Environmental Technologies to Help Achieve SDGs

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Todoroki Arena

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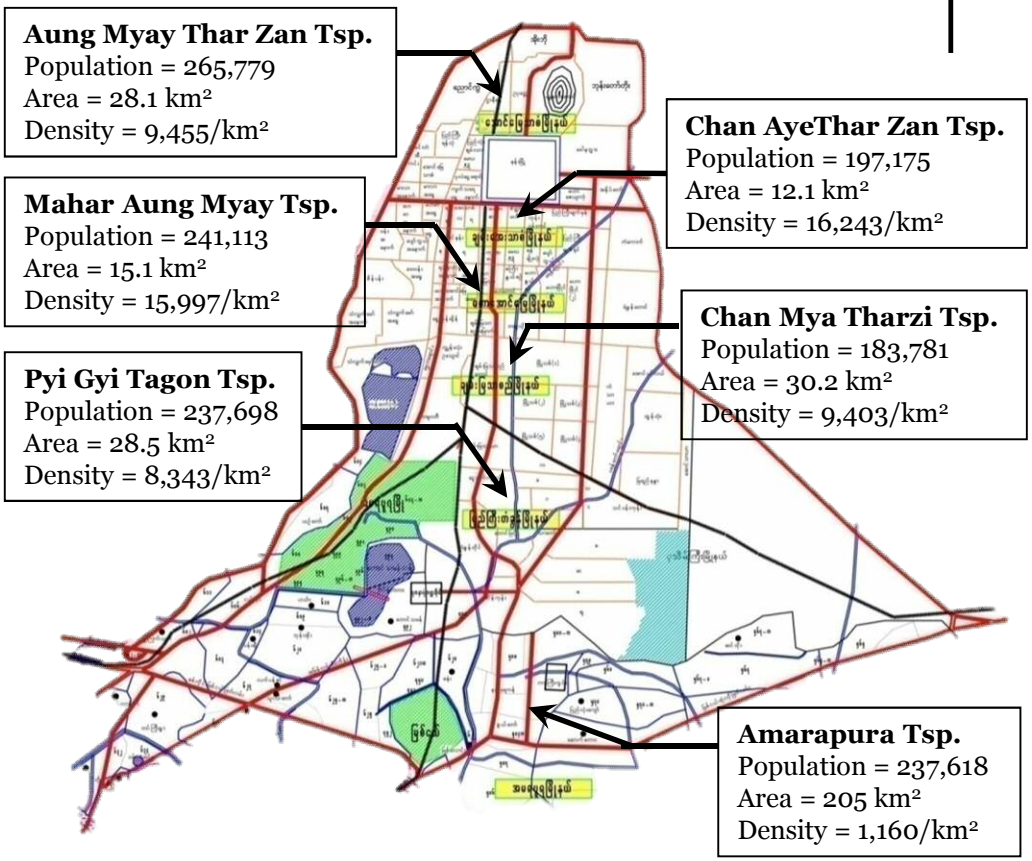
Mandalay City Development Committee, Mandalay City
Myanmar

Mandalay City



Total Household = 271,487

Total population = 1,463,164 (1.46 Million)

Township = 6

Ward = 96

Source: The Population & Housing Census of Myanmar 2014

Organization Structure of Mandalay City Development Committee

Minister for Development Affairs of Mandalay Region and Mayor of Mandalay City

Vice-Mayor

Secretary

Joint Secretary

9 Committee members

Committee
(policy & decision making level)

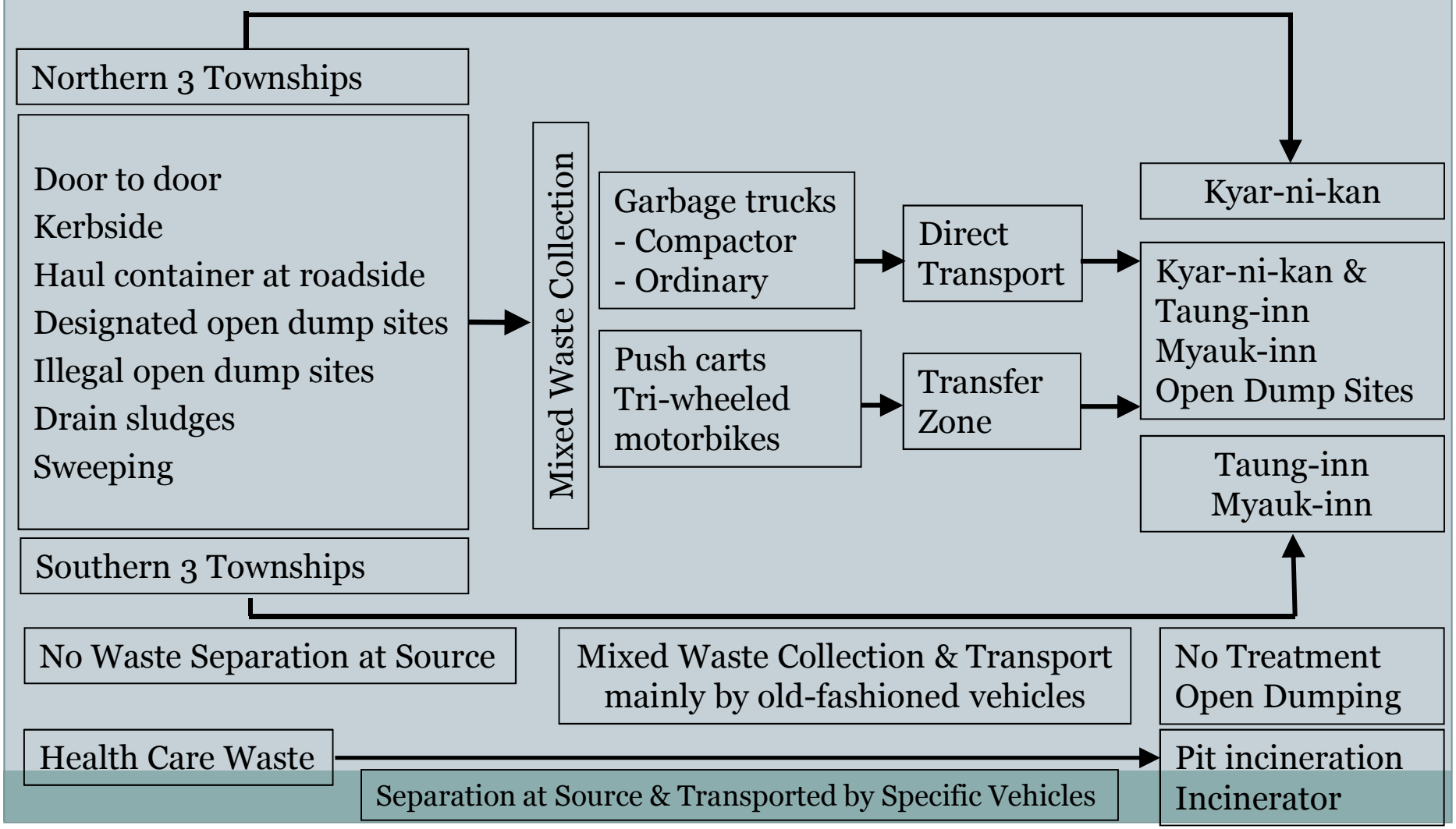
14 Departments (Operational Level)

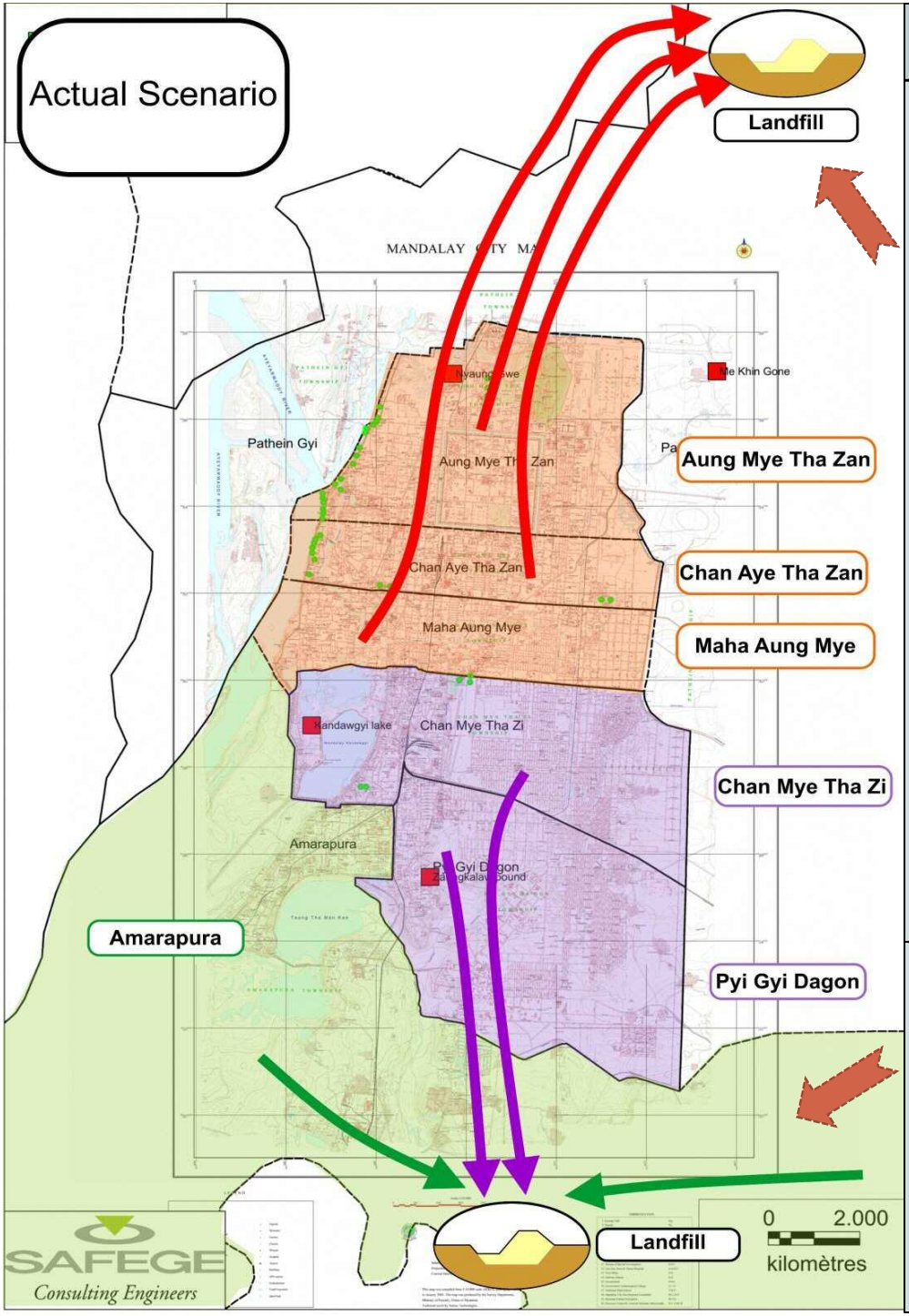
- Administration Department
- Motor Vehicle and Workshop Department
- Market and Slaughter House Department
- Finance Department
- Revenue Department
- Cleansing Department
- Playgrounds, Parks and Gardens Department
- Water and Sanitation Department
- City Planning and Administration Department
- Building and Central Store Department
- Roads and Bridges Department
- Public Relation and Information Department
- Agriculture and Livestock Department
- Inspection Department

Law, Bylaw, Operation Guidelines of Mandalay City Development Comittee

- Revised Mandalay City Development Law – 12 Jan 2015
- Mandalay City Development Bylaw – 14 May 2015
- Operation Guidelines – for each set of sectoral activities
- Conservation of Environment and Cleansing is enacted included with package of tasks in Amending Law on Mandalay City Development Law, 2014.
- In bylaw, waste management and environmental conservation are taken account as essential requirements for Business Administration and Licensing Regulations.

Solid Waste Management in Mandalay City as of 2018





Final Disposal Sites

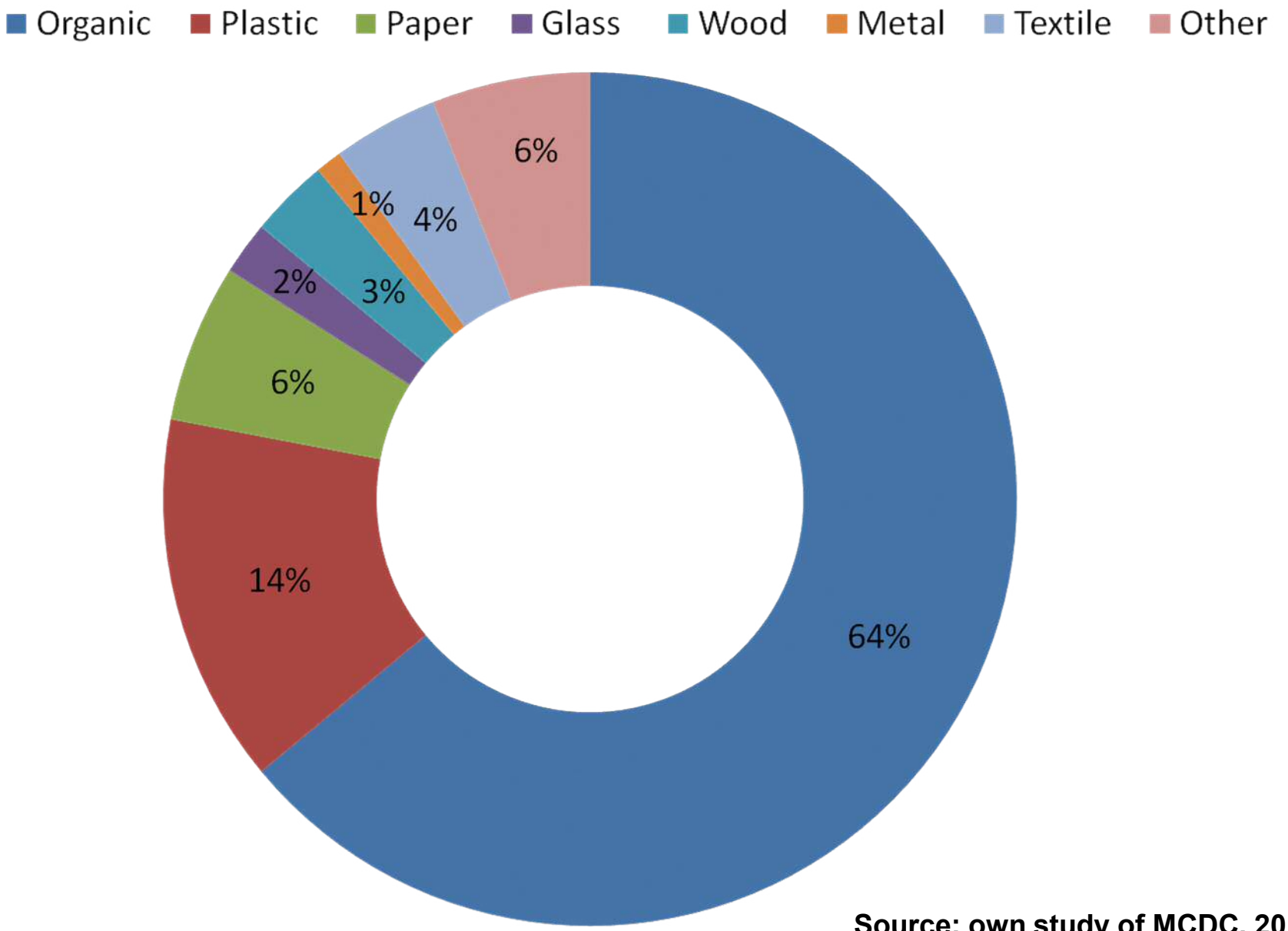
Kyar Ni Kan Open Dump Site

- 175 km far from Mandalay
- Land Area - 17.17Acres
- Dispose MSW - 500 tons/day average.
- From 1 Feb 2010 to 6 Jan 2012 –firstly used and 309,600 tons of MSW were disposed. Then, stopped to use for 2 yrs because cost burden for transportation was unbearable.
- Instead a dump site closer to Mdy was opened. Now it poses problems since city expands to encircle it.
- From 24 Dec 2013 to date – former open dump site was resumed.

Taung Inn Myauk Inn Open Dump Site

- 17 km
- 29.32 Acres
- 400 Tons /day of MSW
- Started at 2.2.2011 & still being used.
- Also it is problem scenario.

Waste Composition (as of 2013)



Source: own study of MCDC, 2013.

The Situation of Solid Waste Management in Mandalay City (2016-2017 FY)

Sr.	Indicators	Value
1	Waste Collection in ton/year	328,500 ton
2	Average Daily Waste Collection	900 tons/day
3	Per capita waste generation/day	0.73 kg/day
4	Primary collection rate	80%
5	Secondary collection rate	10-15%
6	Collection by private waste collectors but transported by MCDC	5%

The Situation of Solid Waste Management in Mandalay City (2016-2017 FY)

Sr.	Indicators	Value
7	Average Fq. of Waste Transport	2.5 trip/day/garbage truck
8	Average Waste Loading Capacity	1.6 ton/trip
9	Average Waste Loading Density	220 kg/m^3

The Situation of Solid Waste Management in Mandalay City (2016-2017 FY)

Sr.	Input	Items	Value
1	Vehicles	Compactor	24
		Ordinary	224
		Tri-wheeled Motorbike	181
		Road Sweeper	1
		Push Cart	90
		Boat	5
		Backhoe	25
		Bulldozer	2
2	Human Capacity	Waste Worker (permanent)	394
		Waste Worker (non-permanent)	1400
		Staffs	33
		Officer	12

The Current Situation of Solid Waste Management in Mandalay City




Ordinary vehicles and locally designed tank carriers are largely used in transportation of solid waste in Mandalay City.

No segregation, no packing & throw at illegal dump sites, and outdated old fashioned vehicles demand labour intensive & costly service.



The Current Situation of Solid Waste Management in Mandalay City

During recent years, compactor garbage trucks and hook lifts were introduced into the garbage collection and transport service in order to replace ordinary vehicles.

Used compactors (Japan made), not older than 2007 models were imported from Japan.

During 2018, 17 compactors in total will be imported, and for the time being, 7 had already arrived to MCDC. (Added to existing 24, there will be 41 in total during 2018 FY.)

Compactors are much more functional and efficient than ordinary garbage trucks and more importantly, reduce the labour need.

The Current Situation of Solid Waste Management in Mandalay City

Grossly visible manifestations of improper solid waste management



Malpractice of city dwellers that often manifests as disposal of wastes into rivers, ponds, creeks and drains. And in case of industrial waste disposal, it alarms MCDC to establish industrial waste management system as soon as possible.


Leachate seriously destroyed farmlands nearby.
Underground water pollution has not been assessed yet.

The Situation of Solid Waste Management in Mandalay City (2016-2017 FY)

4.0 Billion
(Kyat)

650 Million
(Kyat)

12,176
(Kyat)

Cost recovery mechanism in solid waste management in Mandalay City

- Taxation – stipulate sanitary tax as an integrated inclusion in property tax (building tax, light tax, rubbish and waste tax)
- Sanitary tax rate is calculated based on property value - i.e. building property.
- Sanitary tax NOT directly reflects to the volume or weight of waste generation by each household but reflects to the generally accepted principle i.e. “richer generates more wastes.”
- Collection of Sanitary fees or charges which is made based directly on waste generation is applied ONLY to business enterprises.
- The Gap = 3.35 Billion (Kyat)

The Current Situation of Solid Waste Management in Mandalay City

- Self-assessment made based on lifecycle-based integrated solid waste management
  - Reduction – has not been introduced at levels of direct consumption of natural resources and recycle resources, and at source of production.
  - Sustainable consumption – not yet introduced.
  - No proper treatment and disposal of solid waste.
  - No proper disposal of solid wastes.
  - Reuse and material recycling is growing in private sector. Large portion of raw recycling materials are exported to China.
  - In near future, recycling sector is predicted to decline since China changed the policy on import of raw recycling materials.

The Current Situation of Solid Waste Management in Mandalay City

- Self-assessment made based on generation-based integrated solid waste management
  - 3 Rs has not been introduced in most of residential wards, and in industrial and commercial sectors.
  - 3 Rs is being promoted in education sector and is being planned to introduce in wards where community-based solid waste management project is implemented.
  - Waste separation is properly applied in health facilities.
  - Treatment, recovery, FDS – still there is no treatment and recovery.
  - Confirmed – leachate treatment at open dump sites in 2018.
  - Development of sanitary landfills at 2 sites starting from 2018.
  - Existing open dump sites are to be controlled in order to reduce environmental damage.

The Current Situation of Solid Waste Management in Mandalay City

- Self-assessment made based on management-based integrated solid waste management
  - Regulation to control improper waste management – applied but coverage was not satisfactory.
  - Effective regulations, financial mechanism for service providers, waste generators and enterprises – regulations can not be fully applied at operational level. Standardized instructions could not be conveyed to reach grass-root level without dropping some part of its meaning. Because grass-root level agencies could not fulfill the all requirements as per instructions.
  - Financial mechanism for solid waste management is outdated as mention in earlier slides.

The Current Situation of Solid Waste Management in Mandalay City

- Self-assessment made based on management-based integrated solid waste management
  - Technology innovation – In general, technologies were diffused through entrepreneurs. Main Source - imported from China.
  - But it just means to say 'adjusted' in order to adapt with local needs rather than innovation. E.g. recycling sector
  - Technology innovation is hard to find in the area of waste collection, transport, treatment, recovery and disposal.
  - Rare examples – composting method but it is still a pilot study in Mandalay University. And leachate treatment but it has not been approved yet for efficiency and applicability.
  - To grasp high-tech to be applied in solid waste management sector - seems impossible for local people.

In Brighter Aspect of Solid Waste Management in Mandalay City

ESC Model Cities Programme Year 2 & 3

In long-term perspective, sustainability is ensured by integrating environmental education into traditional & formal education system.

In Brighter Aspect of Solid Waste Management in Mandalay City

ESC Model Cities Programme Year 3

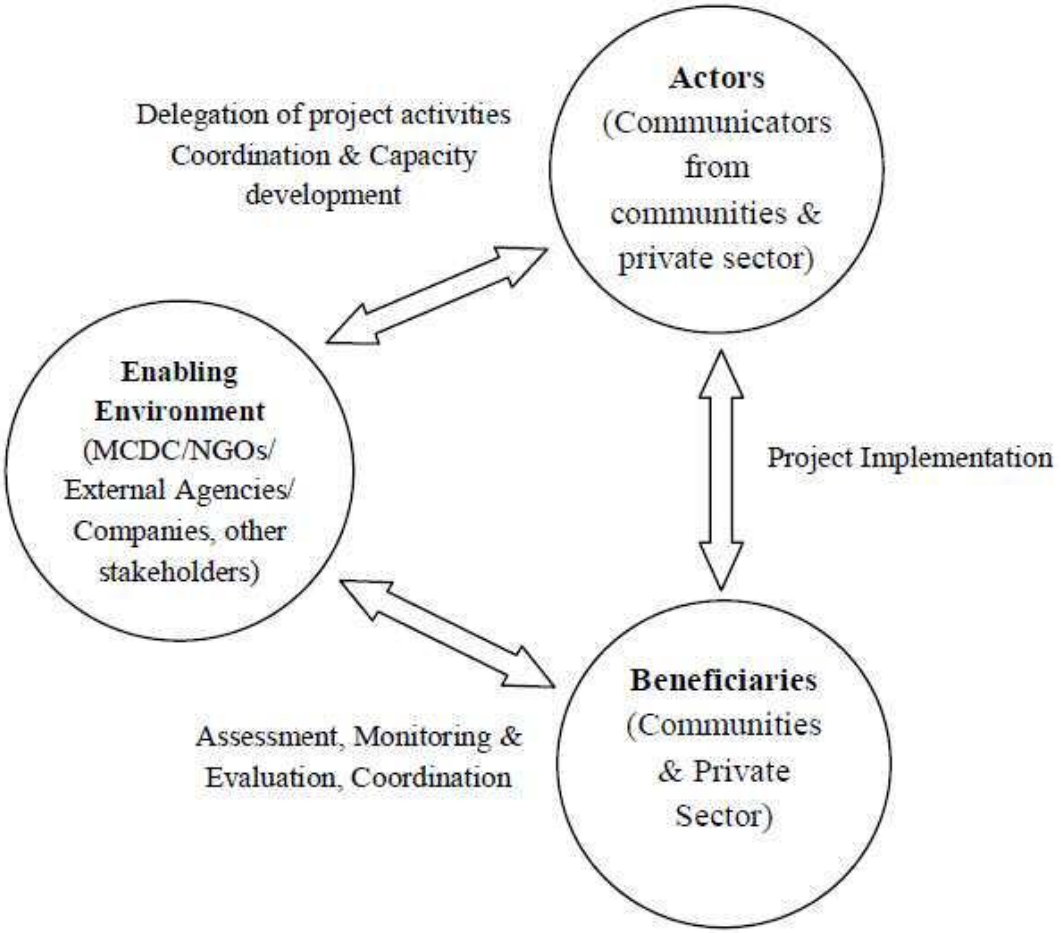
Skill Development Training on biogas generation, composting, and recycle art

In Brighter Aspect of Solid Waste Management in Mandalay City

Community-based Solid Waste Management Project

Started in 2017

- CCET Small Grant Programme
- Entry Point to SWMS & AP
- Goal A, B, E, F.



Activities Package

Regional Level Summit
IEC materials development, training materials
Purchase audio-visual equipment
Development of TV clips, songs, airing via radio and TV channel
Purchase equipment for demonstration of waste separation at source.
Meeting with private sector, informal sector
Assessment on organic waste reduction potential
Development of compost product model
Purchase chopping machine
Monitoring & Evaluation Component

In Brighter Aspect of Solid Waste Management in Mandalay City

Health Care Waste Management as of 2018

- The Activities are being expanded since Nov., 2017 to cover all health facilities.
- Hospital Waste (Average daily collection - 665.75 kg/day)
- Clinics (Average bi-weekly collection - 1056.07 kg/day)
- Anatomical Waste (Average daily collection - 50 kg/day)
- IVDUs (discarded needles & syringes at drop-in centres) Average daily collection - 318 kg/day
- Total collection/day - 2,089 kg/day

Waste Separation at Source, proper collection, proper transport , proper disposal – just recently, the system was introduced in health sector.

Official Colour Codes

General Waste (Black)
Infectious Waste (Yellow)
Sharps (Red)

Planned Activities in Next 3 Months

The planned activities are to be implemented as commencement.

- Commencement of industrial waste management – commenced as separate collection and transport
- Commencement of waste management at source of production – Oxium additive bio-degradable plastics and Ecoplast (technology transfer from Indonesia – introduce and promote in sources of plastic production in Mandalay City)

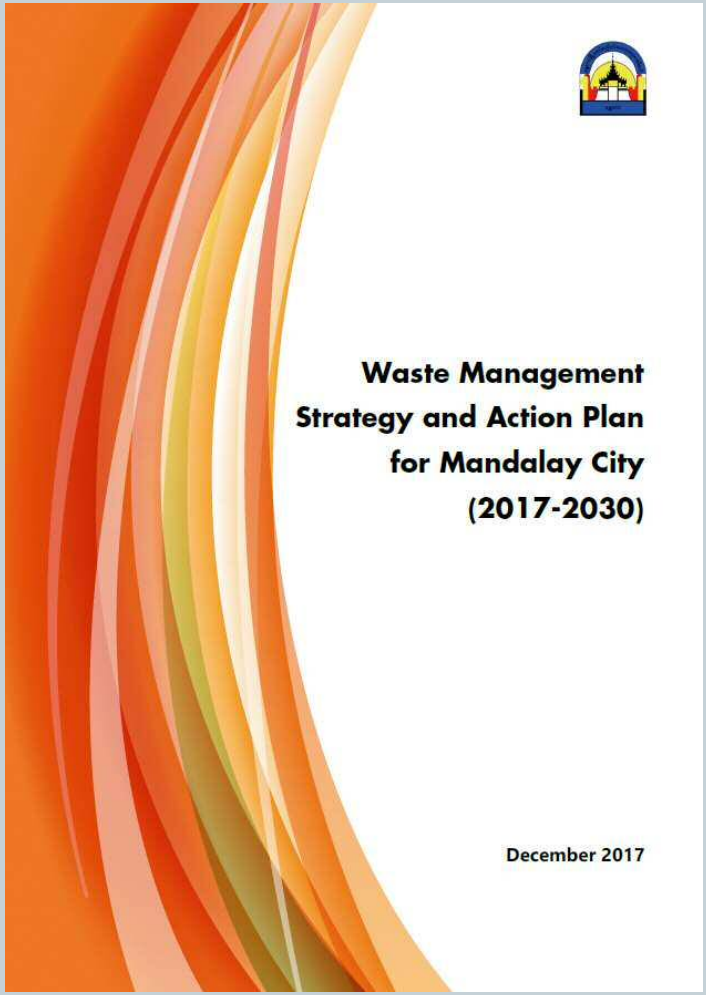
Planned Activities in Next 3 Months

Contd., The planned activities are to be implemented as commencement.

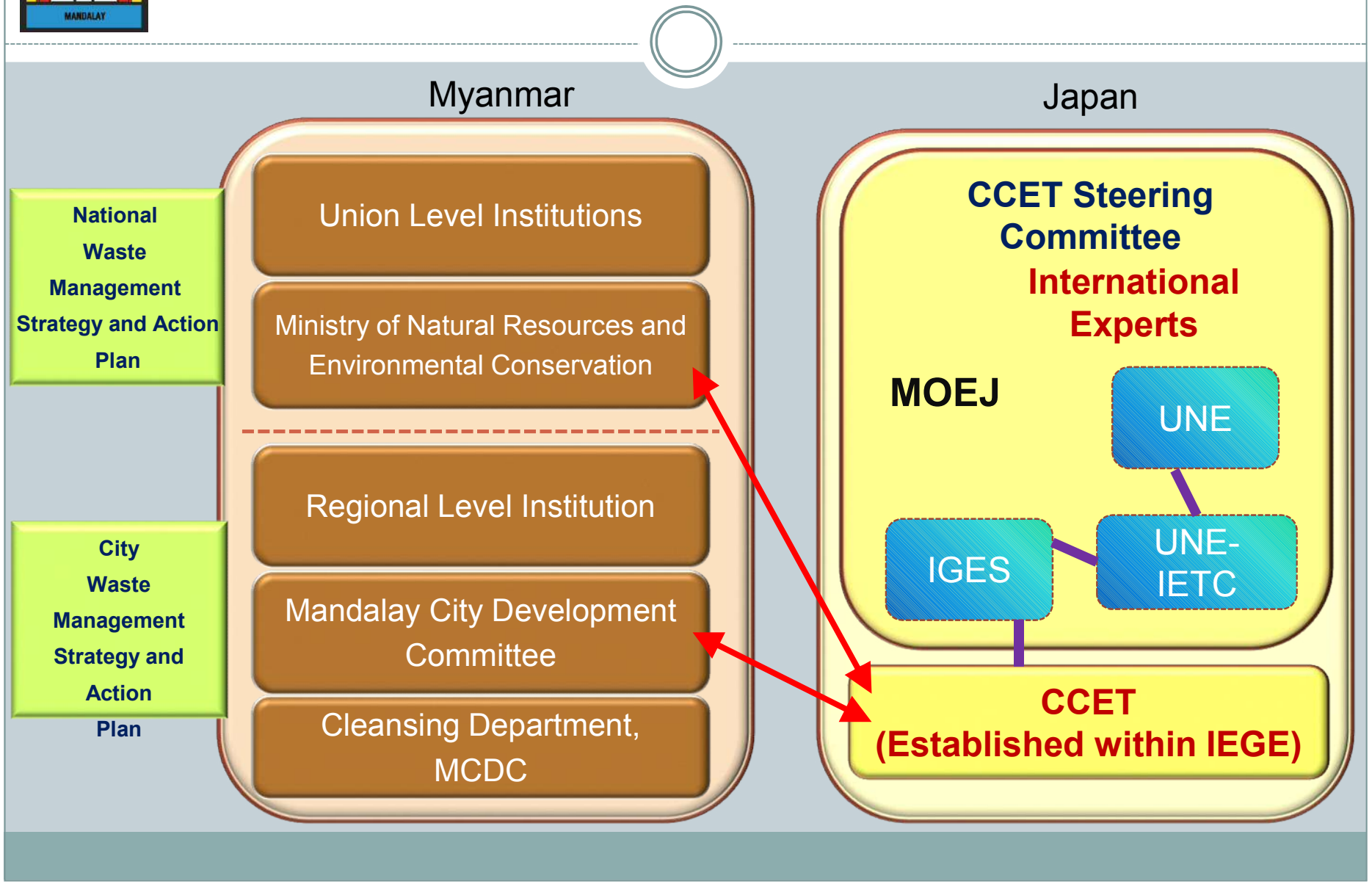
- Commencement of proper disposal at FDS – Purchase land in two sites for sanitary landfill development.

  (Budget Allocation = Ks. 0.7 Billion for purchase of lands)
- Commencement of air pollution control – Establishment of Ambient Air Quality Monitoring System
  - project proposal had been approved by Committee.
  - training had been given to staffs.

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)



ollaboration between Myanmar & Japan for Development of Waste Management Strategy and Action Plan



Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

Process Flow of Strategy Development in Mandalay City

Source: IGES

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

Source: IGES

Multi-stakeholders Workshops held in Mandalay City

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

Vision Statement

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

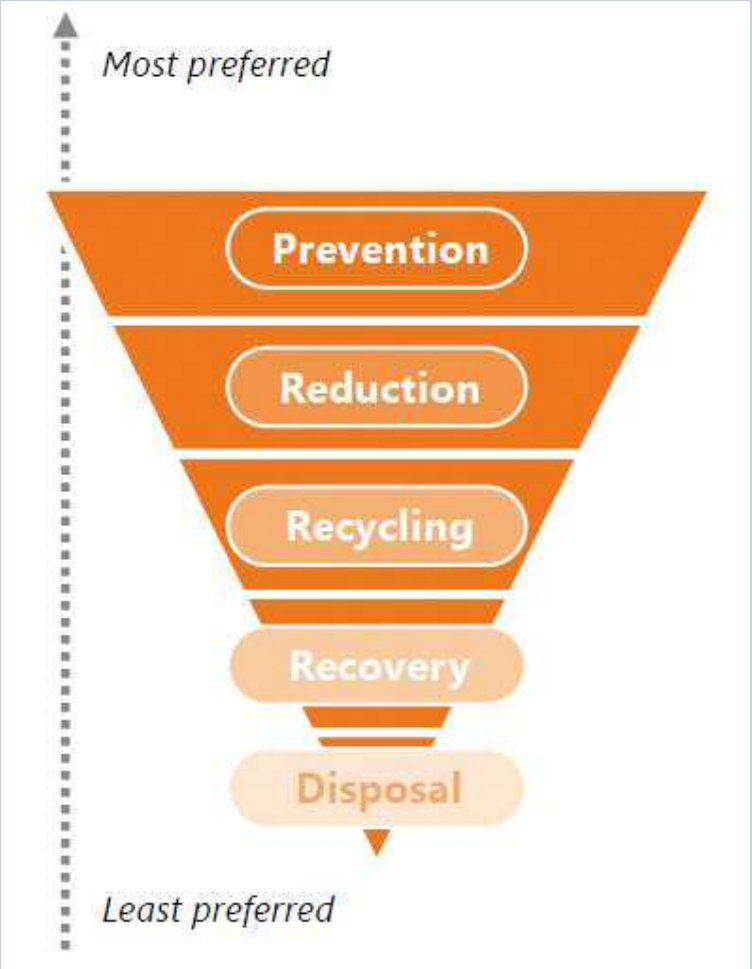
Mission Statement

- To reduce all types of wastes (solid, liquid, and gaseous waste) generation and manage residual waste materials in a way which maximizes opportunities for resource recovery, while protecting public health and the environment to achieve a zero waste society by 2030.

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

The Guiding Principles

- Zero Waste
- Waste Hierarchy
- Resource Conservation
- Polluter-pays Principle
- Precautionary Principle
- Consultation Principle
- Shared Responsibility
- Proximity Principle



Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

Goals

A. Provide adequate and affordable municipal waste collection service for all and waste reduction through prevention and 3Rs.

B. Stop uncontrolled dumping, open burning and improve the final treatment and disposal.

C. Maximize proper collection and treatment of industrial and other special types of wastes.

D. Maximize proper disposal and treatment of liquid waste.

E. Capacity development, awareness raising and advocacy

E. Ensure sustainable services through regular review, monitoring, innovation and improvement.

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

Step-up Processes to the End of 2030

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

A. Provide adequate and affordable municipal waste collection service for all and waste reduction through prevention and 3Rs.

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(i) Increase % municipal waste collection coverage in the whole city	80%	90%	100%
(ii) Progress % of waste separation at source and collection system will be operated.	1 or 2 pilot townships	Half of the townships	All townships of the City
(iii) Increase % material recovery and recycling.	25%(10% recyclable & 15% food waste)	50% (15% recyclable & 35% food waste)	80% (20% recyclable & 60% food waste)

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

B. Stop uncontrolled dumping, open burning and improve the final treatment and disposal.

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(i) Reduction % of illegal dumping & open burning in the City.	50%	75%	100%
(ii) Improvement of the landfill site operation.	Immediate improvement to the operation of existing landfills (open dumping to controlled landfill)	Establishment of controlled landfill site with minimum requirement in place to protect the environment.	Full operation of the sanitary landfill

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

B. Stop uncontrolled dumping, open burning and improve the final treatment and disposal.

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(iii) Reduction % of food waste, market waste and green waste to be land filled	15%	35%	60% & take legislation to ban the food waste & market waste to be landfilled.
(iv) Introduction of appropriate technologies for immediate treatment	Feasibility study & pilot application of composting, anaerobic digester (bio-gas) & other options such as animal feeding to treat organic waste.	Operation of composting, anaerobic digester (bio-gas) & animal feeding for organic waste. Feasibility study for RDF & WtE technologies aimed at minimizing waste disposal.	Any application of RDF & WtE technologies aimed at minimizing waste disposal.

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

C. Maximize proper waste collection & treatment of industrial & other special types of wastes (hazardous, medial, mining, e-waste, construction & demolition waste etc.)

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(i) Increase % of recycling of industrial & other special types of wastes.	25%	50%	80%
(ii) Reduction % of industrial & other wastes sent to land-fill without pre-treatment.	25%	50%	Ban on industrial waste to be landfilled (100%). Establish proper treatment methods & technologies for industrial wastes.

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

D. Maximize proper disposal and treatment of liquid waste.

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(i) Increase % coverage of liquid waste collection & proper treatment in domestic sector.	25%	50%	100%
(ii) Increase % coverage of liquid waste collection & proper treatment in industrial sector.	25%	50%	100%
(iii) Increase % coverage of liquid waste collection & proper treatment in public places (public markets, central buss & train terminals)	25%	50%	100%

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

E. Capacity development, awareness raising and advocacy.

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(i) Increase % number of townships have implemented standard awareness-raising programmes for their residents & % of population reached.	25%	50%	100%
(ii) Increase % number of schools have established environmental education programmes & the % of students reached.	25%	50%	100%
(iii) Increase % of degree of cooperation of other stakeholders for ensuring the sustainable waste management service.	50%	75%	100%

Waste Management Strategy & Action Plan for Mandalay City (2017-2030)

F. Ensure sustainable services through regular review, monitoring, innovation and improvement..

	Short-term (2017-2020)	Mid-term (2021-2025)	Long-term (2025-2030)
(i) Establishment & monitoring of data collection & benchmark performance indicators.	50%	75%	100%
(ii) Decreased % number of enforcement actions filed against non-compliant activities.	50%	75%	100%
(iii) Increased degree of public / customer satisfaction % about the waste management service.	50%	75%	100%

Technology Needs

- Along with the continuum of solid waste management starting from solid waste collection to final disposal are in need of technology in order to transform existing traditional/ineffective/inefficient into modern/effective/efficient.
- Prioritization will be made in accordance with settings laid down in strategy and action plan, and on the other hand, made balanced against availability of financial inputs through budget allocations and other financing mechanisms.

Technology Needs

- Needs in immediate future
  - Equipment, vehicles and facilities to improve collection & transport system.
  - Technologies to sustain & promote recycling enterprises; tailing off dependency on China market & promoting self-sufficiency/ recycling enterprises to be promoted in parallel with or in pace with development of waste separation practice among households in the city.
  - Most appropriate composting technologies that are acceptable widely and be able to duplicate among people in the city.
  - Sanitary landfill development in 2 sites.

Technology Needs

Needs in immediate future

- Technologies to transform existing two open dumps into controlled landfills.
- Pre-treatment technologies for industrial wastes
- Industrial waste water treatment technologies

Short term needs

- Feasibility study & pilot application of anaerobic digester (bio-gas) & other options such as animal feeding to treat organic waste.
- liquid waste collection & proper treatment in domestic and industrial sectors, and public spaces.

Technology Needs

- Mid-term and Long-term Needs
  - RDF & WtE technologies aimed at minimizing waste disposal.

MCDC's Priority Plan in terms of Technology Needs

- ❖ Waste Segregation at FDS
- ❖ Bio-digester Establishment
- ❖ RDF
- ❖ From Waste to Energy

The priority plan will have to be started within the present Government Term (up to 2020).

THANK YOU

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