewater is released into existing water bodies Encouraging compliance with existing laws, by-laws and regulations
- Regularly monitoring environmental water quality levels

(b) Responsible stakeholders

Group 2 indicated that responsible stakeholders include CDCs, as well as local ECD offices. Public participation is also required for effective management of domestic wastewater issues.

In terms of the management of industrial wastewater, MCDC and LECD have reported to face difficulties in the past with regard to addressing the generation and disposal of effluents.

Group 2 indicated that the primary concerned stakeholders involved in addressing wastewater issue include MRG as well as MCDC, LECD, and DISI. Development partners also make up an important stakeholder in this process.

(c) Budget

Proposed sources of financing for implementing this action plan would include the following:

- Public Private Partnerships
- Fines/levies
- MCDC budget

(iii) Collection and Transport

(a) Proposed activities

Group 2 identified 2 different methods for the collection and transport of domestic wastewater:

- Vacuum truck collection for sewage
- Gravity flow from collector drain and main drain to final water body (i.e., grey water)

MCDC serves as the main organizing body supervising the collection and transport of domestic wastewater, of which 80% of the wastewater is managed via the conventional method.

Conversely, as much as 100% of industrial wastewater is untreated. Current collection and transport methods emphasize the following:

- 10 inch main disposal pipeline connecting different industries
- Final disposal site is Dokehtawaddy River for wastewater

Group 2 participants commented that the current collection and transport of domestic wastewater meets an adequate standard; rather, MCDC is facing enormous challenges with the management of industrial wastewater.

(b) Responsible stakeholders

Currently, MRG and MCDC are primarily involved in addressing industrial waste management issues with, cooperation from local ECD offices and the General Administration Department.

(iv) Recycling

At present, Mandalay City does not carry out treatment or recycling of domestic wastewater.

In terms of industrial wastewater, Group 2 indicated that some industries make use of recycling systems, but these are often low cost and conducted in a haphazard way. Most industries do not conduct high volume wastewater treatment. The group also shared that a private company (Hydrotek Supreme Mandalay) has been contracted through a Build, Operate and Transfer scheme to construct Mandalay's first industrial wastewater treatment plant.

Participants in Group 2 also noted the following:

- An oxidation pond exists in Kyar Ni Kan with an annual capacity of 5000m³.
- Approximately 76 factories in Mandalay are currently discharging industrial waste water, largely using low-cost treatment methods.

Taking these issues into account, Group 2 expressed a low satisfaction level with regard to the recycling/treatment of industrial wastewater,

Thus, these are low satisfaction level.

(a) Proposed activities

Addressing both grey water and black water the proposed action plan would comprise the following:

- Installing UASB (Up flow- Activated Sludge Blanket)
- Reusing treated wastewater in the agriculture Sector

(b) Responsible stakeholders

Primary concerned stakeholders include:

- MRG (Focal Point)
- MDCD (Partnership)
- LECD (Partnership)
- Contractor (Partnership)

(c) Budget

Potential financial sources to support for implementing action plans are

- International donor funding (JICA, World Bank)
- ADB Loan (Group 2 noted that a recently-approved ADB loan would fund 25% of the cost associated with establishing a collection and treatment system in Mandalay)

Potential additional sources of finance to support the implementation of action plans include:

- Public Private Partnerships
- Self-financing from industries

(v) Final disposal

With regard to the final disposal of domestic wastewater, Group 2 communicated that there are two types of approaches currently being utilized:

- Oxidation pond for sewage
- Discharge of grey water into existing water bodies

MDCD serves as the main organizing body supervising the disposal of domestic wastewater, of which 60% is managed via the conventional method.

In terms of industrial wastewater, the final disposal site is the Dokahtawaddy River, of which MRG, MDCD and LECD are chiefly responsible for managing. Accordingly, Group 2 indicated a low satisfaction level with current arrangements.

(a) Proposed activities

Domestic wastewater

Group 2 proposed that domestic wastewater would be directed towards the following purposes:

- Discharging into neighboring water bodies (Ayeyarwaddy, Dokehtawaddy, Taungthaman Lakes)
- Utilizing the wastewater for gardening/urban landscaping

Industrial wastewater

Group 2 also indicated that industrial wastewater should be discharged in the following water bodies:

- Dokehtawaddy River
- Taung Inn Myauk Inn Creek

(b) Responsible agencies

Focal institutions and partnerships institutions include:

- MRG
- MCDC
- LECD
- Private contractor

(c) Budget

Proposed sources of financing for implementing this action plan would include the following:

- International donor funding (JICA, ADB, World Bank)
- State Budget
- Public Private Partnerships
- Self-financing from industries

Annex (I)

Lists of Participants

No	Name	Position	Department	Contact
Group (1) Solid Waste Management				
1.	U Ko Ko Aye	Director	ECD, MDY	09-5164015
2.	U Min Aung Phyo	Staff Officer	Cleansing Department, MCDC	09-91037885
3.	U Aung Kyaw San	Inspector	Cleansing Department, MCDC	09-256027878
4.	U Ye Kyaw Swar	Staff Officer	Cleansing Department, MCDC	09-2016839
5.	U Hla Win		Private Sector	09-2025338
6.	U Myint Htay		Merchant	09-796800200
7.	Daw Thandar Phone Win	Secretary	MWAF	09-444017171
8.	Daw Htar Htar Oo	Team Leader	MWAF	
9.	Khin Zaw Win	Associate Environmental Consultant	EQM	09-791115231
10.	Dr. Twae Mu Mu Myint	Socio-Eco Team Leader	EQM	-
Group (2) Water and Wastewater Management				
1	U Khin Maung Thin	Assistant Director	Water and Sanitation Department, MCDC	09-780743117
2	U Than Htut	Assistant Director	Cleansing Department, MCDC	09-43160683
3	U Min Thein	Deputy Director	ECD, Mandalay	myanmarseal@gmail.com 09-971114080
4	Daw Myat Myat Phwe	Deputy Staff Officer	GAD- Chan Aye Thar San	09-797100853
5	Daw Aye Myat Khaing	Mechanical Engineering	Water and Sanitation Department, MCDC	09-799765456
6	Daw Aye Mya Shwe	Household Leader	-	09-445963299
7	U Zin Min Thant	Staff-Assistant Engineer	Water and Sanitation Department, MCDC	zinminthant79@gmail.com 09-2013960
8	Dr. Myat Lay New	Lectures	Chemistry	MIInwe2008.mn@gmail.com

			Department, Mandalay University	
9	U Soe Maung Hla	Assistant Engineer	Water and Sanitation Department, MCDC	09-2018927
10	U Htay Win	Staff Officer	GAD – Aung Myay Thar San	09-797218492
11	Daw Phyo Thet Khaing	Associate Environmental Consultant	EQM	jujuenge@gmail.com 09-771170477
12	U Thiha Htut	Environmental Technician	EQM	thihahtut20@gmail.com 09-798292927

Annex (II)

Final program

Second Workshop on the finalization of City Waste Management Strategy and Action Plan in Mandalay

Mandalay City Development Committee (MCDC)

Ministries of Natural Resources and Environmental Conservations/ Environmental Conservation Department

UNEP

IGES Team

Participants from different ministries /City Development Committees/Institutes and NGOs
Environmental Quality Management Co. Ltd Team members

Date: 8 December, 2016

Venue: MCDC Conference Hall (Mandalay)

Targets:

- Assessing the existing situation of waste management system in Mandalay particularly in satisfaction, proposed action activities, responsible agencies as well as budget issues of the different stages composed in the system
- Finding out the ways how to proceed the development of the pilot project plan in Mandalay
- To establish the necessary monitoring and feedback mechanisms for periodically reviewing the strategy and action plan by the responsible authorities.

Programme for the city workshop in Mandalay, 8 December 2016

In the workshop, it has been discussed about the issue on current situation of waste issue in Mandalay. Besides, it has been focused on group discussion and it was organized into two groups including discussion group for solid waste management and discussion group for liquid waste management from the various sectors.

Day 1, 8 December 2016

Section (1) Opening Ceremony

Date and Time	Topics	Presenter
9:00-9:30	Opening Speech	Dr. Ye Thwin, Mayor, Mandalay City Development Committee
9:30: 9:45	Greeting Message	Dr. D.G.J.Premakumara, Senior Researcher the Institute for Global Environmental Strategies (IGES) – Centre Collaborating with UNEP on Environmental Technologies (IGES-

		CCET)
9:45-10:00	Group photo	
10:00 – 10:15	Refreshment Tea Break	
10:15- 10:45	Presentation of the roadmap of the City Waste Management Strategies	Mr. Matthew Hengesbugh, Policy Researcher, IGES
10:45- 11:00	Information of the current waste management situation of Myanmar	Dr. D.G.J.Premakumara
11:00-11:15	Information of the Kitakyushu city's waste management progress history of sharing	Kitakyushu City
11:15-11:30	Guidelines for the discussion	Dr. D.G.J.Premakumara
11:30-12:30	Group Discussion on Solid waste and Liquid waste	
12:30-12:45	Group Discussion Presentation Group 1, Solid Waste	U Min Aung Phyo Cleansing Department, MCDC
12:45-1:00	Group 2 Liquid Waste	U Khin Mg Thin Water and Sanitation Department, MCDC
1:00 -2:00	Lunch Break	
2:00- 2:10	Explanation for discussion on activities, responsible agencies/persons, budget	Dr. D.G.J.Premakumara
2:10-3:30	Discussion on Solid waste and Liquid waste	
3:30- 3:45-	Group Discussion Presentation Group 1, Solid Waste	U Min Aung Phyo Cleansing Department, MCDC
3:45- 4:10	Group 2 Liquid Waste	U Khin Mg Thin Water and Sanitation Department, MCDC
4:10-5:00-	General Discussion/ Questions and Answers	
5:00 pm	Ending the workshop	

Annex (III)

Photos



Figure 1. Welcome Speech by HE.Dr.Ye Lwin, Mayor of Mandalay City



Figure 2. Getting Message by Dr.D.G.J.Premakumara, IGES)



Figure 3 Group photo



Figure 4. Presentation of the Roadmap of waste management strategy by Mr.Mathew Hengesbugh



Figure 5. Group (1) Discussion on solid waste management issues of Mandalay City



Figure 6. Group (2) Discussion on liquid waste management issues of Mandalay City

Annex (IV) (Attached)

Workshop presentation materials

City Waste Management Strategy and Action Plan for Mandalay

Draft for Discussion
05 December 2016



Structure of the Strategy



Waste Management Strategy and Action Plan for Mandalay

(Revised Draft)

October 2016



Presentation of the Strategy

- Vision Statement

- *Mandalay will be a Clean, Green, and Healthy City in Myanmar, where culture and environment are preserved for future generations.*



- Mission Statement

- *To reduce solid waste generation and manage residual waste materials in a way which maximises opportunities for resource recovery, while protecting public health and the environment to achieve a zero waste society.*



- Guiding Principles

- **Waste Hierarchy** (This consists 3Rs including Reduce - reduce waste that must be generated and which goes to the landfill (this includes composting), Reuse - repair goods that can be repaired, or find alternative uses for wastes, Recycle - return wastes with recoverable value for re-processing).
- **Resource conservation** (Promoting the most efficient use of resources, including resource recovery and waste avoidance).
- **Polluter-pays Principle** (A principle that holds that those responsible for causing pollution or generating solid waste should pay the cost for dealing with the pollution, or managing the solid waste (collection and disposal) in order to maintain ecological health and diversity).
- **Precautionary Principle** (Principle that dictates that a lack of scientific data/information certainty should not be used as a reason for not acting to prevent serious or irreversible environmental damage or degradation).
- **Proximity Principle** (A principle that maintains that waste should be dealt with as close to the source of generation as possible. This reduces transportation costs, and also reduces risks of contamination of the environment during transport).
- **Consultation Principle** (A principle that conveys the importance of all levels of Government consulting and working with people and organizations throughout the development and implementation of waste management strategies and action plans).
- **Shared responsibility** (In this context, zero waste is a shared responsibility and requires partnerships and collaborations between all sectors of government, industry, research institutions, NGO's, and the general community)

Setting Goals, Targets, Objectives and Actions

This City Waste Management Strategy has identified the following major goals:

- Goal A – Maximise municipal solid waste collection and the 3Rs (Reduce, Reuse and Recycling) in the city
- Goal B – Improve final treatment and disposal system in the city
- Goal C – Maximise proper collection and disposal of industrial and hazardous (medical) waste
- Goal D – Maximise proper disposal and treatment of wastewater
- Goal E: Capacity development, awareness raising and advocacy
- Goal F - Ensure sustainable services through review, monitoring, innovation and improvement

Goal A – Maximise municipal solid waste collection and the 3Rs (Reduce, Reuse and Recycling) in the city



Objectives:

- A.1: Provide effective and efficient municipal waste collection services
- A.2: Introduce waste separation at source
- A.3: Integrate private and informal sectors as partners in the delivery of sustainable waste management
- A.4: Improve infrastructure for waste collection, storage, transfer and transport

Short-term (2017 – 2020)	Middle-term (2021 – 2025)	Long-term (2026 – 2030)
<ul style="list-style-type: none">• Increased municipal waste collection coverage (80% of the whole city)	<ul style="list-style-type: none">• Increased municipal waste collection coverage (90% of the whole city)	<ul style="list-style-type: none">• Increased municipal waste collection coverage (100% of the whole city)
<ul style="list-style-type: none">• Established waste separation at source (1 or 2 model township)	<ul style="list-style-type: none">• Increased waste separation at source (3 townships or 50% of the total townships)	<ul style="list-style-type: none">• Increased waste separation at source (all townships in the city)
<ul style="list-style-type: none">• Increased material recovery and recycling (25% of recyclable materials)	<ul style="list-style-type: none">• Increased material recovery and recycling (50%, including 25% recyclable materials, 15% of food waste and 10% industrial and other waste)	<ul style="list-style-type: none">• Increased material recovery and recycling (80%, including 25% recyclable materials, 35% of food waste and 20% industrial and other waste)

Goal B – Improve final treatment and disposal system in the city



Objectives

- B.1: Reduce organic waste (food waste) sent to landfill
- B.2: Increase recovery of additional material at landfill for RDF
- B.3: Examine potential of waste to energy (W2E) technologies such as incinerator and landfill gas capture
- B.4: Establish a new sanitary landfill meeting engineering standards for final disposal
- B.5: Establish mechanisms to discontinue the operation of illegal dumping sites in the city

Short-term (2017 – 2020)	Middle-term (2021 – 2025)	Long-term (2026 – 2030)
<ul style="list-style-type: none"> • Reduction of illegal dumpsites in the city (50%) 	<ul style="list-style-type: none"> • Reduction of illegal dumpsites in the city (75%) 	<ul style="list-style-type: none"> • Reduction of illegal dumpsites in the city (100%)
<ul style="list-style-type: none"> • Immediate improvements to the operation of existing landfills 	<ul style="list-style-type: none"> • Establishment of sanitary landfill site with minimum requirements in place to protect the environment 	<ul style="list-style-type: none"> • Full operation of the sanitary landfill
	<ul style="list-style-type: none"> • Reduction of food waste (market waste) sent to landfill (15%) 	<ul style="list-style-type: none"> • Imposed ban on food waste (market waste) sent to landfill (100%)
		<ul style="list-style-type: none"> • Introduction of viable technologies such as bio digesters, refuse derived fuel (RDF) and waste-to-energy (W2E) technologies aimed

Goal C – Maximise proper collection and disposal of industrial and hazardous (medical) waste



Objectives

- C.1: Reduce industrial and hazardous waste generation and landfill
- C.2: Implement source segregation and collection systems
- C.3: Promote effective recycling, treatment and final disposal and the introduction of selected technologies

Short-term (2017 – 2020)	Middle-term (2021 – 2025)	Long-term (2026 – 2030)
<ul style="list-style-type: none">• Reduction of industrial waste sent to landfill (25%)	<ul style="list-style-type: none">• Reduction of industrial waste sent to landfill (50%)	<ul style="list-style-type: none">• Ban on industrial and hazardous (medical) waste sent to the landfill (100%)
<ul style="list-style-type: none">• Reduction of hazardous and medical waste sent to landfill (25%)	<ul style="list-style-type: none">• Reduction of hazardous (medical) waste sent to landfill (50%)	<ul style="list-style-type: none">• Established proper waste treatment methods and technologies for industrial and hazardous (medical) waste (100%).

Goal D – Maximise proper disposal and treatment of wastewater



Objectives

- D.1: Improve the collection and treatment of liquid waste in domestic areas
- D.2: Improve the collection and treatment of liquid waste in industrial areas
- D.3: Improve the collection and treatment of liquid waste in public areas (public market and central bus/train terminals)

Short-term (2017 – 2020)	Middle-term (2021 – 2025)	Long-term (2026 – 2030)
<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in domestic sector (25%)	<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in domestic sector (50%)	<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in domestic sector (100%)
<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in industrial sector (25%)	<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in industrial sector (50%)	<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in industrial sector (100%)
<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in public places	<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in public places	<ul style="list-style-type: none">• Increased coverage of liquid waste collection and treatment in public places

Goal E: Capacity development, awareness raising and advocacy



• Objectives

- E.1: Mainstream environmental education and waste management in school curricula and programmes
- E.2: Mobilise support of local stakeholders by increasing awareness and participation in environmental education and waste management

Short-term (2017 – 2020)	Middle-term (2021 – 2025)	Long-term (2026 – 2030)
<ul style="list-style-type: none">• Increased number of townships have implemented standard awareness-raising programmes for their residents (25%)	<ul style="list-style-type: none">• Increased number of townships have implemented standard awareness-raising programmes for their residents (50%)	<ul style="list-style-type: none">• Increased number of townships have implemented standard awareness-raising programmes for their residents (100%)
<ul style="list-style-type: none">• Increased number of schools have established environmental education programmes for their students (25%)	<ul style="list-style-type: none">• Increased number of schools have established environmental education programmes for their students (50%)	<ul style="list-style-type: none">• Increased number of schools have established environmental education programmes for their students (100%)

Goal F - Ensure sustainable services through review, monitoring, innovation and improvement

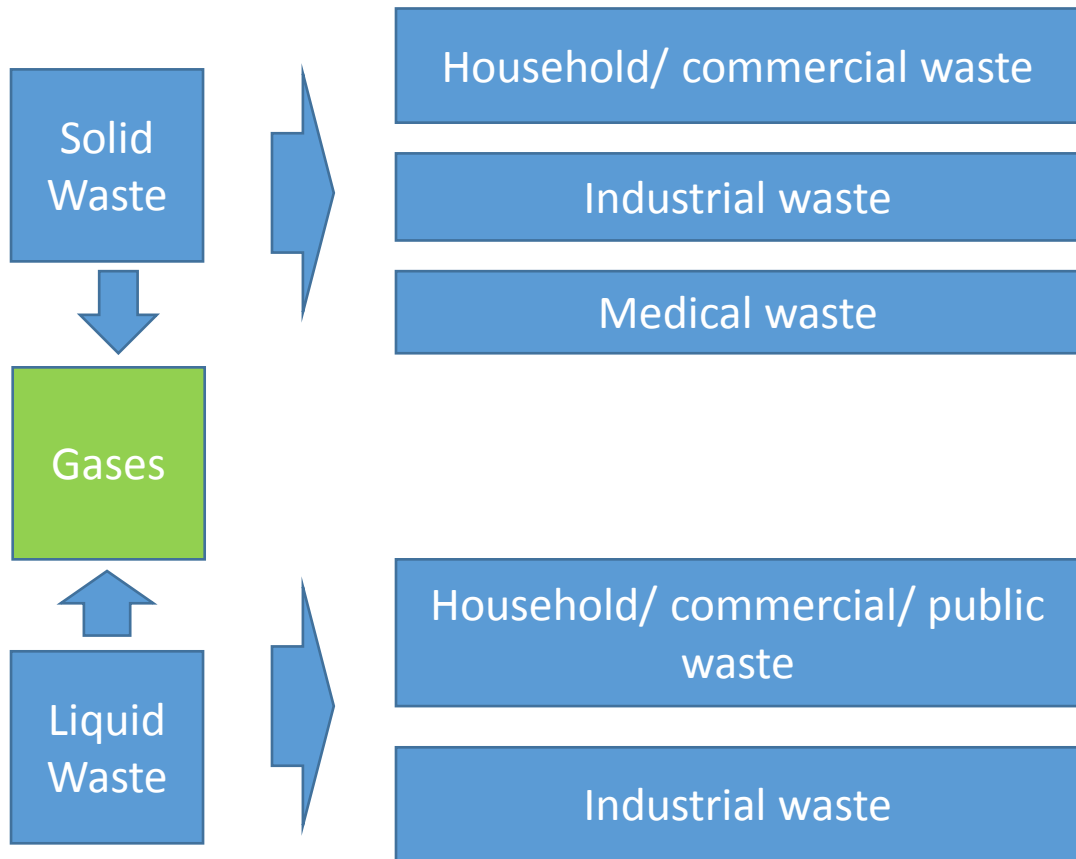


• Objectives

- F.1: Establish a data collection mechanism
- F.2: Establish a reporting mechanism
- F.3: Establish a communication mechanism to ensure regular consultation among key stakeholders

Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2026-2030)
<ul style="list-style-type: none">• Establish and monitoring of benchmark performance indicators (50%)	<ul style="list-style-type: none">• Establish and monitoring of benchmark performance indicators (75%)	<ul style="list-style-type: none">• Establish and monitoring of benchmark performance indicators (100%)
<ul style="list-style-type: none">• Increase in the number of successful enforcement actions filed against non-compliant entities (50%)	<ul style="list-style-type: none">• Increase in the number of successful enforcement actions filed against non-compliant entities (75%)	<ul style="list-style-type: none">• Increase in the number of successful enforcement actions filed against non-compliant entities (100%)

Today Actions (1)



Activity	Current situation	Responsible Agencies/ Persons	Satisfaction
(1) Generation /Disposal			
(2) Collection/ Transport			
(3) Treatment/ Recycle			
(4) Final Disposal			



Waste Management Strategy Development in Myanmar: Consultation and Formulation Process

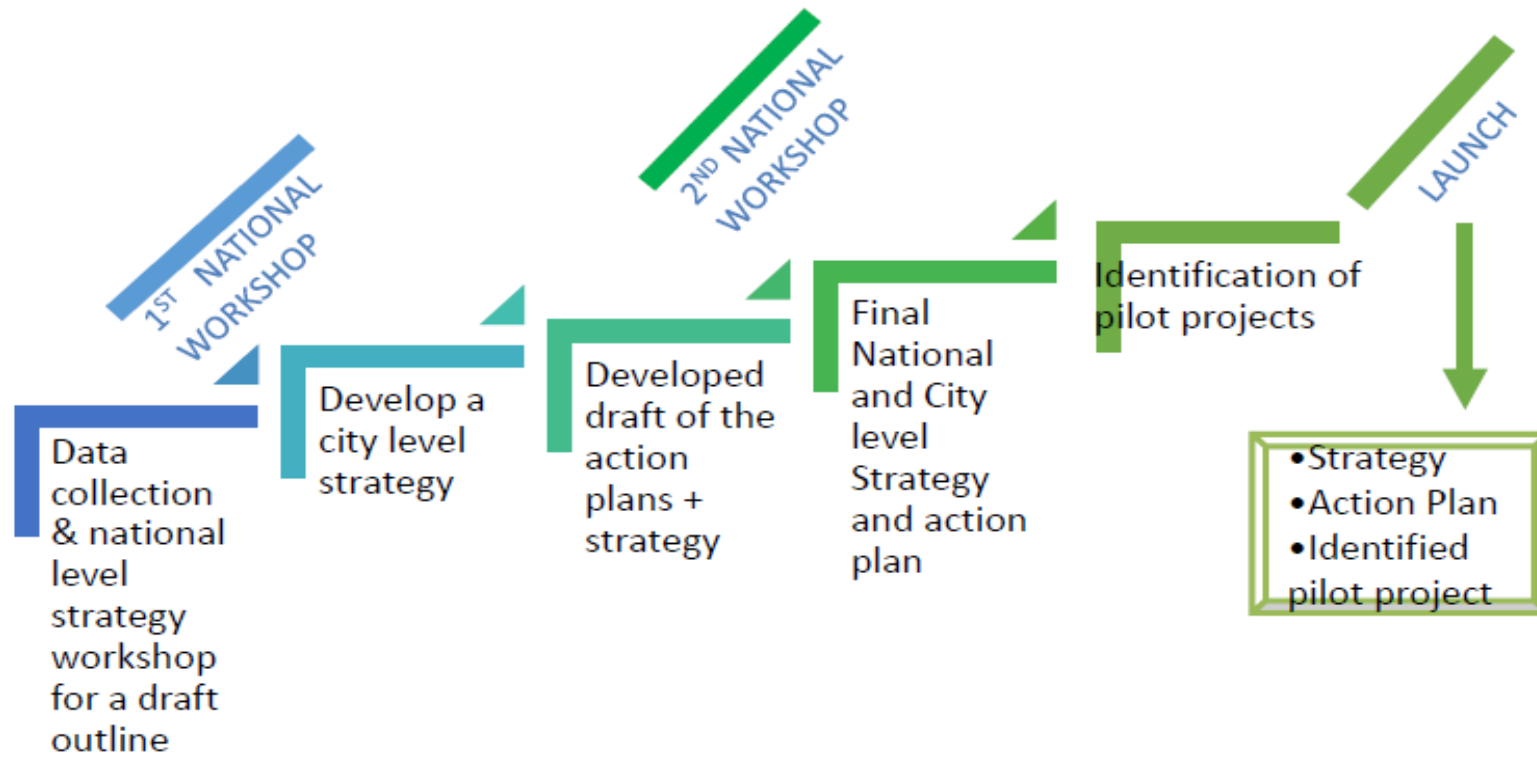
Matthew Hengesbaugh

Policy Researcher

Institute for Global Environmental Strategies (IGES)

5 December 2016

Waste Management Strategy Development in Myanmar: Roadmap



Waste Management Strategy Development in Myanmar

Initial Dialogue → March 2016

First round of consultations with MONREC, YCDC, MCDC, NCDC

- Agreement on scope of national/city-strategies
- Mandalay selected as target city for strategy development
- Confirmation of schedule for first National and City-Level Workshops

Rapid Assessment → March-May 2016

Quick Study preparation

- Evaluation of existing WM system (policy, technology and finance)
- Identification of major gaps and good practices at national and city level

Waste Management Strategy Development in Myanmar (2)

Participatory Work Planning → 13-17 June 2016

1st National/City-Level Workshop held in Nay Pyi Taw & Mandalay

- Validation of waste management gaps and challenges
- Mobilization of stakeholders for strategy formulation
- Establishment of monitoring and feedback mechanisms for strategy

Main Outcomes

- Consensus reached with national/local counterparts on content of strategies
- Emphasis on coherence with existing policy development processes
 - 5-Year Development Plan (MONREC)
 - Mandalay Regional Development Plan
- Examination of potential financing for future activities (JICA, ADB)
- Agreement on follow-up review process at regional level





Waste Management Strategy Development in Myanmar (3)

Evaluation and Review → September 2016

Organization of National/City-Level Roundtable Discussions

- Consultation on initial drafts of waste management strategies held with MONREC/NCDC/MCDC/YCDC
 - Guidance on improving policy and regulatory alignment with existing MONREC & MCDC rules/regulations and standards, planning and budget cycles, coordination mechanisms, institutional roles and responsibilities
 - Suggested consideration of National Environmental Policy (UNDP), National Climate Change Strategy (UN-Habitat), Green Economy Policy Framework (WWF)
 - Feedback on time interval/target setting, monitoring and evaluation
 - Plan and consensus on officialising strategies

Finalization and Identification of Pilot Project → December 2016



Waste Management Strategies: Turning Problem into Resources



**Dr. Mushtaq Ahmed MEMON, Programme Officer,
International Environmental Technology Centre (IETC), UNEP**

**Dr. Dickella Gamaralalage Jagath PREMAKUMARA, Senior Researcher
Sustainable Cities, IGES Centre Collaborating with UNEP on
Environmental Technologies (CCET)**

The National Waste Management Seminar, 19 July 2016, Male, Maldives



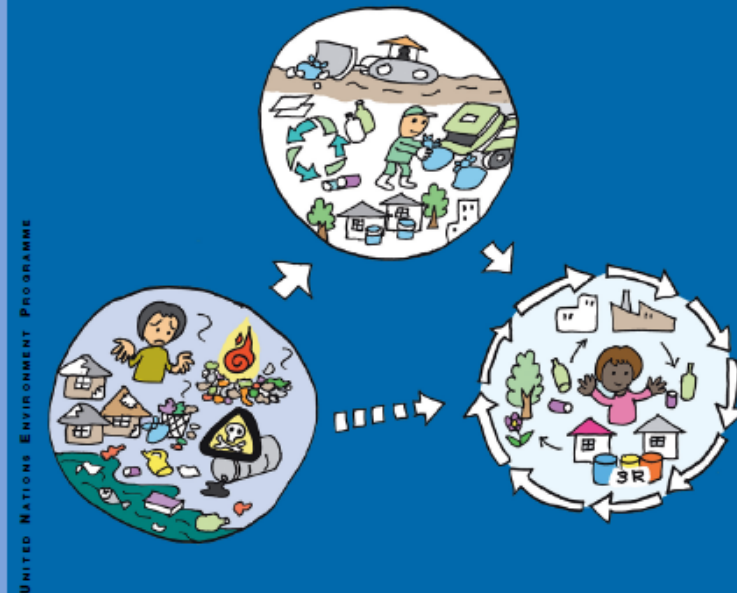


Overview

- Why waste management is a matter in developing countries?
- Need of a Holistic Approach for Waste Management
- UNEP support for National and City Waste Management Strategies



Global Waste Management Outlook



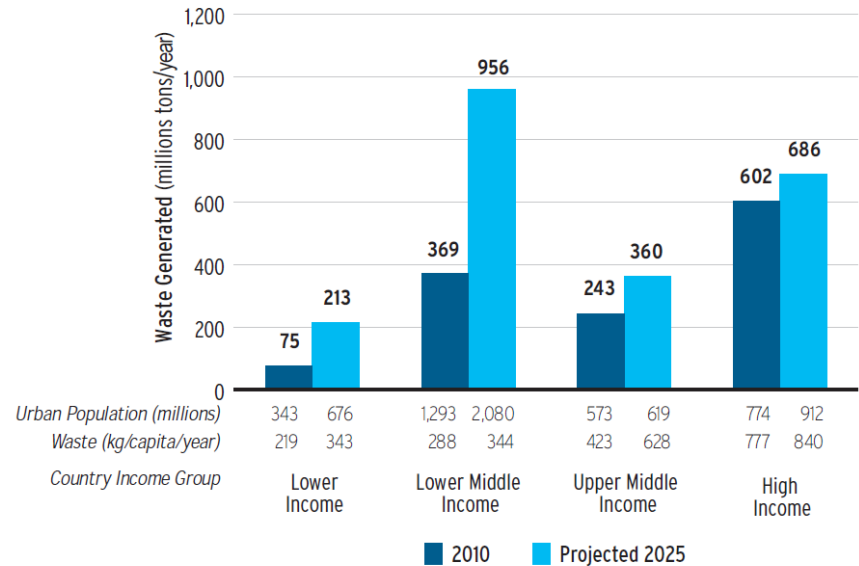


Increasing Waste Generation

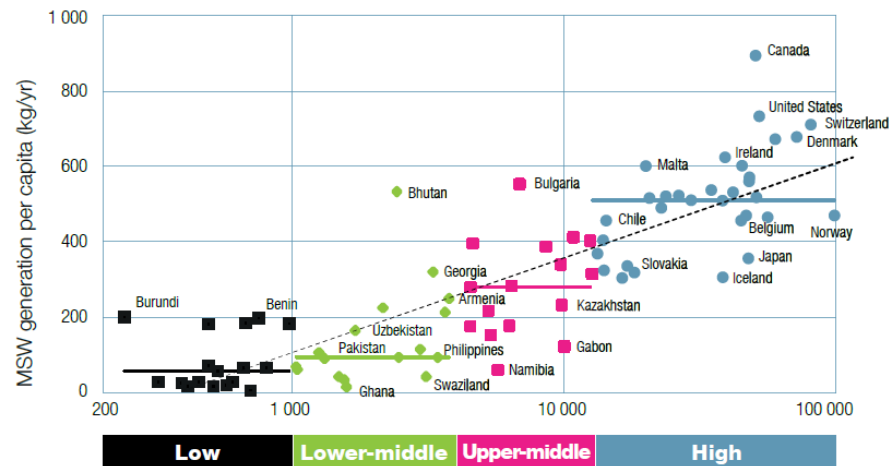
Currently, world cities generate about 1.3 billion tonnes of solid waste per year. This volume is expected to increase to 2.2 billion tonnes by 2025. *“Lower income cities in Africa and Asia will double their municipal solid waste generation within next 15-20 years”*



MSW generation rates vary widely within and between countries. The generation rates depend on income levels, socio-cultural patterns and climatic factors. *“the richer we get, more we discharged”*



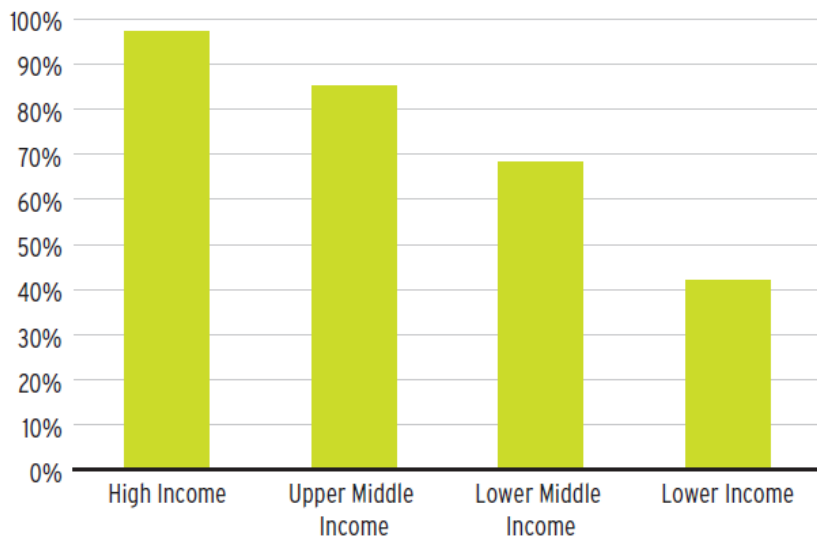
Urban waste generation by income level and year, World Bank (2012)



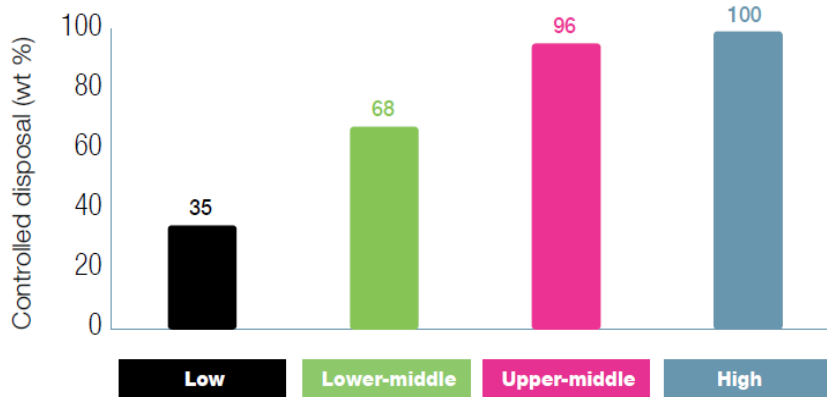
Waste generation versus income level by country, UNEP/ISWA (2015)



Solid Waste Management is Essential Service



Waste Collection Rates by Income, World Bank (2012)



Income group

Controlled disposal for selected cities by income level, UNEP/ISWA (2015)





Multiple Benefits

Waste management has strong linkages to a range of other global challenges: health, climate change, poverty reduction, food and resource security, sustainable production and consumption. The political case for action can be significantly strengthened when waste management is viewed as an entry point to address a range of sustainable development issues, many of which are difficult to tackle.



Climate change

Potential impact of improved waste management on reducing GHG emissions across the economy: 15-20%



Diversion from disposal of biodegradable wastes prevents emissions of methane, a powerful greenhouse gas (GHG)

Reduction, reuse and recycling all displace virgin materials and products, and the GHG emissions in their manufacture



A clean city

- Where the solid waste management service works well
- A holistic approach is taken to managing all residuals



A successful city

- A healthy, pleasant and safe place to live
- A good place to do business and visit as a tourist
- Fosters a sense of community and belonging



Good governance

- The cleanliness of the city can be used as a proxy indicator of good governance



Enterprise and creating sustainable livelihoods

'Waste to wealth' projects in Africa have demonstrated that new waste services can be used as a catalyst for sustainable livelihoods and economic development in poor neighbourhoods of some of the world's poorest cities

2000-2010 in Europe employment in waste and resource management doubled: > 2 million

15-20 million people working in the small-scale entrepreneurial 'informal' waste sector worldwide

Estimate of worldwide potential for new jobs in the circular economy: 9 to 25 million



Waste management: An ‘entry point’ to sustainable development

A GLOBAL CALL FOR ACTION

Addressing waste management as a priority will facilitate early progress towards more than half of the Sustainable Development Goals (SDGs) within the Post-2015 Development Agenda

Global waste management goals

Global waste management goals		Related SDGs	
Ensure by 2020	W.1 Access for all to adequate, safe and affordable solid waste collection services	3 – Health for all	11 – Safe cities
	W.2 Stop uncontrolled dumping, open burning	3 – Health for all 11 – Safe cities 12 – Sustainable consumption and production (SCP)	6 – Clean water and sanitation 14 – Marine resources 15 – Terrestrial ecosystems
Ensure by 2030	W.3 Achieve sustainable and environmentally sound management of all waste, particularly hazardous waste	12.4 – Managing all waste 13 – Climate change	7 – Access to energy
	W.4 Substantially reduce waste generation through prevention and the 3Rs (reduce, reuse, recycle) and thereby create green jobs	12.5 – The 3Rs 8 – Growth & employment	1 – End poverty 9 – Sustainable industry
	W.5 Halve per capita global food waste at the retail and consumer levels and reduce food losses in the supply chain	12.3 – Food waste	2 – End hunger; food security

Global Waste Management Outlook, UNEP/ISWA (2015)



Paradigm shift from Waste Management to Resource Management



20th CENTURY

WASTE
MANAGEMENT

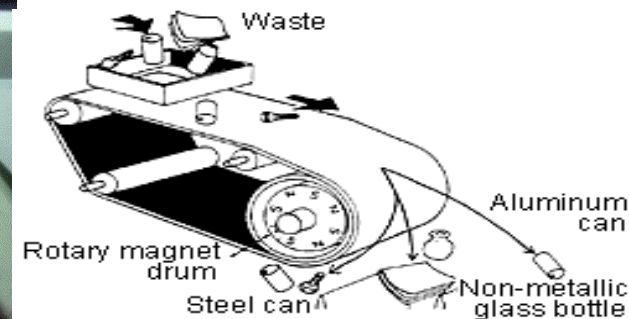
“How do we get rid of our waste efficiently with minimum damage to public health and the environment?”



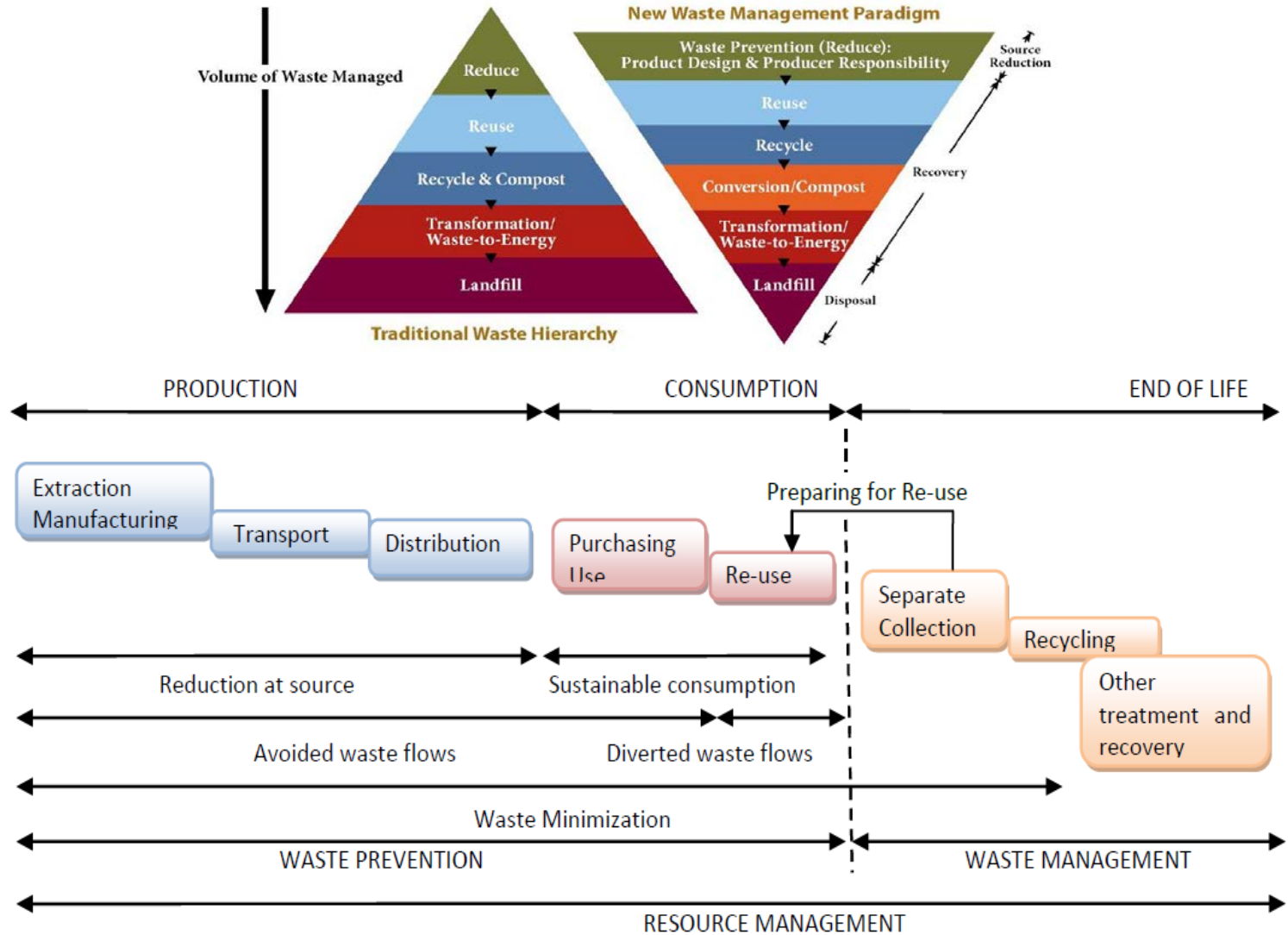
21st CENTURY

RESOURCE
MANAGEMENT

“How do we handle our discarded resources in ways which do not deprive future generations of some, if not all, of their value?”

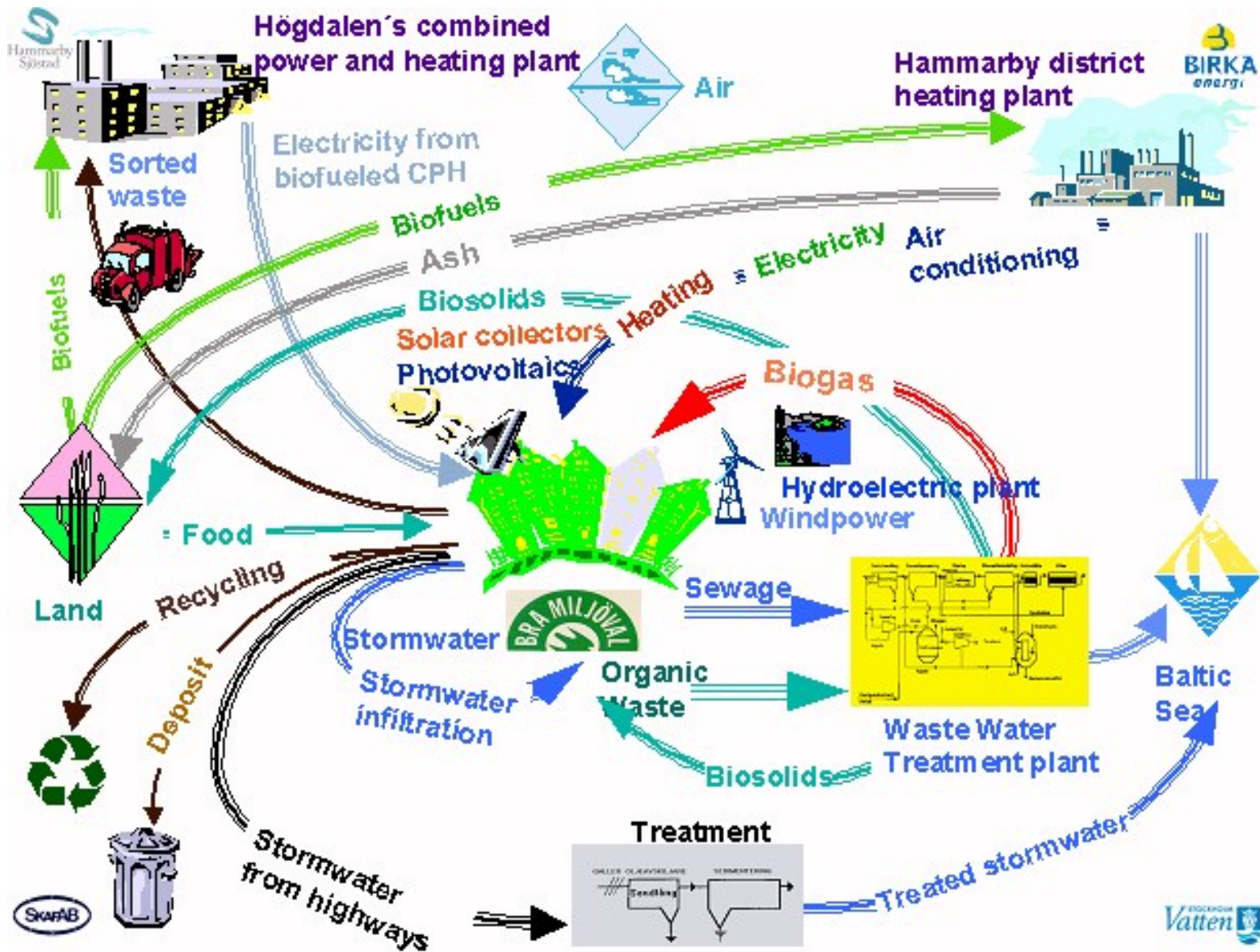


Resource Management





Circular Economy/ 3R – Closing the Loop



What needs to be done at the local and national levels



Bring wastes under control

Ensure access for all to basic waste services (A)

Deal with the hazardous substances in wastes (B)

Stop uncontrolled dumping and burning

- Extend affordable collection services to all in society, irrespective of income level
- Ensure the controlled disposal of all waste as a necessary first step towards environmental protection

Bring hazardous wastes under control

- Separate hazardous waste, and in particular hazardous healthcare waste, from other waste at source
- Manage them separately in environmentally sound facilities
- Need a holistic approach to managing all residuals, as pollution controls concentrate contaminants from air emissions and wastewater into (often hazardous) waste

Focus on waste prevention

- Reducing waste improves resource security, improves well-being and saves everyone money
- Design out waste and hazardous waste
- Maximize repair, reuse and remanufacture
- Keep materials separate/seggregate waste at source to minimize contamination and facilitate reuse and recycling

Focus on the 'feedback loops'

- Maximize recycling
- In low-income countries, integrate existing small-scale entrepreneurial recycling within mainstream waste management
- Develop environmentally sound energy recovery facilities and landfills for residual waste that cannot be sustainably recycled

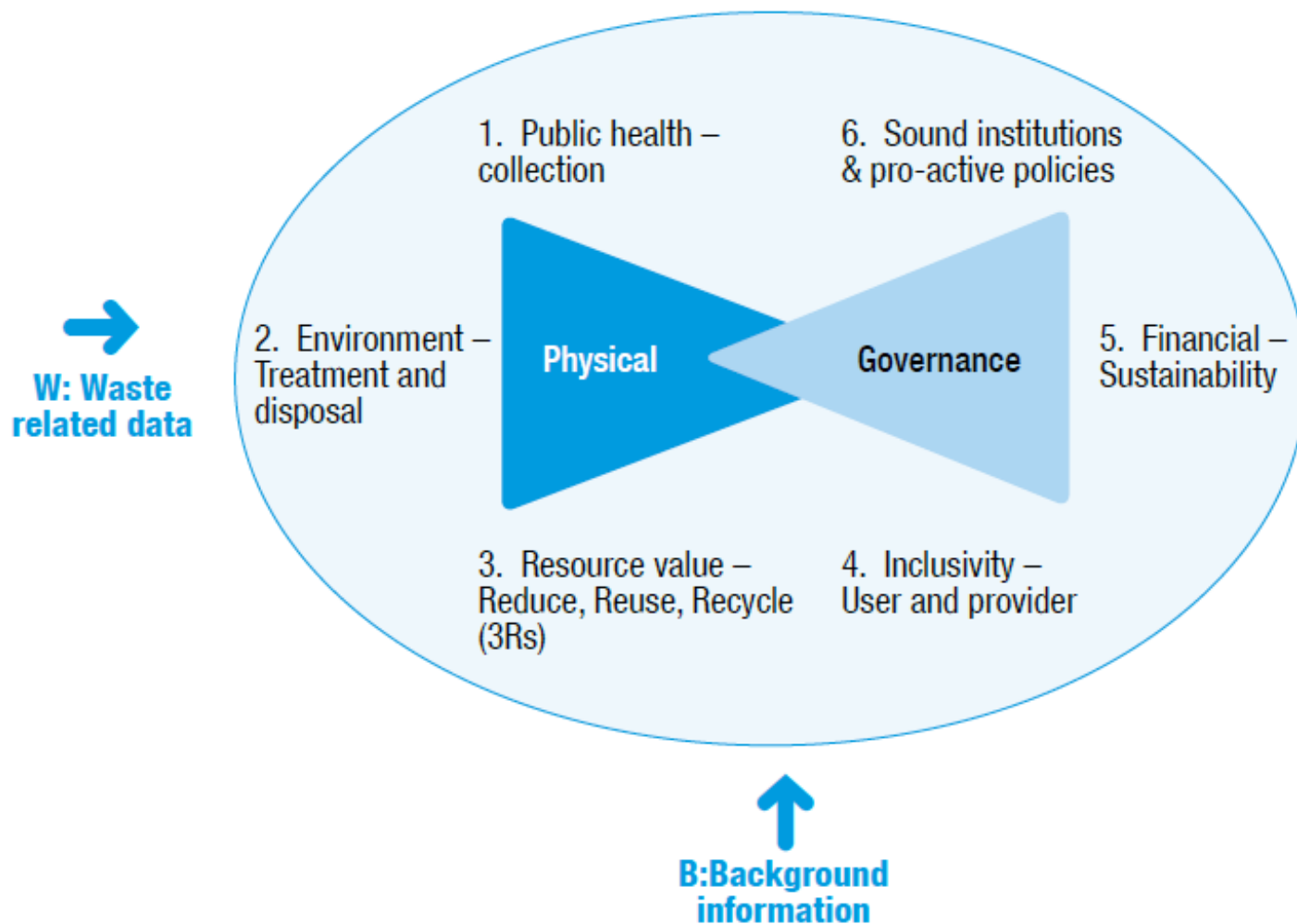
Tackle the problem at the source (C)

Close a clean material cycle (D)

Move from a linear to a circular economy

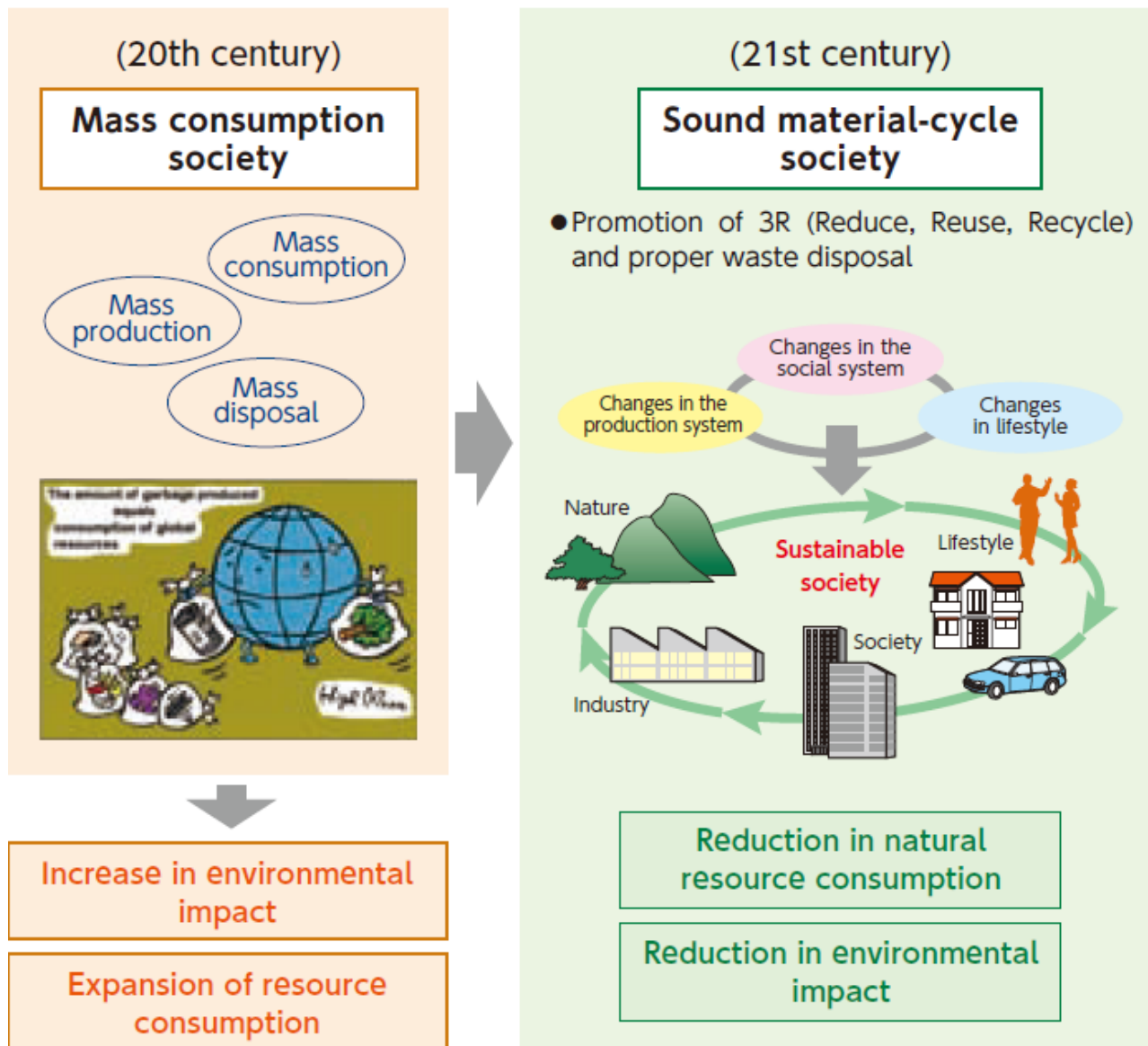
Action Imperatives, UNEP/ISWA (2015)

Sustainable Factors or Motivating Factors to Change

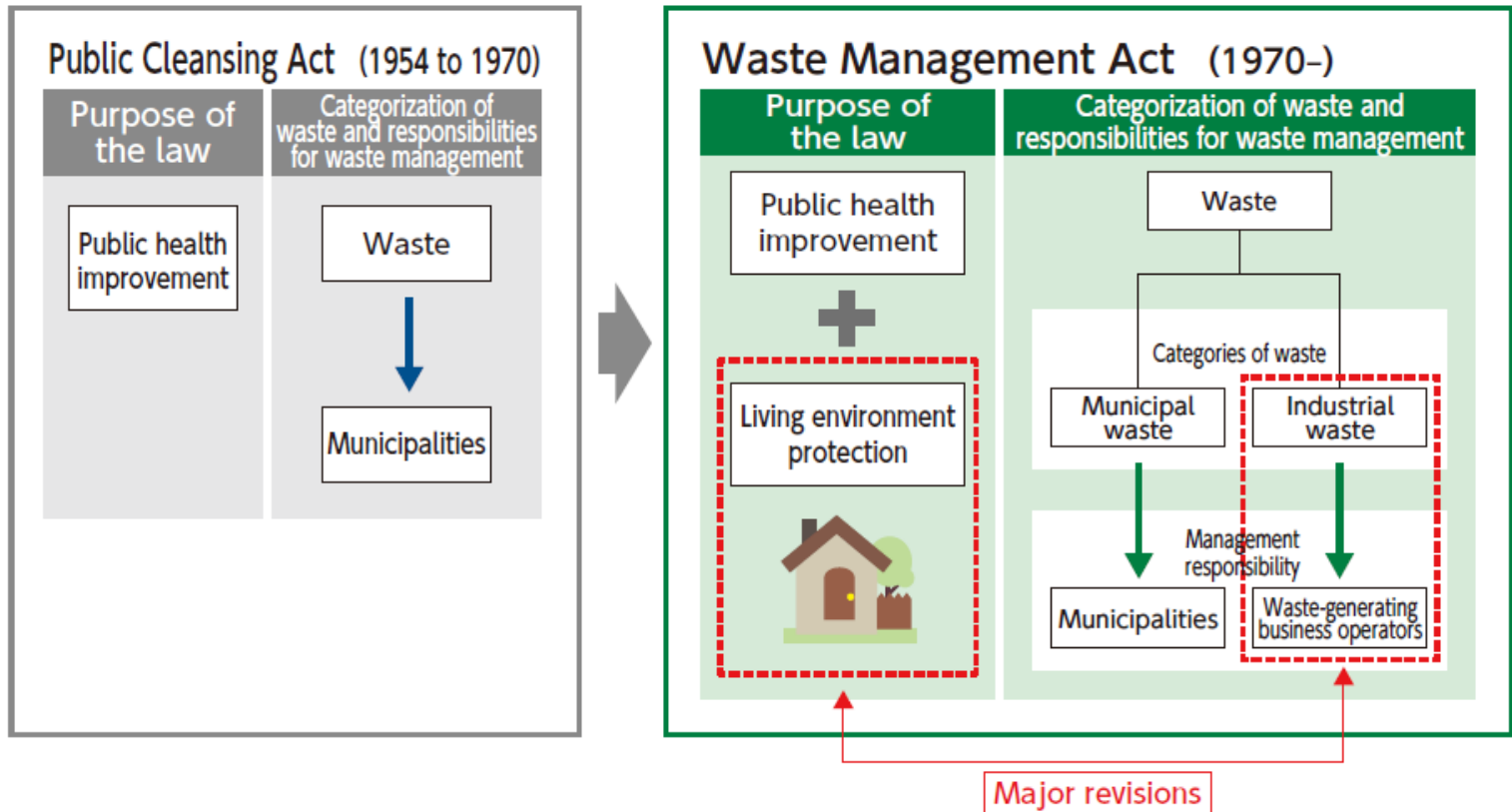




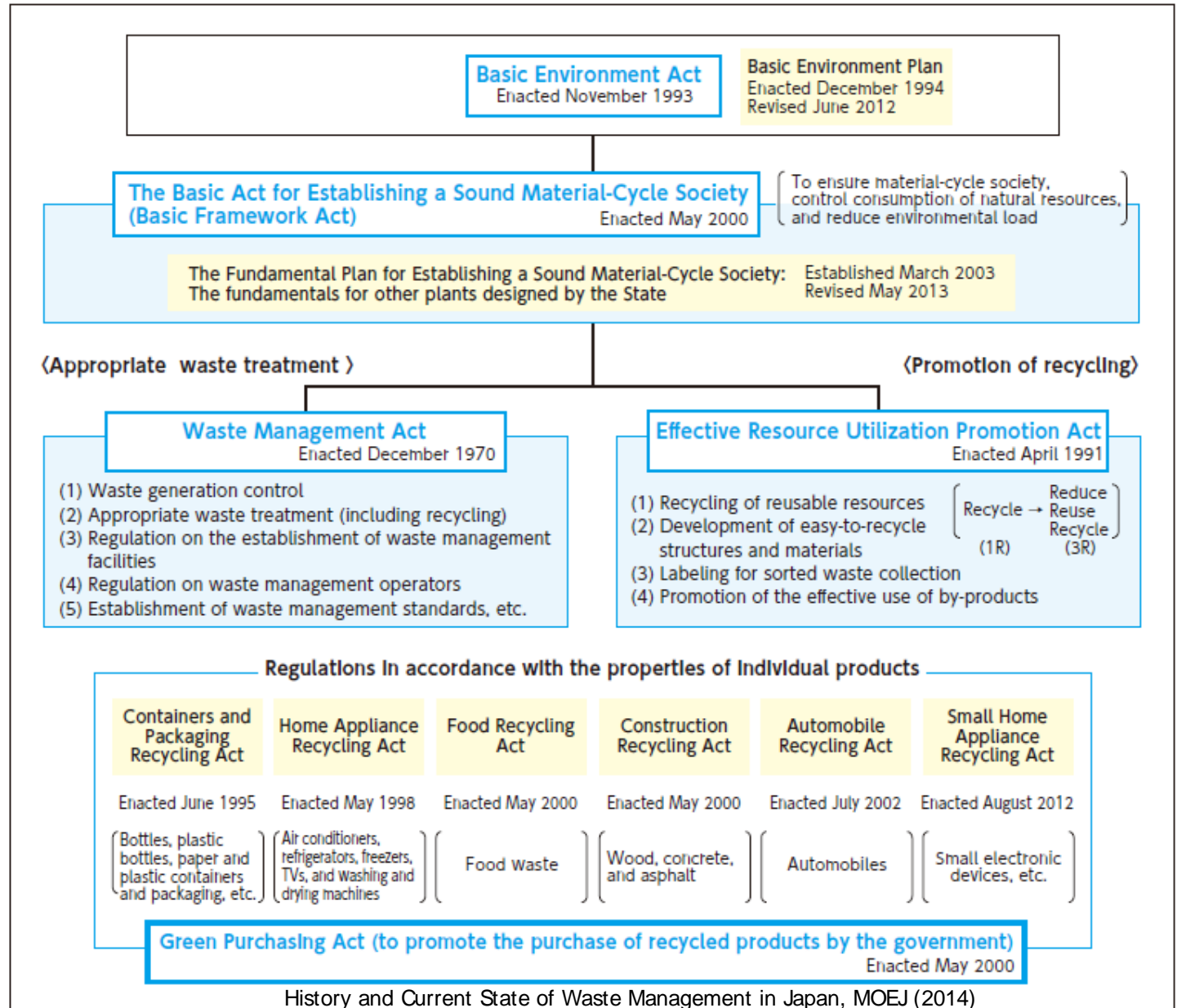
Moving from Waste Management to Resource Management in Japan



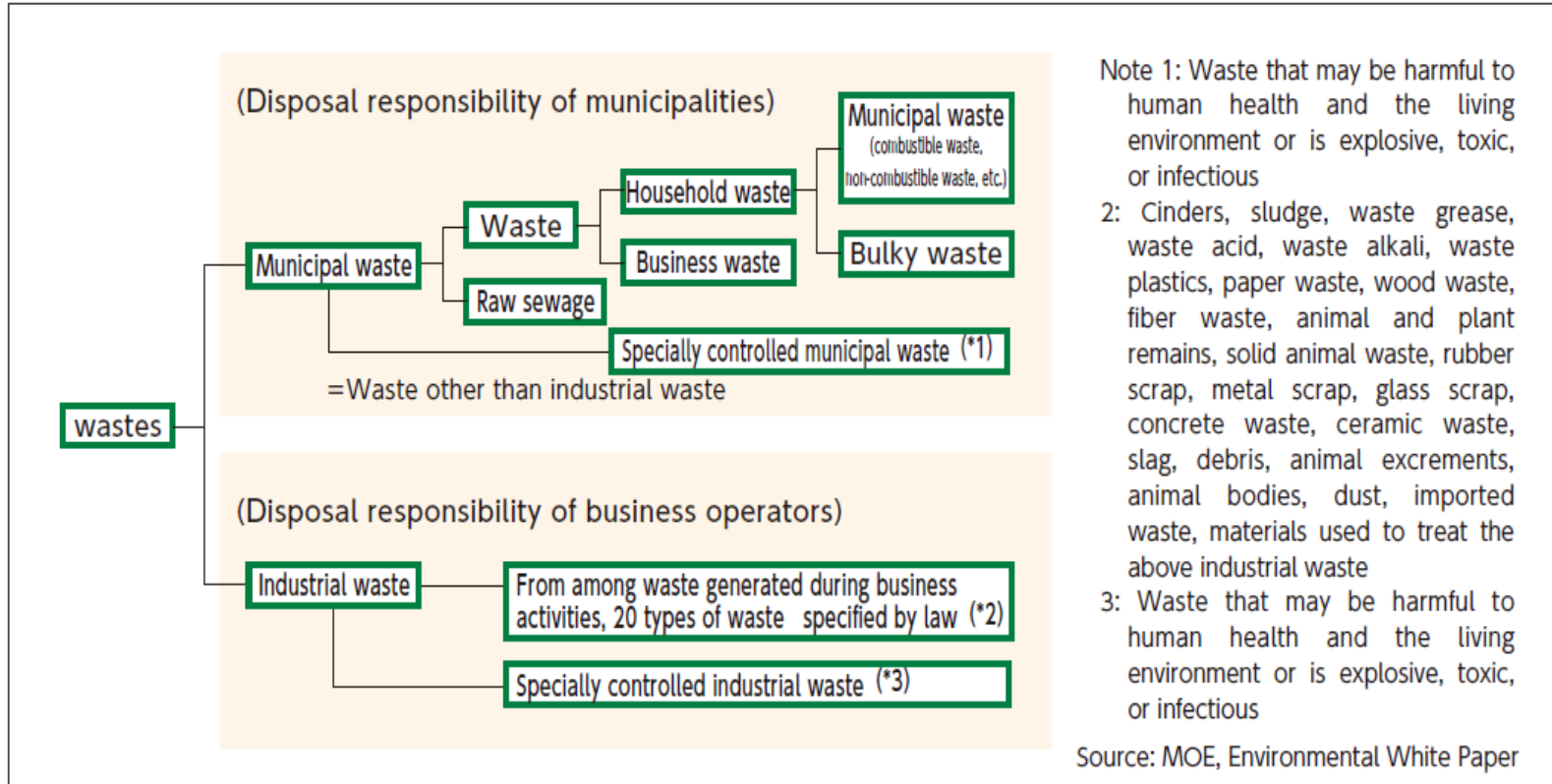
Development of Basic Legal System to Support Waste Management in Japan



Comprehensive Legal System to Support Waste Management in Japan



Categories of Waste for Management



Note 1: Waste that may be harmful to human health and the living environment or is explosive, toxic, or infectious

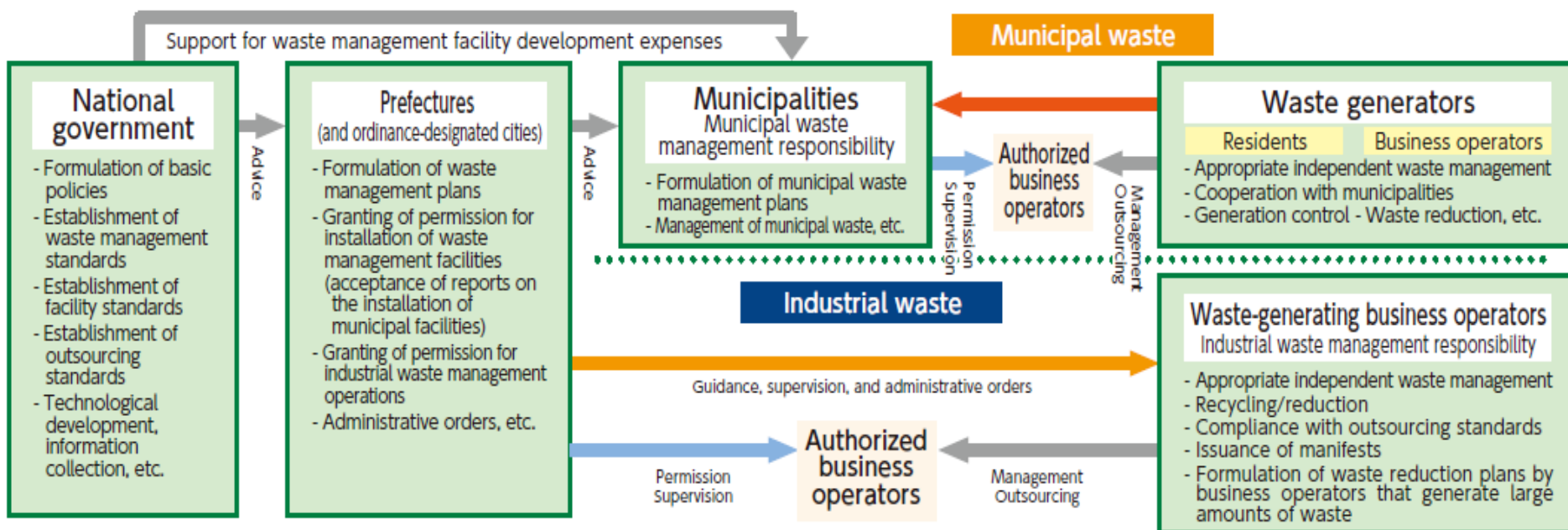
2: Cinders, sludge, waste grease, waste acid, waste alkali, waste plastics, paper waste, wood waste, fiber waste, animal and plant remains, solid animal waste, rubber scrap, metal scrap, glass scrap, concrete waste, ceramic waste, slag, debris, animal excrements, animal bodies, dust, imported waste, materials used to treat the above industrial waste

3: Waste that may be harmful to human health and the living environment or is explosive, toxic, or infectious

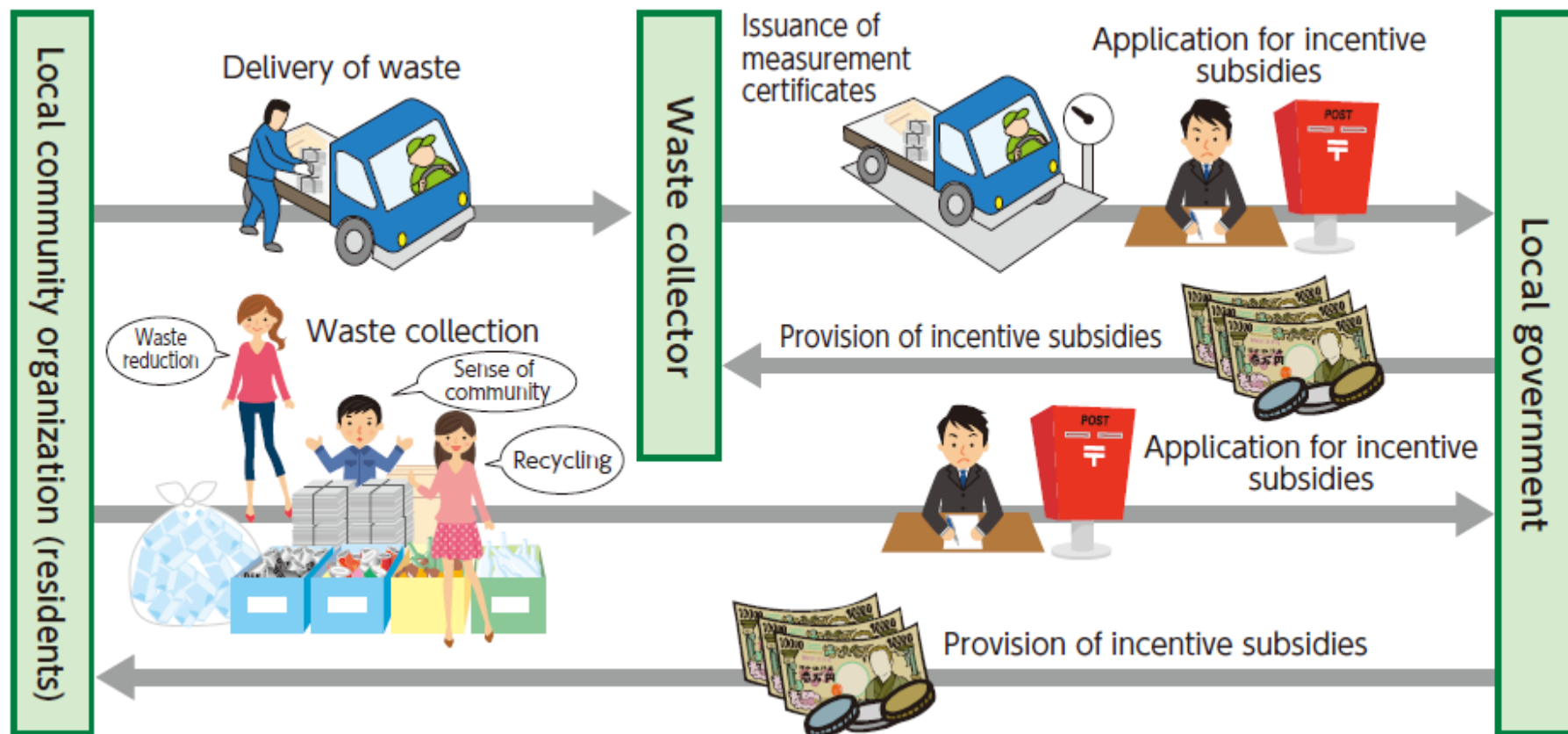
Source: MOE, Environmental White Paper

Roles and Responsibilities Among Key Stakeholders

Relationships between national and local governments and waste-generating business operators in the Waste Management Act



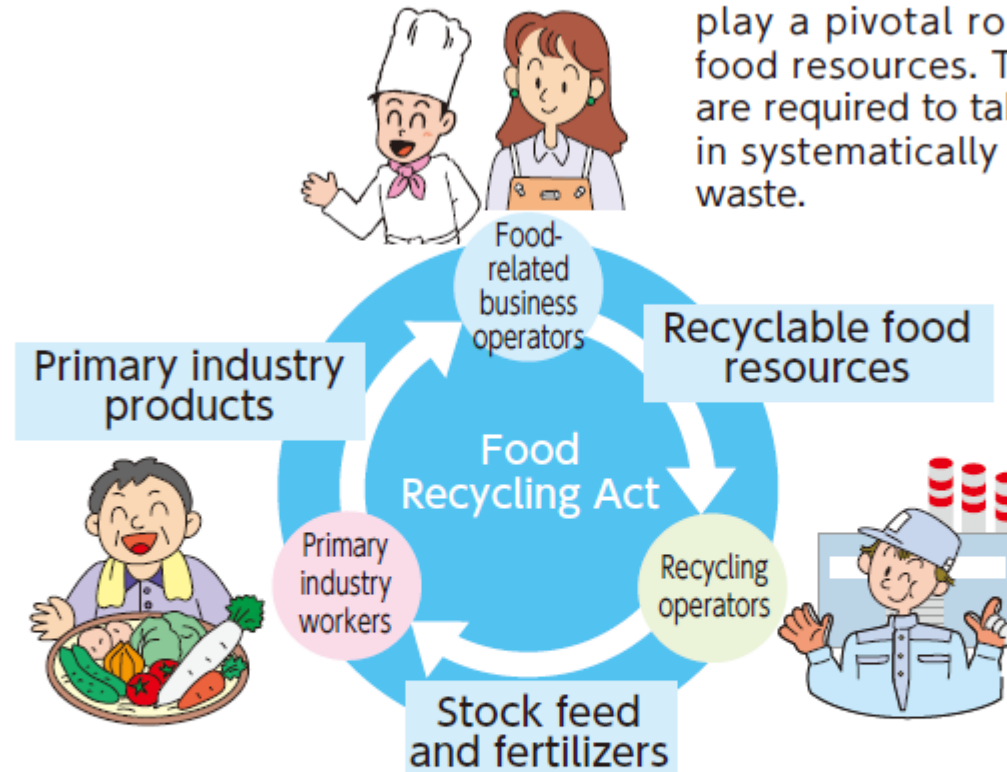
Creating Incentive System



Creating Sustainable Recycling Loops



As food waste generators, food-related business operators play a pivotal role in recycling food resources. Therefore, they are required to take the initiative in systematically recycling food waste.

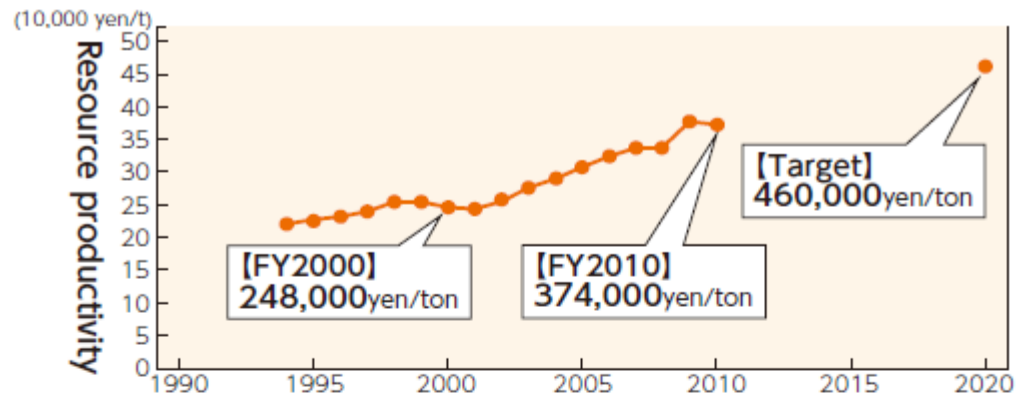


Primary industry workers are required to use recycled fertilizers and stock feed as much as possible to produce their products and provide such products to food-related business operators to ensure resource circulation between food production and consumption.

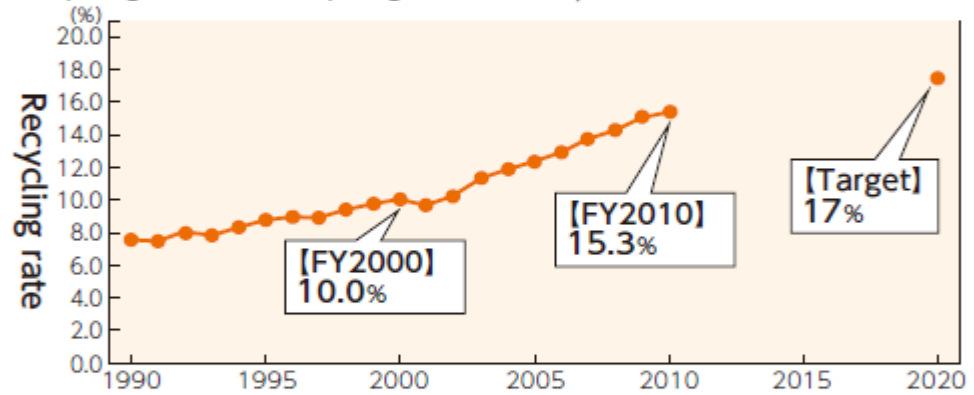
Recycling operators recycle recyclable food resources and play the role of connecting food-related business operators and users of fertilizers and stock feed. Recycling operators are required to provide information to other parties involved as well as to develop programs that are friendly to the environment in which we live.



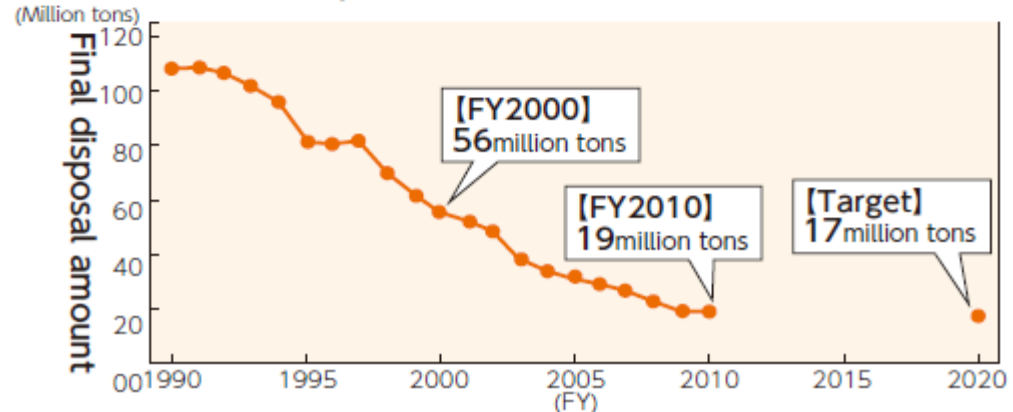
Target Setting, Data Management and Monitoring



■ Cycle: Recycling rate
Recycling amount / (recycling amount + input of natural resources, etc.)



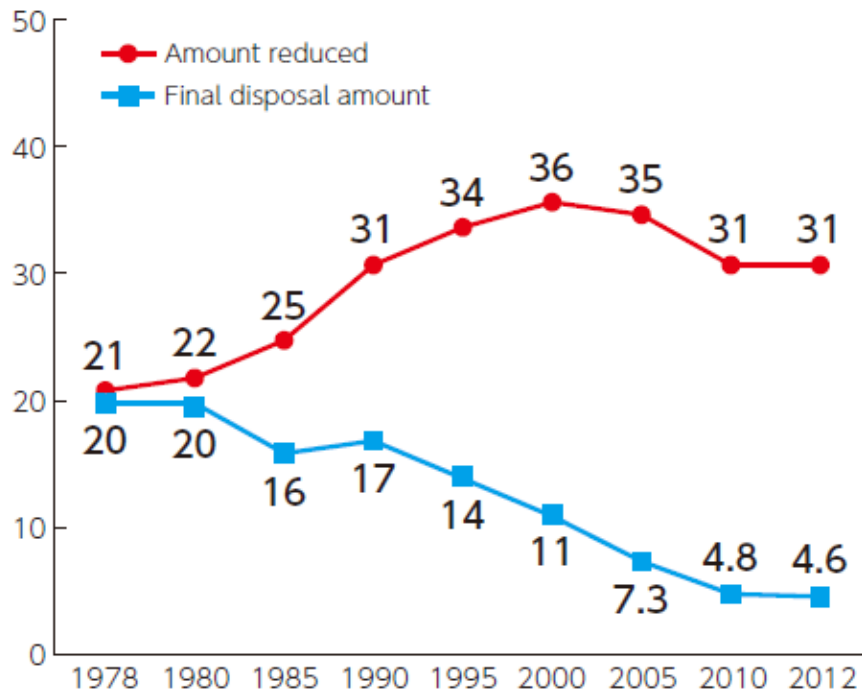
■ Outlet: Final disposal amount



Results of Waste Reduction

Municipal waste

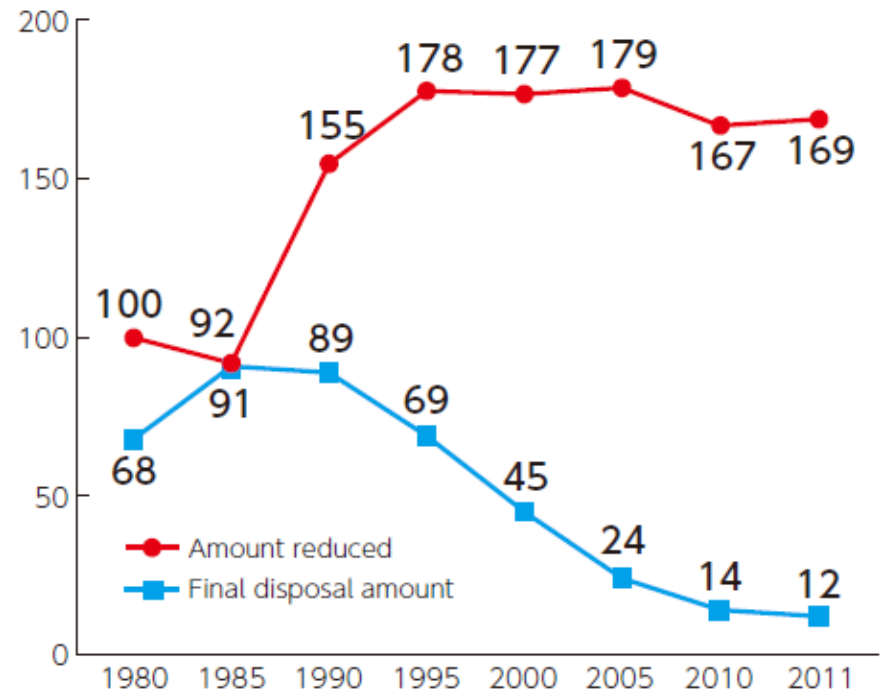
(Units: million tons)



Source: Compiled from MOE, Waste Management in Japan (annual editions)

Industrial waste

(Units: million tons)

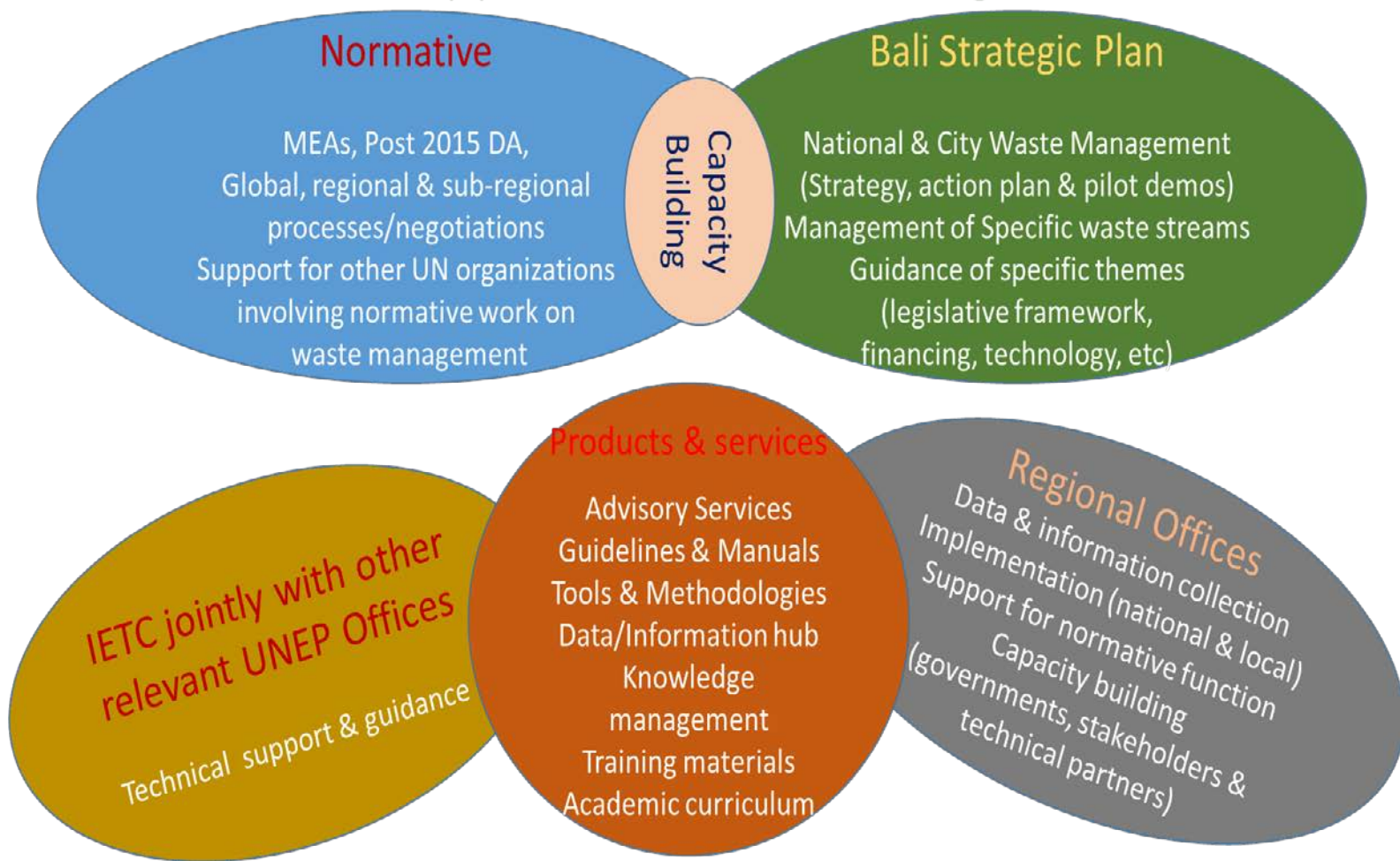


Source: Compiled from MOE, Survey on the Discharge and Disposal of Industrial Waste (annual editions)



UNEP Support for Waste Management

UNEP Support on “Waste Management”





UNEP-IETC Support for Holistic Waste Management

- Holistic approach to waste
- Waste to Resource (From linear to closed-loop material cycle)
- Promote Prevention Policies: Anchor

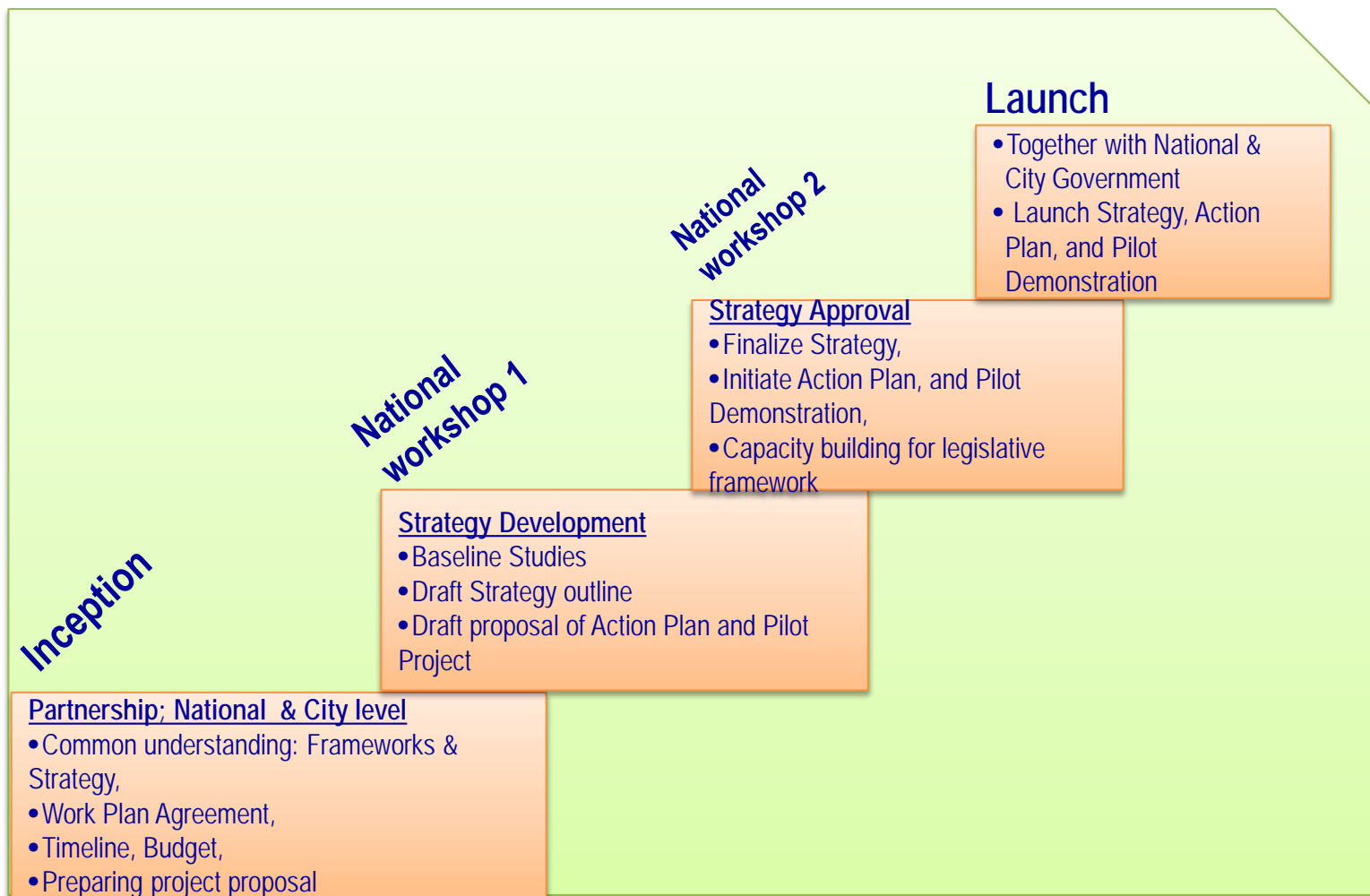


Knowledge, Expertise, Technology, Policies

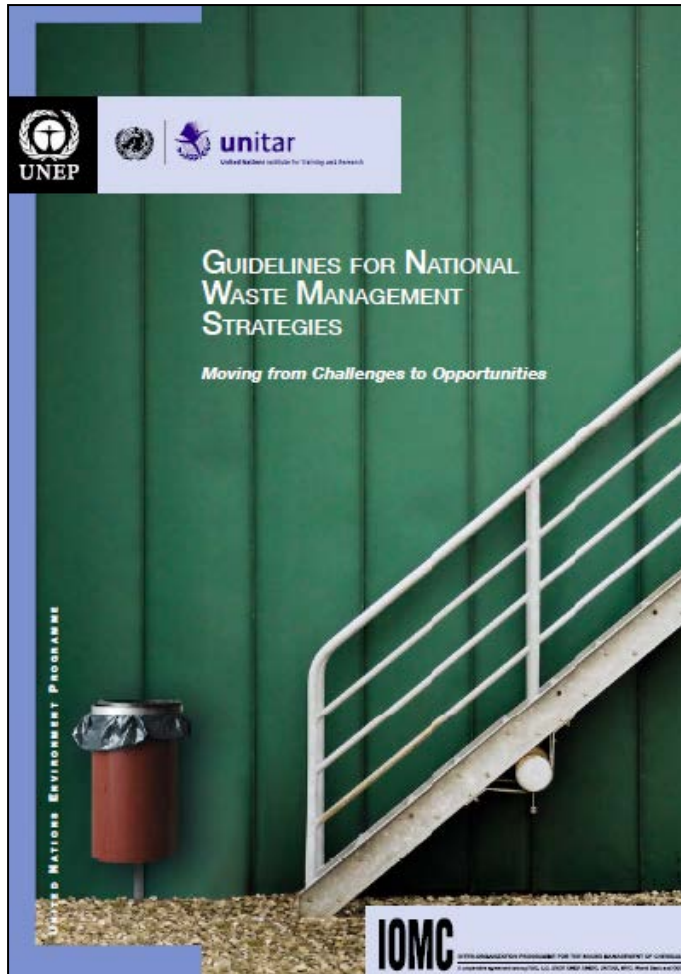




UNEP-IETC Support for Development of National and City Waste Management Strategies



Guidelines for National/City Waste Management Strategies



<http://www.unep.org/ietc/InformationResources/Event/s/GuidelinesfortheDevelopmentofNationalWasteM/tabid/1104470/Default.aspx>

- Provide a conceptual and methodological framework for national planning that countries may adapt to their particular circumstances.
- Establish a clear rationale for making waste management a national priority.
- The guidelines, while focused on strategy development, also encompasses implementation, review and updating of the strategy.

Development of National and City Waste Management Strategies

- Wuxi New District, China – 2008
- Pune City, India – 2008
- Maseru City, Lesotho – 2009
- Matale City, Sri Lanka – 2009
- Novo Hamburgo, Brazil – 2009
- Nairobi – 2010
- Bahir Dar, Ethiopia – 2010
- Pathum Thani, Thailand – 2011
- Addis Ababa – 2011
- Danang, Vietnam – 2012
- Kampot, Cambodia – 2012
- Bangkok – 2012
- Honduras - 2013





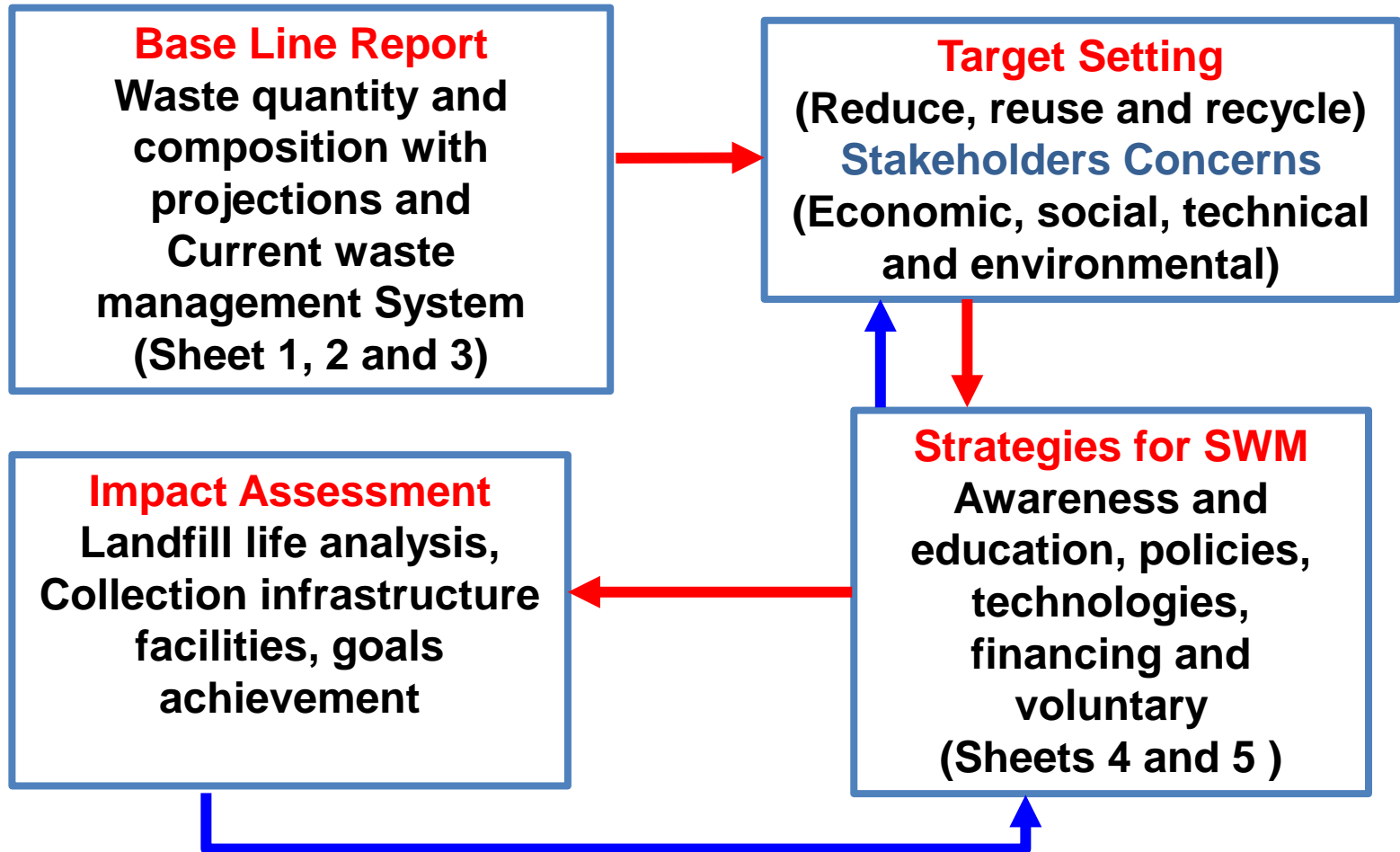
Strategic Planning Process for Development of National/City Waste Management Strategies



Strategic Planning Process	Adopted Methodology
Phase 1: Where are we now?	1. Review of current waste management system and identify gaps (Day 1 - Session 2)
Phase 2: Where are we going?	1. Identify vision, mission and guiding principles (Day 2 - Session 3)
Phase 3: How did we get there?	1. Identify goals and strategies (Day 2 - Session 3) 2. Develop an action plan (Day 3 - Session 4)
Phase 4: Are we on track?	1. Identify monitoring mechanism (Day 3 - Session 4)

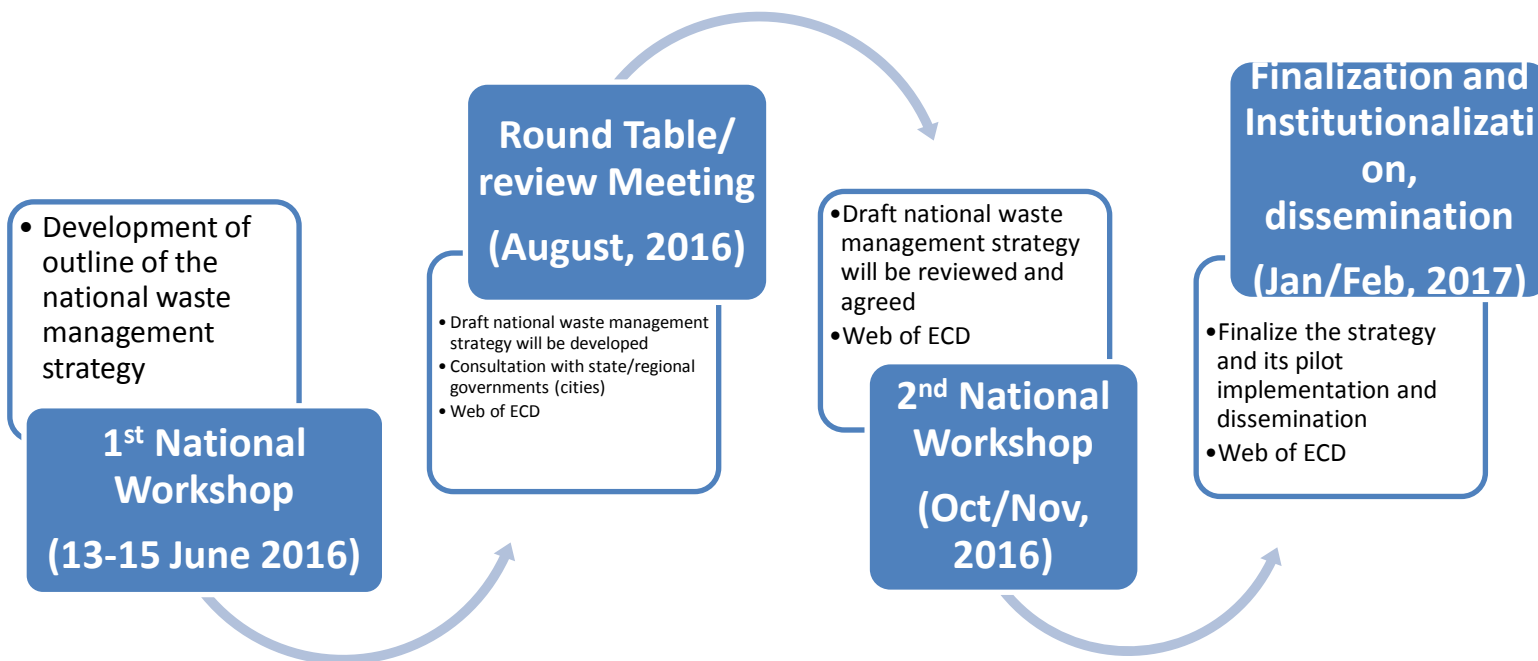


Key Steps/Actions





Development of National/City Waste Management Strategy in Myanmar





IGES Center Collaborating with UNEP on Environmental Technologies (CCET) for supporting national/city waste management strategies



- Signed in Lima in December 2014
- The Centre, named “IGES Centre Collaborating with UNEP on Environmental Technologies” (CCET), will be established as a unit within IGES, located at IGES Headquarters in Hayama, Japan.
- The Centre will be headed by a Director and assisted by two dedicated Programme Coordinators working primarily in the Sustainable Consumption and Production Area.



IGES is an Implementer of CCAC-MSWI Projects in Asia



CLIMATE AND CLEAN AIR COALITION TO REDUCE SHORT LIVED CLIMATE POLLUTANTS MUNICIPAL SOLID WASTE MANAGEMENT INITIATIVE

What is the Coalition?

The Climate and Clean Air Coalition is the only global effort that unites governments, civil society and private sector, committed to improving air quality and protecting the climate in next few decades by reducing short-lived climate pollutants across sectors.

Complementary to mitigating CO₂ emissions, the Coalition acts as a catalyst to create, implement and share immediate solutions addressing near-term climate change to improve people's lives rapidly, and to ensure sustainable development for future generations.

Starting in February 2011 with 6 Countries and 1 International Organisation, the coalition has rapidly expanded to 49 Countries, 44 NGOs, 16 International Organisations (as of September 2015).

The Municipal Solid Waste Management Initiative is one of 11 initiatives currently being undertaken by the coalition.

Short Lived Climate Pollutants from the Solid Waste Management Sector

Methane (gas)

- Landfill gas comprises ~50% methane and ~50% CO₂
- Global warming potential of 25 (100 year time horizon), relative to CO₂
- Anthropogenic - formed as a result of management of waste from humans

Black Carbon (fine particles in aerosol form)

- Most strongly light-absorbing component of particulate matter
- Formed by the incomplete combustion of fossil fuels, biofuels, and biomass
- Emissions patterns and trends vary significantly across regions, countries and sources
- An aerosol (not a greenhouse gas)

How Cities Participate in the MSW Initiative

- Undertake City Waste Assessments
- Quantify SLCP emissions and identify suitable sustainable alternatives for waste management - Emissions Quantification Tool
- Develop Work Plans
- Attend training and capacity building workshops targeting specific waste related themes
- Participate in city-to-city collaboration
- Obtain technical and financial analysis support in developing sustainable waste management projects
- Get access to resources and information on best practices on the CCAC MSW Initiative Knowledge Platform
- Get access to a world-wide network of experts

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SCP Mainstreaming in Maldives and Sub-Regional Forum on Sustainable Tourism





Mainstreaming of SCP into national policy making in the Maldives and South-Asia Sustainable Tourism Forum – Early September 2016

Activities:

1. Organization of National Roundtable on Sustainable Consumption and Production (SCP) and the 10YFP in the Republic of Maldives
2. Organization of South Asia SCP dialogue with emphasis on sustainable tourism – potential interfaces with waste management issues will be explored

Activity 1 – Expected results:

- Establish a foundation for dialogue to integrate SCP and resource efficiency requirements in relevant national policies and legislation, and raise awareness on the importance to adopt SCP practices
- Proposals for the integration of SCP in national development plans and strategies (*i.e. National Strategy on Sustainable Development, National Framework for Development, National Environmental Action Plan*)

Activity 2 – Expected results:

- To engage government representatives and policy makers in dialogue and collaboration with emphasis on the promotion of sub-regional sustainable tourism strategies
- Assess progress towards Sustainable Tourism in South Asia and propose policy priorities feeding into annual South Asia SCP Forum dialogues
- Support meaningful, evidence based dialogue and decision making on SCP issues, and monitoring of progress in achieving regional SCP objectives (*i.e. 10YFP Regional Roadmap on SCP*)



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Discussion on

Solid Waste Management

Group 1

8.12.2016

HOUSEHOLD WASTE

Activity	Current Situation	Responsible Agencies/Persons	Satisfaction
(1) Generation / Disposal	<ul style="list-style-type: none"> - From own dust bin to temporary waste storage area (dust tanks, carts, three wheels, etc..) (95%) - Open dumping to channel (5%) - Combining waste (80%) - Recyclable materials (20%) 	<ul style="list-style-type: none"> - Public - Governing agencies - CDC 	<ul style="list-style-type: none"> - Not satisfied (60%) - Need to dispose through waste separation and packing - Need to extend awareness and announcement
(2) Collection/ Transport	<ul style="list-style-type: none"> - Collection by CDC (70%) and by private (20%) and others (10%) - Transport by CDC 	<ul style="list-style-type: none"> - MCDC - Private sectors - Public 	<ul style="list-style-type: none"> - Not satisfied (60%) - Need more vehicles (compactor), human resource and accessories - Upgrade technology and maintenance
(3) Treatment/ Recycle	<ul style="list-style-type: none"> - Recycled by informal and formal ways 	<ul style="list-style-type: none"> - Public - Governing agencies - Private sector - MCDC 	<ul style="list-style-type: none"> - Not satisfied - Need more awareness to separate at source, budget support, land , technology and monitoring
(4) Final Disposal	<ul style="list-style-type: none"> - Open landfill - Waste picking - No leachate treatment - Air pollution - Underground water pollution 	<ul style="list-style-type: none"> - Public - Governing agencies - Private sector - MCDC 	<ul style="list-style-type: none"> - Not satisfied - Technologies (sanitary landfill) - Need budget, land, regulation - Capacity building

INDUSTRIAL WASTE

Activity	Current Situation	Responsible Agencies/Persons	satisfaction
(1) Generation/ Disposal	<ul style="list-style-type: none"> - Temporary waste storage area (80%) - Removing recyclable materials (20%) 	<ul style="list-style-type: none"> - Public - Entrepreneur - MCDC - Governing agencies 	<ul style="list-style-type: none"> - Not satisfied (60%) - Need to dispose through waste separation and packing - Need to extend awareness and announcement
(2) Collection/ Transport	<ul style="list-style-type: none"> - Collection by CDC (60%) - Industries by themselves (40%) 	<ul style="list-style-type: none"> - Public - Entrepreneur - MCDC 	<ul style="list-style-type: none"> - Not satisfied (60%) - Need more vehicles (compactor), human resource and accessories - Upgrade technology and maintenance
(3) Treatment/ Recycle	Recycled by informal and formal ways		<ul style="list-style-type: none"> - Not satisfied - Need more awareness to separate at source, budget support, land , technology and monitoring
(4) Final Disposal	<ul style="list-style-type: none"> - Open landfill - No leachate treatment - Air pollution - Underground water pollution 		<ul style="list-style-type: none"> - Not satisfied - Technologies (sanitary landfill) - Need budget, land, regulation - Capacity building

MEDICAL WASTE

Activity	Current Situation	Responsible Agencies/Persons	satisfaction
(1) Generation/ Disposal			<ul style="list-style-type: none"> - Not satisfied (60%) - Need to dispose through waste separation and packing - Need to extend awareness and announcement
(2) Collection/ Transport	<ul style="list-style-type: none"> - Collection by CDC (50%) and others not being able to collect at small clinics 	<ul style="list-style-type: none"> - Private Clinics - MCDC 	<ul style="list-style-type: none"> - Not satisfied (60%) - Need more vehicles (compactor), human resource and accessories - Upgrade technology and maintenance
(3) Treatment/ Recycle	No recycle and treatment		<ul style="list-style-type: none"> - Not satisfied - Need more awareness to separate at source, budget support, land , technology and monitoring
(4) Final Disposal			<ul style="list-style-type: none"> - Not satisfied - Technologies (sanitary landfill) - Need budget, land, regulation - Capacity building

Thank You

DOMESTIC WASTE

Activity	Proposed Activities	Responsible institution /Person	How to find budget
(1) Generation / Disposal	<ul style="list-style-type: none"> - Need to extend awareness and announcement - Free distribution of separate color waste bags, and monitoring and cooperation of NGOs, MCDC and (only in pilot Project area) - To separate two types of wastes (wet (kitchen) and dry) - Extend the neighboring township or ward - Law enforcement - Selling the color bags after pilot project - House to House Education - To organize the “Ward Waste Management Committee” in the pilot area 	<ul style="list-style-type: none"> - Ward Waste Management Committee - Township Administrative office - Ward Administrative office - Volunteers - NGOs, CSO, MWAFF - MCDC - Public Health Department - Education Department 	<ul style="list-style-type: none"> - Regional Budget - CSR Budget from every new development (both local and foreign) - Fine from not following after the education period (one month)

DOMESTIC WASTE

Activity	Proposed Activities	Responsible institution /Person	How to find budget
(2) Collection/ Transport	<ul style="list-style-type: none"> - Define regular collection system such as defining collection day for wet waste and dry waste, eg., everyday for wet waste and twice a week for dry waste - Upgrading collection and transport vehicles (compactor trucks) - To collect from not only door to door system but also secondary collection point - To promote private sector involvement - Public participation 	<ul style="list-style-type: none"> - MCDC - Ward Waste Management Committee - Private waste collector for dry waste 	<ul style="list-style-type: none"> - Regional budget

DOMESTIC WASTE

Activity	Proposed Activities	Responsible institution /Person	How to find budget
(3) Treatment/ Recycle	<ul style="list-style-type: none"> - Waste segregation factories for dry wastes as recyclable (paper, plastic, tin/can, PET, glass) and non-recyclable for RDF (<i>future plan</i>) - Compost plant for wet waste by community - Grinding broken glass with crusher and used in road construction 	<ul style="list-style-type: none"> - MCDC - Private waste collector for dry waste - Volunteers/NGOs/CSOs/MWAF 	<ul style="list-style-type: none"> - Regional budget - Fines from public - Budget from tender of recyclable materials

DOMESTIC WASTE

Activity	Proposed Activities	Responsible institution /Person	How to find budget
(4) Final disposal	<ul style="list-style-type: none">- Composting for wet waste by MCDC- Controlled landfill	<ul style="list-style-type: none">- MCDC- UNEP- IGES	<ul style="list-style-type: none">- UNEP- Regional budget

Thank You

Liquid Waste Management in Mandalay City

Actions (1)

Actions (1) For Domestic Wastewater and Septic Waste

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
1 Generation / Disposal	<p>Domestic Issue 35-55 gal/Cap/day , Including gray water and black water.</p> <ul style="list-style-type: none">• Weak in proper flow• Design of Drainage System,• Improper Solid waste discharge system into drainage,• Weak in maintenance• Weakness in public participation• Need to develop laws and regulation	<ul style="list-style-type: none">• CDCs,• Public participation• LECD	Not at all

Actions (1) For Industrial Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
1 Generation / Disposal	<p>Industrial Waste Water</p> <ul style="list-style-type: none">- Insufficient Land areas for Industrial Owner- Lack of Budget for pre-treatment system- Understanding wastewater treatment methodology- Weakness in compliance of laws, rules, regulations and ordinance	<ul style="list-style-type: none">• MCDC• Business Entrepreneur• Industrial zones committee• LECD	Not at all

Actions (1) For Domestic Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
2. Collection / Transport	<ul style="list-style-type: none">• Vacuum Truck collection for sewage• Gravity flow from collector drain and main drain to final water body (Gray Water)	<ul style="list-style-type: none">• MCDC	80% can manage by conventionally method

Actions (1) For Industrial Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
2. Collection / Transport	<ul style="list-style-type: none">• 10" main disposal pipeline collected by different industries• Final disposal site Dokehtawaddy River• Untreated wastewater	<ul style="list-style-type: none">• MCDC• LECD• GAD• MRG	Not at all Big Challenges to solve

Actions (1) for Domestic Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
3. Treatment/Recycle	<ul style="list-style-type: none">• No treatment system• No recycle issue• 25% coverage collection and treatment system by ADB loan (Dec-2016)	MRG, MCDC LECD	Not at all

Actions (1) For Industrial Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
3. Treatment/ Recycle	<ul style="list-style-type: none">• Low cost and improper wastewater treatment system in some industries• No wastewater treatment system in high volume and high concentration generated wastewater industries (Distillery)• BOT system by Hydro Tek Supreme Mandalay	<ul style="list-style-type: none">• MRG• LECD• MCDC	Not at all

Actions (1) For Domestic Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
4. Final Disposal	<ul style="list-style-type: none">• Oxidation pond for Sewage• River water body for Gray Water	<ul style="list-style-type: none">• MCDC	60% can manage by conventionally method

Actions (1) For Industrial Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
4. Final Disposal	Dokehtawaddy River	MRG LECD MCDC	Not at all

Liquid Waste Management in Mandalay City

Group B

Action 2 for Wastewater management plan

Activities	Type of Waste	Proposed Activities	Responsible Institutions and Person	How to find the budget
Generation/ Disposal	Domestic Waste Water (Gray + Black Water)	<ul style="list-style-type: none"> To develop Topographic map for all Drainage System To Draw and design systematic drainage network To construct wastewater treatment and collection system by sector To monitor Env.Water Quality 	<ul style="list-style-type: none"> MRG MCDC LECD Development Partnership 	<ul style="list-style-type: none"> JICA's Loan or Grants ADB Loan World Bank Loan State Budget PPP Development Polluter Pay Principles USBOP (Urban Services Business Operation Plan)
	Industrial Waste water	<ul style="list-style-type: none"> To construct pre-treatment system in every industry To enforce Centralized Industrial Waste Water treatment plant To control the generated wastewater volume capacity To encourage to follow the existing laws, by-law and regulation To monitor Env. Water Quality 	<ul style="list-style-type: none"> MRG MCDC LECD Factory Owner Industrial Zone Committee 	<ul style="list-style-type: none"> PPP Development Polluter Pay Principle

Action 2 for Wastewater management plan

Activities	Type of Waste	Proposed Activities	Responsible Institutions and Person	How to find the budget
Collection and Transport	Domestic Waste Water	<ul style="list-style-type: none"> • Sewer Pipeline system • Drainage system • Vacuum Truck 	MRG MCDC LECD Public	<ul style="list-style-type: none"> • JICA's Loan or Grants • ADB Loan • World Bank Loan • State Budget • PPP Development • Polluter Pay Principles • USBOP (Urban Services Business Operation Plan)
	Industrial Waste Water	<ul style="list-style-type: none"> • Pipeline System to Central Wastewater treatment plant then, • Treated waster will be disposed to final water body 	<ul style="list-style-type: none"> • Industrial zone committee • All industries owner • MCDC • LECD • DISI 	<ul style="list-style-type: none"> • PPP Development • Polluter pay principles • MCDC Budget

Action 2 for Wastewater management plan

Activities	Type of Waste	Proposed Activities	Responsible Institutions and Person	How to find the budget
Treatment /recycle	Domestic Waste Water	<ul style="list-style-type: none"> • UASB (Up flow- Activated Sludge Blanket) • Treated Water will be reused in Agriculture Sector 	<ul style="list-style-type: none"> • MRG • MCDC • LECD Contractor 	<ul style="list-style-type: none"> • ABD • WB • JICA
	Industrial Waste Water	<ul style="list-style-type: none"> • UASB (Up flow- Activated Sludge Blanket) • Treated Water will be reused in Agriculture Sector 	<ul style="list-style-type: none"> • MRG • MCDC • LECD Contractor 	<ul style="list-style-type: none"> • PPP Contractor • Industries Owner

Action 2 for Wastewater management plan

Activities	Type of Waste	Proposed Activities	Responsible Institutions and Person	How to find the budget
Final Disposal	Domestic Waste Water	<ul style="list-style-type: none"> • Nearest Water Body (Ayeyarwaddy, Dokehtawaddy, Taungthaman lake) • For Gardening 	<ul style="list-style-type: none"> • MRG • MCDC • LECD • Contractor 	<ul style="list-style-type: none"> • JICA's Loan or Grants • ABD Loan • World Bank Loan • State Budget
	Industrial Waste Water	<ul style="list-style-type: none"> • Only Dokehtawaddy River and Taung Inn Myauk Inn Creek 	<ul style="list-style-type: none"> • MRG • MCDC • LECD • Contractor 	PPP Development Industrial Owner

Liquid Waste Management in Mandalay City

Actions (1)

Actions (1) For Domestic Wastewater and Septic Waste

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
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Actions (1) For Industrial Wastewater

Activity	Current Situation	Responsible Agencies / Persons	Satisfaction
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Liquid Waste Management in Mandalay City

Group B

Action 2 for Wastewater management plan

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Action 2 for Wastewater management plan

Activities	Type of Waste	Proposed Activities	Responsible Institutions and Person	How to find the budget
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Action 2 for Wastewater management plan

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Action 2 for Wastewater management plan

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	Industrial Waste Water	<ul style="list-style-type: none"> • Only Dokehtawaddy River and Taung Inn Myauk Inn Creek 	<ul style="list-style-type: none"> • MRG • MCDC • LECD • Contractor 	PPP Development Industrial Owner