





PREVENT PLASTICS

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Myanmar\_PP



Partners



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# ABBREVIATIONS

3R	Reduce, Reuse, Recycle
CBOs	Community-Based Organisation
EU	European Union
EMA	Environmental Management Authority (formerly known as Pollution Control and Cleaning Department (PCCD))
ECD	Environmental Conservation Department
IZ	Industrial Zones
NGOs	Non-Profit Organisations
INGOs	International Non-Governmental Organisations
MSW	Municipal Solid Waste
MDY	Mandalay
MOI	Ministry of Industry
MONREC	Ministry of Natural Resource and Environmental Conservation
MFA	Mass Flow Analysis
PP	Prevent Plastics
SMEs	Small-Medium Enterprises
MSMEs	Micro Small-Medium Enterprises
SD	South Dagon
SLB	Shwe Lin Ban
SPT	Shwe Pyi Thar
TYTC	TYTC Services Company Limited
UMFCCI	Union of Myanmar Federation of Chambers of Commerce & Industry
YCDC	Yangon City Development Committee



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INTRODUCTION

Myanmar has been encountering substantial challenges in the waste management sector due to the increasing income and consumption levels, population growth, economic growth, and a lack of effective waste treatments and disposal options for the growing amount of waste generation.

Prevent Plastics is an EU funded project with the overall objectives to promote Sustainable Consumption and Production – SCP patterns in Myanmar through raised awareness and best practices on waste management.

The purpose of the 3Rs concept is to ensure the implementation of effective and comprehensive waste management practices in model zones in Yangon and Mandalay. This 3Rs concept offers strategies and approaches to reduce waste generation as a first step, and to identify constraints and areas for improvements, gaps in current waste management structures, and propose step by step the 3Rs tactics (reduce, reuse, and recycle) while contributing towards environmental sustainability and improving the quality of waste management services with an affordable and reliable collection and transportation system in targeted Industrial Zones.

The targeted industrial zones are South Dagon Industrial Zone 1 (SD), Shwe Pyi Thar Industrial Zone 1 (SPT), and Shwe Lin Ban (SLB), and one zone in Mandalay region (MDY) to improve their waste management, practices specifically regarding plastics waste reduction, reduced illegal dumping and burning. This 3Rs concept is mainly generated based on the three targeted industrial zones in Yangon. Due to the travel restriction and pandemic crisis, it was not possible to acquire much detailed formulation for industrial zones in Mandalay.

A baseline assessment was conducted in 2020 analysing waste generation and forms of disposal from 19 factories out of 2,004 factories in SD, SPT, SLB, and MDY. It also raised awareness for sustainable waste management practices in the targeted industrial zones. By the end of the project, the aim is to reach at least 30% of these factories that benefit from improved waste collection and recycling services and consequently a safer working place and improved urban environment.

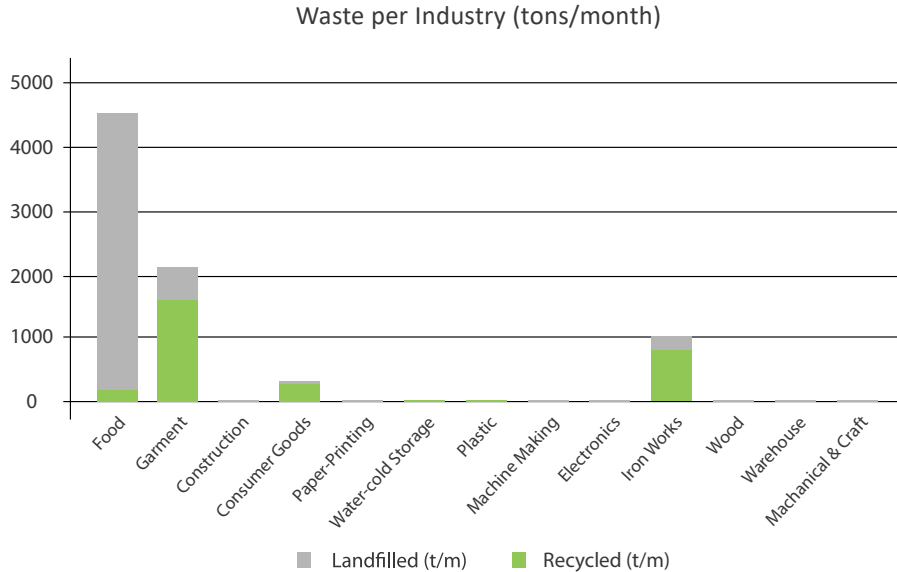
## CURRENT SITUATION



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## 2.1 Baseline

Waste generation in Myanmar's industrial zones is not well documented. Therefore, a method of extrapolation was used from surveys made in sample factories and at one transfer station in the South Dagon Industrial Zone. The analysis for the four industrial zones revealed that waste generation is around 8,100 tons per month, from which 2900 tons of waste is recycled, and 5200 tons are sent to landfills. A detailed generation per sector can be seen in the following figure:

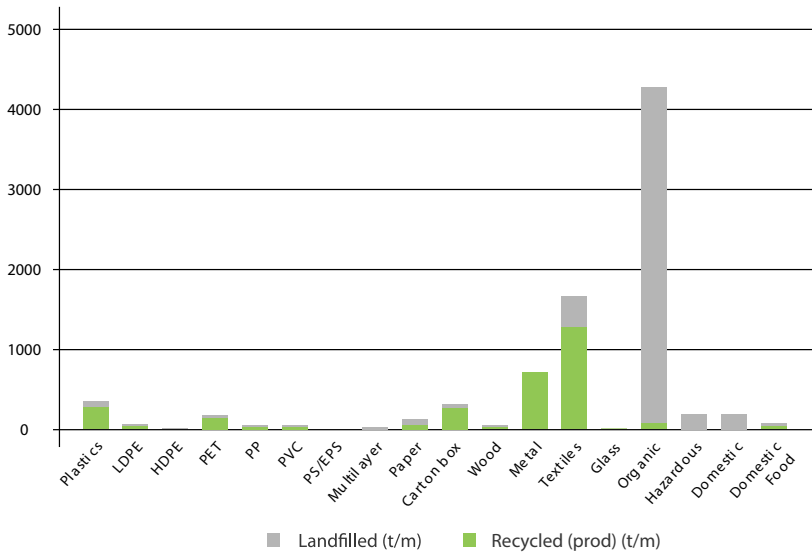


The food and garment industries are dominating the waste generation since they are the largest industries, but also because they produce more waste per worker. Although producing a lot of waste, the iron industry does not dispose their waste in landfills since most metal is recycled. The food industry is landfilling most of its organic waste since there is no treatment facility for organic material up until now.

The waste composition in the zones was assessed similar to the generated amount. Sample factories were surveyed and the results were extrapolated to the full industry. This approach allowed us to have a good estimation of generated waste by the different industries. As seen in the figure below, the production of organic waste is heavily dominating the waste stream while other materials are lesser in quantity and often better recycled.



## Waste Generation per waste material: recycled and non recycled



Resource efficiency has a long history in the traditional manufacturing process in Myanmar, given the fact that up until 2011, the import of material was challenging and expensive. Processes from this era are still visible, although not all of them are environmentally friendly. For example, factories often burn their leftover waste in their boiler. Waste burned in the boiler often contains different forms of plastics and other materials, including toxic terials. Another challenge in efficiency comes from the lack of making technological advancements and the unwillingness to hire consultants who support the factory in improving their processing.

Factories that set up only recently and where owners are not aware of the well-developed reuse/repair and recycling economy tend to produce more waste and often do not have a waste segregation system in place. These factories often rely on informal waste collection service providers who collect waste for no charge and generate their income through the extraction and sale of valuable materials in the waste. On the first impression, this looks like a win-win situation, but it does not lead to a well-managed waste segregation system on the factory level, and recyclable materials are often contaminated.

## 2.2 Existing policies, laws, rules, and regulations

Myanmar has legislations and laws that protect and conserve the natural environment and that help to manage a path that is economically strong, but also socially and environmentally sustainable for its citizens. However, the enforcement is still weak. The laws require amendments in the enforcement structure to supervise both local and national levels for waste generation and composition.

Furthermore, Myanmar also needs to revise existing laws or formulate new laws that consider the changing economic situation in the country, the prevailing global environmental concerns, and align with the international environmental conventions. More effort should be made to treat waste as a resource and to reduce waste at its source.

The following rules and regulations were implemented at the city and national level to govern the municipal solid waste management:

### 2.2.1. Legislation at city level

The City of Yangon Development Law No. 11/90, published in 1990 by SLORC (State Law and Order Restoration Council), discusses the duties and responsibilities of all stakeholders regarding solid waste management. It lays down the policy, supervises the implementation process and contributes to city developments by implementing civil projects. Furthermore, the establishment of new towns and administration of townlands within the limits of the City of Yangon is regulated.

The City of Rangoon Municipal (Amendment) Act 31/1960 and The City of Yangon Municipal Act, 1922 state the obligations related to environmental sanitation, pollution of air and water, and public health. (Please see Annex 2)

The quality of waste management services may be considered as a good indicator of a city's governance: The way waste is collected and discarded gives us a key insight into the functioning of the local government. The quality of waste produced per person, in turn, shows how people live in the community.

### 2.2.2. Legislation at the national level

The Environment Conservation Law (2012) was established by the Pyidaungsu Hluttaw on March 30th, 2012, to preserve the natural environment from public and private actions and behaviours that might cause destruction. The Environmental Conservation Law included governing on municipal waste management under Chapter 4 and Chapter 7 to measure the purposes of protecting the environment and promoting environmental management and sustainable development. (Please see in the Annexes 1)

Although Myanmar is striving to manage waste issues the best it can, it is still weak in delivering sustainable best practices in waste management compared to other experienced countries. However, with the absence of policy reinforcement, enabling legislation, and environmentally concerned citizens for the solid waste management practices in Myanmar are not effective.

Therefore, public policies and legislations reinforcements are required from both local and national government bodies to support and advocate the transition process to sustainable waste management practices while contributing towards environmental sustainability to improve the quality of waste management services with the affordable and reliable collection and transportation system in industrial zones.



3

OBJECTIVES,  
GOALS,  
TARGETS

## 3.1 Objectives

*The overall objective of the “3R Concept Developments in Industrial Zones” is the promotion of sustainable production and consumption patterns in Myanmar’s industry through raised awareness and best practices on waste management.*

*Therefore, four industrial zones were selected to adopt sustainable waste management practices, which are specified in this document.*

## 3.2 Goals

- Adoption of sustainable waste management practices.
- Reduction of plastic waste within the four industrial zones at dumpsite level.
- Elimination of open burning of waste and illegal dumping sites in the targeted industrial zones.
- Public-Private-Dialogue and industrial symbiosis.
- Capacity development for stakeholders.

## 3.3 Targets

- At least 50% of MSMEs in four industrial zones introduced sustainable waste management practices by 2024.
- By the end of the project, 30% of the solid waste generated in the target areas is systematically collected and optimally handled without being sent to landfills.
- Open burning and illegal dumpsite disposal practices are largely eliminated from the intervention area (expected 80% reduction in prevalence of illegal dumpsites and illegal burning).
- Waste assessments/audits of dumpsite intake from the four targeted zones reveal a reduction in plastic by at least 80%.
- A reduction programme to achieve at least 20% reduction of the top two waste sources is established in each of the first three industrial zones.
- Ten qualified local consultants and master trainers for sustainable waste management are trained and 4-8 qualified local consultants for waste auditing are trained.
- 120 waste service providers are trained.
- Technical capacity of 8-12 members of industrial committees in four industrial zones is enhanced.
- A guideline to access green loans for sustainable waste management has been developed and at least eight MSMEs have accessed green loans by the year 2023.

## GAPS AND CHALLENGES



4

The main challenges and obstacles for effective waste management in industrial zones are categorised under the following four main themes: reduction, recycling, reuse, and collection.

## 4.1 Reduction

- Lack of awareness about the benefits and approaches of waste reduction at source, leading to little or no efforts to reduce waste generation in the first place.
- Inefficient production practices and manufacturing equipment in the factories.
- Limited public perception: Factory management and industrial zone citizens consider that waste management is not their problem, but YCDC's responsibility. The public carries a negative perception of the role played by the local body mainly due to the conspicuous quantities of waste lying uncollected on city roads for days. With civic awareness and public cooperation, people can keep the city clean.
- Limited data collection and record keeping: A functional record keeping method to assess the ward-wise and street-wise volumes of waste handled is missing. Without adequate record keeping and realistic databases, it is difficult to improve the quality of planning and delivery of basic services in the cities. Industries often also do not have records of their amounts of waste generation.
- Not sufficient partnerships: Requires building partnerships with relevant stakeholders such as national authorities, ministries, related departments, NGOs, INGOs, and CBOs.
- Absence of participatory mechanisms: The city administration does not have adequate institutional mechanisms to engage the residents, public organisations, NGOs, and other stakeholders on a regular basis to assist in decision-making and programme implementation. The role that these stakeholders can play in educating the masses and mobilising their communities has not been adequately recognised.
- Lack of new initiatives: Moving away from traditional approaches and rethinking several new technical options to address and understand the waste as resources. Composting, biogas generation, separation at source and promotion of collection centres are some these initiatives.

## 4.2 Recycling

- Factories are not always aware of the different recycling options available as the system operates informally and they accept the offers from informal collectors, who then collect their waste.
- Factories do not practice recycling processes/systems in their factories due to lack of awareness on cost-recovery from the recycling materials.
- Some valuable materials such as cardboards and metal are sold to third party users, however other organic materials such as food waste that is not "recyclable" and often thrown away into the landfills. e.g., fruit skins, fish skins, food factories and workers' food waste are thrown away mixing with other waste.

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- Since there is an inefficient and unreliable collection system or with considerable high tipping fees, self-drop systems by the factories are common in the industrial zones. As a result, there is not only a high number of self-drop systems in place but also the most recyclable materials are not recovered until they reach disposal sites.
- Factories do not usually practice segregation processes at the factory level. They rely on private collectors who then segregate while collecting their waste, mostly contaminating the material.
- There are no formal regulations and enforcement for recycling materials for factories.

### 4.3 Reuse

Material and waste exchange markets are missing at industrial level. Only valuable type of material is being sold in the market after being modified or repaired. The rest is discharged as waste and will be landfilled in best case.

- No specific reusing structure or foundation for specific materials or items in the industrial zones.
- Limited awareness on refining and reusing practices between factories, but they are practicing selling material to third parties by weight.
- Inefficient experiences of improving existing products and requiring fabricating materials to further interventions.
- Limited repurposing process for reusable materials in the factories due to lack of sorting practices.
- Lack of relevant and contextualised captured design knowledge on the products’ development process.
- Reusable materials are mostly fabricated with low quality and standards except for carton boxes, drums, and machinery which factories utilise as required by standard of product quality and lifespan.
- Limited community participation and resource provision from the relevant authorities and departments at factory level.

At national level, there are huge marketplaces for reuse of products, materials, vehicles, buses, motorcycles, clothes, electrical products, and appliances. Those are mainly used products from China, Japan, Korea, and Thailand. However, markets are not supporting the trade of local products.

## 4.4 Collection

Industries face different challenges with disposing of their waste which can be divided into following categories:

- Non-hazardous production waste is by far the largest component in the waste stream from factories and a decent percentage is collected for recycling informally. However, certain challenges remain for the waste:
  - Municipal collection is not fully reliable, which is challenging for the food production sector which cannot store their waste for a longer period.
  - Waste is not collected in a segregated manner, contaminating recyclable materials, and sometimes being mixed up with hazardous waste.
- Domestic waste requires pick up at least every second day to avoid pests of the compound. Since this frequent service is mostly not provided at the factories, they tend to:
  - Dispose their waste in communal bins.
  - Dispose with informal collectors who might dump it on illegal grounds.
- Hazardous waste faces the most challenges when disposing:
  - Private facilities like Golden Dohar are too expensive and therefore factories try not to use them.
  - Public facilities provided by YCDC are not always up to the environmental standards needed to dispose of material.
  - Separate collection of hazardous waste is not always available or well promoted/enforced allowing factories to mix it with their production waste.





5

ACTIONS

Initial consultation and baseline studies led to the following general approach to improve waste management in the industrial zones in Yangon and Mandalay with five focus areas:

1. Waste reduction through improvements in the production processes.
2. Waste reduction through awareness raising amongst industries and behaviour change.
3. Waste valorisation through source segregation.
4. Improved waste collection facilitation between IZ committees, municipality, and the community.
5. The setup of treatment facilities.

Each focus area has a specific set of actions and stakeholders to engage which together can assist not only the current waste stream problems but also help to restore a greener and cleaner environment for all.

## 5.1 Waste reduction through improvements in the production process

### 5.1.1 Production Waste

Approach: The overall approach for the assessment at the factories will include planning, identification of improvement options, preparation of quick action plans, prioritising the actions based on 3R's approach, assessment in detail with tools like mass flow analysis (MFA), technical support, handholding, follow up, impact verification, preparation of the showcases/case-studies, replication in other factories/clusters and reporting of results.

The waste generated in the factories depends on the input material and production process. For example, the dyeing industries will have wastage in forms of clothes, rags, dyes, other chemicals, packaging waste etc., whereas food manufacturing units may have waste in the form of vegetable peels, rejected fruits/vegetables, oil, packaging waste etc. The same 3R's concept when applied to factories with different production processes will have different sets of actions required for waste minimisation.

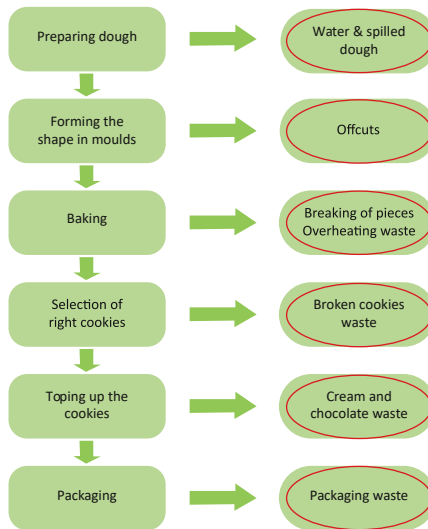
Activities:

- Understanding the production process at the factory (gate to gate).
- Recognising the main raw materials which are responsible for 80% of cost of production.
- Studying the input-output flow of these raw materials in the production process.
- Identification of options where optimisation in production process is required which in turn will reduce the wastage of raw material in the process.
- Supporting factories in quantifying the cost of material that is getting wasted.
- Taking actions for reduction of material/waste at the source.
- Promoting use of alternative and sustainable packaging e.g., returnable containers.
- Initiating the segregation of waste and collection. Ensure that there are suitable and separate storage facilities in place for different kinds of waste in the production line. The category of waste will depend on process - organic, inorganic, hazardous etc.

- Initiating quantification of waste on a daily/weekly basis.
- Initiating data collection of the materials and development of performance indicators.
- Helping factories develop internal benchmarks to keep a track on their waste minimisation efforts.
- Guiding factories in setting up annual performance targets.
- Identifying options to reuse a material considered as waste in the factory by either putting an item into use again or for another purpose. This is the case when the object can be used again or differently compared to what it is intended to do. It also means passing on things to others instead of throwing them away.
- Identifying options for recycling when reduction and reuse is not feasible. To recycle means to change or transform waste and non-useable items into raw materials that can be used to create new objects.
- Conducting awareness and training workshop at various levels to waste minimisation in the production process.

### Example 1: Generalised production process and waste in a cookie factory

Cookies making factory- production waste overview



**Example 2: For a factory using a lot of paper for office work, the very simple options for reduce, reuse, and recycle could be:**

Reduce:

- Printing papers on both sides to reduce paper wastage.
- Using electronic mail to reach out to people instead of sending paper mails.

Reuse:

- Writing on paper can be done on both sides.
- Using old non-confidential papers for wrapping and packaging.

**Recycling:**

- Sending used/old papers for recycling and using recycled paper for printing or making paper handicrafts.
- Buying a small in-house shredder for confidential papers and then sending it for recycling.

**5.1.1.2 Domestic Waste from Industries**

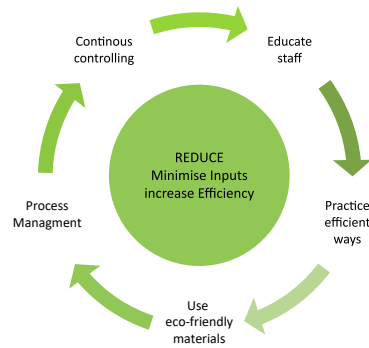
The different kinds of domestic/municipal waste at a factory derive from food waste from the canteen, plastic bags, bottles, plastic cups and wrappers from tea and coffee consumption, garden waste etc.

**Activities:**

- Understanding the type and source of different kind of domestic waste in the factory.
- Studying the feasibility to reduce these waste - food waste, plastic, garden waste, etc.
- Taking actions to reduce the single use items to reusable items, like replacing single use plastic bottles with refillable glass bottles, and replacing single use plastics bags with cloth bags.
- Initiating segregation of waste so that appropriate action for reduction, reuse and recycle could be taken. Only when effective segregation has taken place, one is able to decide the course of actions for a particular kind of waste. E.g., the amount of food and garden waste will decide what is more feasible - composting or setting up a biogas plant.
- Initiating waste quantification, data collection and setting short-term and long-term targets.
- Studying the feasibility for composting, biogas plant etc. in case of food waste and initiating pilot projects to demonstrate composting and/or biogas production.
- Studying feasibility and suggesting options for recycling of the domestic waste like food waste to form briquettes or use with construction material. Similarly the plastic is also used in certain garment industries and in the construction sector.
- Involving management for some changes to reduce domestic waste from shops inside the factory.
- Conducting awareness and training workshop at various level for domestic waste minimisation.

**Examples of domestic waste in factories' waste**

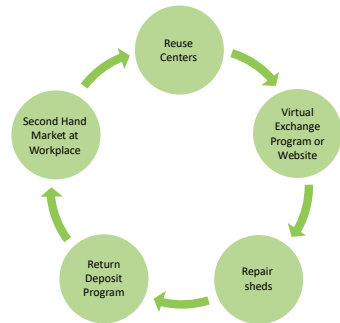
## 5.2 Waste reduction through awareness raising amongst industries and behaviour change



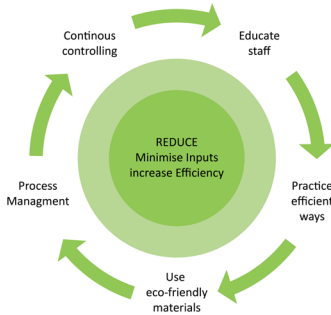
At the top of waste hierarchy is source reduction. This means to find a way to reduce the amount of waste being generated during production. The best way is a waste minimisation approach. Reducing excess processing defectives, defects, and scraps, can have a big impact on waste reduction in businesses and workplaces. The owners should train their staff to understand the fabrication activities and practice efficient ways to produce as little waste as possible. Second, the products should utilise the higher

quality materials to sustain product lives and allow the product to be in use in production shop floors for a long time. Third, having proper management is the key to oversee production and consumption. Finally, this practice must continuously be managed and monitored to benefit both the company and the community in a sustainable way.

Reuse: Reuse helps to save time, money, energy, and resources. In broader economic terms, it can make quality products available to enterprises and its people. Financial motivation was one of the main drivers of the reuse practice. A reuse centre and virtual exchange programme within factory-wide and industrial zone-wide programme is highly recommended. This programme will facilitate the transaction and reusing of unwanted (but in good shape and usable) materials and equipment from one person or one department or another. The reuse of electrical and electronic equipment products remains low due to inadequate infrastructure, lack of repair networks and products. Therefore, another idea is providing repair services or workshops shed inside the factory yard to develop reuse and repair habits among workplaces. Offering deposit programmes such as a financial incentive to the enterprise's buyers or customers to return the reusable package to the factory for reusing in packaging activities. Keeping packaging materials from oversea suppliers such as cardboard boxes, Styrofoam peanuts, air-filled plastic "pillows" which can wind up in the landfill, can be reused for the finished products' own shipping needs. The company can save resources and money by not buying newly packed peanuts every time. Old electronics, old sewing machines, old machinery parts, which come out from process upgrading requirements, can be reused in training rooms for new employees' on-boarding programmes for skill training of operators and mechanics.



Instead of using disposable cups in factory canteens and water stations, own travel mugs and bottles must be encouraged to the employees or workers for reuse behaviour development. Plastic, glass, or metal food storage containers are the quintessential “reusable resource.” A lot of store-bought food items come in reusable containers. Hence, a second-hand market day at the enterprise can be developed to raise the awareness of 3Rs value in the workplace.



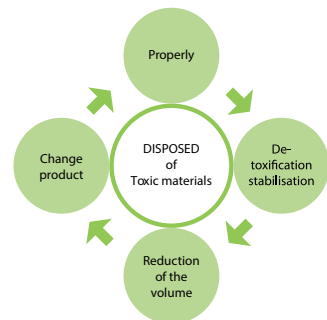
**Recycle:** The segregation process is the essential driver in recovering materials. The staff/workers should be trained and encouraged to follow the recycling guidelines inside the factories and practice them within the production process to ease the cost and time consumption. SMEs must also support local businesses and their materials to increase the financial mechanism in the country. Moreover, recycling is changing old products into new ones to resell them. For example, when bottles and cans are set out to be recycled, they are taken to a plant

where they can be reprocessed into many new things. They may be changed into new bottles or cans, or they could be changed into things like bicycles or asphalt.

Some hints for successful recycle practices in industrial workplaces:

- Communicate recycle plans clearly to all levels of employees and employers.
- Create a “recycling manual” that can be referred to current and future employees.
- Get employee engagement in the reduce, reuse, recycle process.
- Clearly label bins in convenient locations for easier and effective segregation processes.
- Offer incentives from recycling.

**Waste Disposal:** Developing and investing in affordable and appropriate technologies and methods should be in place. The national government and other related bodies must formulate the rules and regulations to tackle hazardous waste adequately. For instance, adopting detoxification stabilisation methods, introducing volume reduction, and redesigning and repurposing the product in the most eco-friendly way. SMEs should invest in the migration of production in the most sustainable way to decrease the raw material wastage and increase their profit margins.



### 5.2.1. Stakeholders and their roles

Relevant stakeholders:

Industrial Zones Committees; factory owners and workers from Shwe Lin Ban Industrial Zone, Shwe Pyi Thar Industrial Zone 1, and South Dagon Industrial Zone 1; Prevent Plastics; government bodies such as Environmental Management Authority, Yangon City Development Committee, Ministry of Industry (2), Ministry of Commerce; Universities; UMFCCI (Union of Myanmar Federation of Chambers of Commerce & Industry) and its affiliated organisations; SMEs department from MOI; ILO; industrial consultant firms and engineering firms; MSMEs media.

They all play a significant role for the following:

- Development and implementation of sustainable waste management strategies require active participants from different major stakeholders in the process. Each party is responsible and entails vigorously contributing their parts into this action and collaborating with other parties to make a difference for future generations.
- The government must develop and reinforce policies, guidelines, and rules and regulations with an objective to reduce waste production, reusing materials and recycling waste at all levels, as well as facilitate local authorities and industries to provide infrastructure facilities.
- Citizens and industrialists must practice segregation at source practices in households, industries/factories, and institutional levels.
- The informal sector must play a supportive role to promote separation and collection of waste at primary level and use practical experience and local knowledge to improve waste management and recycling systems.
- SMEs must utilise recyclable raw materials and create demand for fresh recyclables in the market rather than purchasing new raw materials.
- Media must promote coverage of 3R activities and create digital platforms to display public participation and awareness.

### 5.2.2. Relevance

By implementing the 3Rs (reduce, reuse, recycle) into waste management, SMEs and enterprises in Myanmar cannot only help to support the environment, but they can also significantly reduce their costs.

Industrial waste varies enormously and requires special management. Some types of waste are consistent in composition and therefore more easily recovered, but may require management because they are hazardous or contaminated with materials that require special management, special treatment, skills, and/or knowledge in waste handling.

Some of the garbage may require waste management skills or the cooperation with different departments in a workplace. Waste root cause finding is mandatory in the reduction or elimination of waste at source by involving everyone from respective factories.

Waste awareness and behaviour change is also playing a crucial part for success in effective waste management systems in industrial communities, because at shop floor, the vast majority (75% -80%) of their time is spent on daily routine activities (i.e., maintaining standards, production activities) while the rest is spent on improvement activities. Supervisors and middle management spend most of their time on improvement of activities, while the top management focuses evenly between innovation (investment, expansion and cost reduction, waste reduction and other strategic decisions) and improvement activities. Therefore, industrial communities' workplace coordination and participation in solid waste management is essential for success in this area.

### 5.2.3. Strategy and Sustainability: Engagement of People

Involving everyone in solving waste generation problems from waste stream mapping is a more promising approach than trying to do it alone. Workplace cooperation forms the foundation for continuous improvement of operations and systematic waste management in the factories. Continuous improvement in waste reduction in factories can only happen in organisations where workers, supervisors, leaders, managers in factories are engaged and aware, and understand poor waste handling risk factors, health knowledge and health risks from hazardous waste, cost, and benefit from proper waste handling. It is important to note that engagement and usage of their knowledge and skill of every worker plays a vital role in daily generated waste problem-solving and will result in day-by-day improvements. Very often, workers who are closest to the problems (such as generating waste or quality, or safety problems on the shop floor) need to be involved and engaged in coming up with solutions to these problems. The workers and supervisors must be at the front line of making every-day operational improvements in waste management and sustaining the improvement at the workplace.

### 5.2.4. Methodology: Empowering employees (waste reduction in production)

- Empowering employees through waste awareness trainings and hazardous waste information sharing.
- Value stream map vs waste stream map from shop floors in enterprise.
- Sharing information through daily waste recording and daily meetings, visual information sharing.
- Employee suggestion schemes for reduce, reuse, recycle ideas in shop floor.
- Teamwork.
- Introduction to Kaizen.
- Waste reduction through 5S system.
- Performance checklist.
- Enterprise waste management improvement ideas.
- Enterprise waste management improvement plans.



### 5.2.3. Strategy and Sustainability: Engagement of People

For mindset and behaviour change towards responsible waste disposal and waste management in the factory, the technique of the Risks, Attitudes, Norms, Abilities, and Self-regulation (RANAS) approach should be used.

RANAS psychosocial factors	Example thoughts
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**Risk factors, representing a person's understanding and awareness of the waste classification and risk:**

Health knowledge	"If I burn my garden leaves in my yard, it can cause air pollution and black carbon is not good for our health."
Vulnerability	"The risk that I get diseases from polluted water is high."
Severity	"If our drain is blocked by plastics and trash, when the flood comes, the drainage cannot work properly resulting in a flooded water in shop floors, so we need to do extra work at the factory and cannot hit the daily target and we lose money."

**Attitude factors, representing a person's positive or negative stance towards a behaviour:**

Belief about cost and benefits	"Waste segregation at source can minimise waste but it is time-consuming."
Feelings (joy, pride, disgust)	"I like to compost my organic waste from home for organic fertiliser."

**Norm factors, representing the perceived social pressure towards a behaviour:**

Others' behaviour	"Nearly all factories from this industrial zone use separated waste bins for waste disposal."
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RANAS psychosocial factors	Example thoughts
Others' (dis-) approval	"My supervisor does not approve unsafe acts when I handle hazardous waste at work."
Personal importance	"I feel personally obliged to give a cost saving idea when the team leader asks for our suggestion toward waste reduction ideas in the workplace."

**Ability factors, representing a person's confidence in her or his ability to practice a behaviour:**

How to do knowledge	"When we finished our textile bales, we can reuse textile poles as shelves to store things."
Confidence in performance	"I am confident in my ability to train waste segregation and waste management to other workers correctly."
Confidence in continuation	"I am confident that I can find time to learn more about recycling ideas from other businesses."
Confidence in recovering	"I am confident in my ability to refuse to accept free plastic water bottles from meeting rooms."

**Self-regulation factors:**

Action planning	"I plan to organise a 5S day before we all go on long holidays."
Action control	"Last week, we skipped the 5S audit for waste stream, but this week we need to do as priority number one."
Barrier planning	"If IZs' waste collector trucks will not come and pick up during holidays, we need to prepare a team for a waste disposal schedule, so that it can avoid open disposal on our streets and vacant plots."
Remembering	"Every Friday, we make our waste stream map audit and thus remember to clean up the drains and streets next week."
Commitment	"I am committed to avoid open burning and boiler burning in my factory."

## 5.2.6. Activities: Empowering employees (waste reduction in production)

In order to reduce waste generated from production shop floors, it is suggested to go apply the DMAICV approach.

- Define the problem (source of waste) and set 3Rs goals in the factory.
- Measure in detail the various aspects of the current process or locations or waste generation.
- Analyse data based on root causes.
- Improve the current waste management and start a waste segregation system.
- Control how the waste management is done in the future.
- Verify the design by running simulations and a pilot programme area or pilot factory, and then hand over the process to the factories' owners or industrial zone committees.

The goal and impact are to set up short- and long-term waste minimisation targets as listed in the steps below.

### STEP 1. Defining who has what responsibilities and defining waste types

1. Setting up a group of people (5 people max) a for waste management team.
2. Defining types of waste/garbage (hazardous + non-Hazardous) in the factory.
3. Classifying type of waste (sellable + recyclable + reusable) items.
4. Defining which R will start first. Set a target date to start 3R practices in the factory.

### STEP 2. Measuring waste through indicators

1. By measuring the waste, the results and challenges can be shared with everyone within your company to reduce the quantity of waste they produce.
2. Starting to do waste type segregation and labelling, measuring current waste generation (at actual condition after waste segregation).
3. Setting up KPI for waste recording and waste measuring data collection (sorted waste weighing time / month).
4. Measuring current, target, and actual waste in tonnage, viss or kilograms.

### STEP 3. Analysing based on segregated waste types

1. Reducing waste at the factory production floor: Via reduction of high volume of defective rates, repair, return products, reduction in machine / equipment downtime, product overuse, overproduction without PSI checking, reduce 8 kinds of waste in shop floor.
2. Reducing waste at warehouse inventories defectives.
3. Reducing waste at packaging.

### STEP 4. Improved current condition in the factory

1. By using the 5-Why-2-How analysis, pareto chart, Ishikawa fishbone cause and effect for waste.

2. By implementing a 5S (sort, set in order, shine, standardise, sustain) system.
3. By starting a responsible waste disposal system and appreciation of clean production practices on the shop floor.

STEP 5. Control how the waste is done in future

1. Sharing waste information through daily meetings, notice boards, after action review, visual information sharing, employee suggestion schemes (such as 1-Day-1-Idea for waste minimisation), daily improvement activities from natural teams.
2. By implementing waste types.

STEP 6. Verify the design by using pilot simulation area in the factory

1. Canteen?
2. Warehouse?
3. Production area?
4. Toilet and welfare area?
5. Office?

### 5.2.7. Activities: Empowering employees (behaviour change)

- Improvement in waste segregation, collection, and transportation (involving waste pickers to improve door to door collection in IZs).
- Minimum requirement of waste handling, classification, and disposal from YCDC and ECD training and exchange visits for management committees technical/financial/moral support from the municipality.
- Clean City Championship: A five-day competition in three IZs to improve waste segregation knowledge and 3R concepts.
- Green Ambassadors, Zero Garbage IZ and Zero waste wards.
- Litter cops in IZs and wards.
- Sanctions for bad behaviour.
- Waste reuse, recycle, recovery using vermicomposting, biogas, upcycling plastic waste, briquette making (industrial boilers coal or wood substituting material using coconut leaves by slow pyrolysis process).
- Cleaner Production in factories in IZs.

### 5.2.8. Activities: Empowering communities living in industrial zones (behaviour change)

- Participation of industrial communities.
- Industrial communities led initiatives in solid waste management.
- Adapt daily habits to agreed solid waste segregation system (rules, schedules, e.g., to offer waste at the right time and place to the collection team).
- Bring garbage to the communal collection point for transfer in the factory compound.
- Store garbage in colour coded plastic bags, a special bin, etc.

- Cooperate in factory-wide clean-up campaigns organised by factory manager, or 5S clean-up days in the factory.
- Keep own workstation and immediate environment clean (workspace, process line, layout, hall, staircase, toilets, canteen, drains, streets in front of the factory).
- Separate waste in organic and non-organic, wet and dry, keep plastic, paper, etc.
- Compost the organic fraction in your own backyard.

### 5.2.9. Summary of action

To reduce manufacturing waste, it is recommended to:

- Invest in newer or upgraded process equipment that will reduce defectives or scraps.
- Use higher quality supplies or raw materials which may generate less waste in the process.
- Talk to suppliers for better alternatives to cut waste generation at the source.
- Teach and conduct new training or refresher courses to keep employees in top form and help reduce inefficiencies and waste on the production line.
- Add step by step process quality checks to catch errors quicker and generate less scrap or rework.
- Track output and find areas of improvement.
- Reduce packaging layers of plastics or materials.
- Redesign process flow to cut out unnecessary steps and reduce the amount of seven wastes to improve efficiency.
- Establish a 5S culture in the workplace and hold regular 5S Events. 5S methodology for lean process improvement includes: sort, set, shine, standardise, sustain.

To reuse manufacturing waste, it is recommended to:

- Set up reuse centres, repair workshops, repair services platforms.
- Encourage second-hand market day culture inside factories or workplace employees.
- Reuse vendor packaging which generates greater quantities of waste if possible.
- Reuse cardboard & bubble wrap waste in shipping/receiving.
- Reuse newspapers, tracing paper, and plastics bags from cutting and sewing lines.
- Instruct suppliers to ship things on reusable pallets.
- Instruct suppliers and vendors to backhaul packaging pallets or drums for reuse if possible.
- Reuse wastewater if the business is a heavy water user.
- Use reusable towels in canteens and toilets instead of tissues or hand dryers or wet tissues.
- Wash and use washable or reusable PPE textile coveralls and aprons in food and beverage industries instead of using disposable plastics coveralls, hairnets, and aprons.

To be successful in recycling, being able to turn an item into raw materials which can be used again, usually for a completely new product is the goal. Therefore, it is recommend to:

- Start a company-wide recycling and education programme.

- Start a recycling team to identify other ways to recycle throughout the company. For example, switching to regular silverware in the lunchroom and getting rid of styrofoam cups by the coffee machine.
- Send canteen food waste to a local farm – local farms can sometimes feed your food waste to their livestock.
- Establish and build relationships with local recyclers, waste management businesses or shops, and even colleges and universities that may be interested in related school projects, or even a graduate student thesis.
- Use a waste exchange programme – What you consider waste can be a resource for another business. Exchange the generated waste through a waste exchange programme with such businesses. This can include off-spec products, scrap, excess, small amounts of raw materials that may expire before use, or small amounts that are not enough for a full process run.

## 5.3 Waste Valorisation through Source Segregation

### 5.3.1 Recovery before collection

Two approaches will be presented for the recovery before collection.

#### 5.3.1.1. Approach 1

Initiate waste segregation practices at factory level: waste reduction (pre-production and post-production), reuse, recycle, and recover waste generation.

#### Actions:

1. Conduct training, workshops, and capacity-building programmes to spread awareness and the importance of 3Rs to minimise waste generation, resource consumption, and cleaner production practices.
2. Set up the appropriate waste/product reduction targets by formulating proper disposal and waste reduction at the sources.
3. Encourage factory-based campaigns for single-use plastics usages by motivating people to participate in segregation, waste management, and collection.
4. Once segregation has been started, study the options to minimise the production of waste generation in the fabrication process, reuse the produced waste within the factory, and recovery the material out of waste.
5. Create awareness among citizens about waste segregation and make them active stakeholders in the waste management process.
6. Promote activities to prevent illegal dumping and illegal burning through investments and operation of sanitary landfills.
7. Develop strategies and guidelines for waste segregation, collection, and sorting of recyclable materials inside and outside factories by collaborating with local authorities

and relevant bodies to mandate.

8. Generate waste management plans with measurable targets for waste reduction, reuse separation, and recycling.
9. Mandate proper mechanism for the waste data collection, recording, monitoring, enforcement, and incentives for waste management system in the factory.
10. Launch designated waste disposal sites for different types of waste (e-waste, wet and dry, and recyclable waste).
11. Improve the existing protocols for special waste disposals and hazardous waste.
12. Enhance sufficient bins with colour identifications or stickers.
13. Introduce organic waste treatment options at household level. For organic waste, depending on the factory, either a treatment facility would be suggested at factory level or cluster/community level.
14. Provide space/options for garden waste treatment (composting methods or on call system i.e., dial number or services) in urban areas to stop and reduce leaf burning.
15. Build relationship with existing informal sector to encourage and support their structure and practices.

#### **Stakeholders:**

Industrial Zones Committee, Shwe Lin Ban Industrial Zone, Shwe Pyi Thar Industrial Zone 1, and South Dagon Industrial Zone 1, Prevent Plastics, Environmental Management Authority, YCDC, informal sector.

#### **5.3.1.2. Approach 2**

Create industry-wide recyclable exchange platforms and encourage by-products exchange and cooperation between factories.

#### **Actions:**

- Promote community-based recycling and reusing materials activities in collaboration and motivate people to participate in segregation, waste management, and collection.
- Encourage the community to engage in product sharing and trading and raise interest in participating in waste exchange platforms by promoting the benefits for the industries and also for the environment, based on international experience.
- Identify key resources available in the waste stream that can be utilised by local industries.
- Set up community level waste exchange platforms for exchanging information on products and items available as a pilot.
- Campaign to encourage residents/workers to subscribe to the platform, to access the data and to transact directly with other subscribers.
- Introduce activities for community participation, behaviours, and attitude towards coordination and cooperation among the community by hosting competitions and give awards to the cleanest wards, streets, and factories.
- Based on a successful of, consider setting up a digital platform.

**Stakeholders:**

Representatives of Shwe Lin Ban Industrial Zone, Shwe Pyi Thar Industrial Zone 1, and South Dagon Industrial Zone 1, Prevent Plastics, Environmental Management Authority, YCDC.

### 5.3.2. Recovery after collection

- Cluster approach for recycling at transfer: Initiate segregation and supporting (technically) in setting up segregation facilities at transfer stations for different kinds of waste like industrial, municipal and recyclable waste.
- Facilitate between TYTC and IZ committee for waste collection services.
- Capacity building for waste service providers.
- Ensure effective primary collection by providing awareness training to waste handling workers on the mismanaged disposal of municipal solid waste at dump sites.
- Capacity building of officers responsible for administering waste in the municipalities.
- Suggest the designs and technologies for integrated recycling facility models where industrial and municipal solid waste treatment could take place.
- Refurbish recovery materials and collect costs from the manufactures.
- Repurpose collection materials and create new products to extend the products cycle.
- Collaborate with waste buyers and informal waste pickers.

## 5.4 Improved waste collection facilitation between IZ committees, municipality and community

### 5.4.1. Approach

Over the past years industrial zones developed their specific waste management system which is not necessarily comparable with one in other zones. Factors include the time of set up of the zone, its vicinity to a final disposal site, its main industries in the zone, etc.

Therefore, the approach to improve waste collection is a collaborative one between the IZ committees, YCDC and if applicable a private collector. Community leaders and the informal recycling sector should be consulted and if possible, included into the process to find an agreeable solution for the community and capitalise on the private sector network and existing work relation.

With the different stakeholder, an action plan is developed depending on their interest and best practices in other IZs in the country.



### 5.4.2. Stakeholders

**The IZ committees** are the main stakeholders for this component since it is assumed that they are willing to improve the situation in the IZs and that correct facilitation will lead to an approved action plan by the IZ which then can be implemented in coordination with YCDC following their regulations.

**YCDC/PCCD** is the main counterpart for this component since they provide the service to all IZs and set the regulatory framework to collect and dispose of waste. The agreement between the IZs and YCDC on an agreed action plan will be critical to improve the situation in the IZs.

**The community** living in and around the IZs are heavily affected by the current mismanagement of solid waste causing heavy flooding adding toxic substances to soil and water, creating dense living conditions with migrant workers who are not aware of urban waste systems, and overloading the communal waste collection system with IZ waste. Listening to their challenges and also the support they could provide in the form of labour for segregation, treatment, and collection will be crucial for success of the system.

**Private waste collectors** are very common in the IZs providing vital service to factories, segregating recyclables and relieving YCDC and factories from the work. Private collectors can equally collect as companies owning a couple of trucks servicing a variety of factories down to individuals who collect waste at the factory front (mostly domestic waste) with the small pushcart. They together keep the expertise of segregation and creating sustainable business models from waste collection. On the other side, since they are not regulated, waste can be ending up in inappropriate places.

### 5.4.3. Actions

- Develop an agreed action plan to improve waste collection in cooperation between the IZs and YCDC:
  - Identify the needs of different industries and how they can be met by YCDC or other waste collectors.
  - Include IZs in primary waste collection allowing better segregation and treatment in the zone. Trucks could be equipped with GPS to control that an IZ is serviced completely.
  - Clarify disposal methods for industries for the different waste material (domestic/production/hazardous).
  - Identify funding mechanisms for the different waste materials in a polluter pays model which creates a self-funded stable collection system.
  - Integrate 3R activities into the action plan.

- Encourage dialogue between IZ committee and the community:
  - Facilitate discussions with IZ committees and surrounding wards with the objective to improve the relationship between the two implementors and to develop a combined strategy on waste collection. EMA has to be a stakeholder in this discussion.
  - Provide regular and reliable collection service – including sweeping of streets and public places and drain cleaning.
- Mainstream the project with the incoming service provider TYTC if applicable.

## 5.5 Setup of Treatment Facilities

### 5.5.1. Approach 1

The first approach deals with purposing and introducing the appropriate technologies and treatment companies/facilities which are interested in investing in Myanmar.

#### **Actions:**

- Collect biodegradable waste data from the IZs as well as other sources for the mechanical-biological treatments plant to generate sufficient production.
- Collaborate with local authorities, relevant organisations, companies, and other parties who are the key players for the project.
- Present waste to energy and resources options and recovery process for instance recovering technologies for food waste into biogas, electricity, and composting.
- Survey factories on their organic waste products for cluster level to build a business case for large scale treatment (Target: reach at least 100,000 TPY)
- Improve the efficiency of waste collection and transport by optimising collection points and routing, decreasing the loading time, conveying with larger load for longer distance, and training and educating staff.

#### **Stakeholders:**

Representatives of Shwe Lin Ban Industrial Zone, Shwe Pyi Thar Industrial Zone 1, and South Dagon Industrial Zone 1, Prevent Plastics, ECD, EMA, YCDC, MYT Plant by EUWELLE, Orgaworld Asia

### 5.5.2. Approach 2

The second approach focuses on improving the coordination and cooperation between waste management authorities and industries to ensure equal access for all to obtain affordable services.

#### **Actions:**

- Work together to designate or establish mutually beneficial partnerships to deliver effective and sustainable services.

- Establish the short-term and long-term agreement and framework for waste and resource management strategy between active stakeholders.
- Include the community and informal sectors within an integrated system in the IZs.
- Secure commitment and participation.
- Develop regular discussion to monitor the practices by measuring progress improvements to have consistent and effective manners.
- Collaborate and formulate clear strategic goals and targets among the parties.
- Ensure waste generation and monitoring data should be accessible for all.
- Set up the prices for various type of waste generations which is required to be aligned with national guidelines.

**Stakeholders:**

Representatives of Shwe Lin Ban Industrial Zone, Shwe Pyi Thar Industrial Zone 1, and South Dagon Industrial Zone 1, Prevent Plastics, ECD, EMA, YCDC, National Government Body,

# CONCLUSION



6

## 6.1. Recommendations

Monitoring solid waste stream in sanitary manners were decided on the following development strategies and recommendations:

Purchase replacement of vehicles and equipment for waste collection and transportation:

- Building new facilities for waste classifications, sorting, storages, recycling.
- Capacity development for maintenance of vehicle and equipment.
- Capacity building for staff and employees.
- Promoting community-led activities, for example community clean-ups, responsible consumption and production.

Cooperate with relevant stakeholders:

- Coordinate within local departments of YCDC/MCDC.
- Attract people attitude towards waste into resources.
- Manage people's attitude towards waste: Rethink about our habits, our needs, our requirements.  
Reduce – reducing by waste generation – Repairing, Reusing, Sharing.
- Set up a recycling guide for residential and community use.

Commence 3R policies reinforcements:

- A Recycling Act must be introduced and should be mandatory.
- Prepare the monitoring and advisory community the integrated solid waste management plan.
- Improvement of data collection and capacity development.
- Establish advisory bodies to manage the process of the implementation of the policies.

Cooperate with Public Private Partnerships (PPP):

- Support private companies for waste collection, transportation, recycling, landfill management, and operation of treatment facility.
- Restructure and update the collection fees, plans, and designs.
- Share costs, promote, and support 3R.
- Introduce the circular economy approach with PPP.

## 6.2. Propositions for Regulations and Enforcements

- Polluter pays fines to the factories who are practicing the 3Rs concepts and make the party responsible for producing pollution responsible by collecting fines for the damage done to the natural environment.
- MONREC and other relevant departments and ministries should develop a monitoring body and reinforcement body to train public awareness workshops, training, and programmes

through media platforms and schools.

- Monitoring and supervision bodies must be established in each township.
- Increase reinforcements to follow segregation rules and guidelines.
- Formulate the policies for the minimal requirement for a safe living community by implementing a controlled and sound solid waste stream in sanitary methods which will minimise the environmental and social impact from waste generation to final disposal.
- Waste collection services should be provided and maintained for the whole urban population by target year.
- Adapt feasible technologies and treatment options for waste management in terms of environmental, society, economy, and technical aspects.
- Improve existing technologies and treatments which are currently operating in the country.
- Develop policies for a Recycling Act and Take-Back-Provisions for single-use plastics bottles in the short-term, medium-term, and long-term.
- Establish policies on circular economy system; closed cycles, renewable energy, and systems thinking.
- Promote laws and policies to ban environmental unfriendly products to and to encourage a redesign that are environmentally friendly is a key component of an integrated product policy, which is a policy concept to minimise environmental impacts at all phases of a product's life cycle.
- Review and update waste fees and fine systems annually to check if the policies are working as planned or not.

## 6.3. Outlook

Although Myanmar is attempting to manage surplus waste issues with limited resources and technical mechanisms, it is still weak in implementation and developing processes of sustainable waste management practices for the country.

Currently, developing effective segregation practices at sources, improving the collection services and disposal methods are the main priorities for the municipalities. The allocation of capital expenditure for waste collection and transportation, including purchasing new waste collection trucks, equipment and creating task forces is mandatory. On the other hand, the cities and communities have to develop and improve appropriate and sustainable waste treatment infrastructure and facilities for the adequate discharge of the collected waste.

At the same time, local governments, the private sector (both formal and informal) and all relevant stakeholders should formulate a platform or partnerships with both local and international partners by supporting community awareness activities, implementing initiatives to promote the 3Rs, and promoting public participation. Hence, with international cooperation and support, as well as the commitment and determination of local stakeholders, Myanmar can enhance access to capital

financing which will be essential for developing the critical infrastructure for addressing increasing levels of waste segregation at sources approaches, extending the new waste collection services, recycling, treatments, and introduction of more sustainable disposal practices.

As a next step, the Prevent Plastics project will be developing action plans and frameworks, initiating dialogue at policy level for sustainable waste management and activities which are required to establish a reduction, recycling, and recovery activities for each industrial zone. The project will closely collaborate with key players such as environmental management authorities, waste service providers such as recycling companies, local banks, industrial zone committees, and MONREC/ECD to ensure approaches based on these 3R concepts in compliance with pollution and environmental standards.

# ANNEX

## 1. Legislation on Municipal Solid Waste Management

### Chapter 4: Duties and Powers relating to the Environmental Conservation of the Ministry

**Article 7.** The duties and powers relating to the environmental conservation of the Ministry are as follows:

- (a) implementing the environmental conservation policies.
- (b) planning and laying down national or regional work plans relating to environmental management.
- (c) laying down, carrying out and monitoring programmes for conservation and enhancement of the environment, and for conservation, control and abatement not to cause environmental pollution.
- (d) prescribing environmental quality standards including standards on emissions, effluents, solid wastes, production procedures, processes and products for conservation and enhancement of environmental quality.
- (e) submitting proposals to the Committee for economic incentive mechanisms and terms and conditions which may not affect the environment or cause least environmental affect for sustainable development in addition to legal affairs and guidelines relating to environment.
- (f) facilitating for the settlement of environmental disputes and, if necessary, forming bodies to negotiate such disputes.
- (g) specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities.
- (h) prescribing categories of hazardous substances that may affect significantly at present or in the long run on the environment.
- (i) promoting and carrying out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances.
- (j) prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms.



- (k) negotiating, cooperating and implementing in respect of international, regional and bilateral agreements, instruments and programmes relating to matters of environment.
- (l) implementing the international, regional and bilateral agreements accepted by Myanmar for environmental conservation and enhancement of environmental quality in accord with the guidance adopted by the Union Government or the Committee.
- (m) causing to lay down and carry out a system of environmental impact assessment and social impact assessment as to whether or not a project or activity to be undertaken by any government department, organisation or person may cause a significant impact on the environment.
- (n) laying down guidance relating to the management, conservation and enhancement of environment for the matters of protection of ozone layer, conservation of biological diversity, conservation of coastal environment, mitigation and adaptation of global warming and climate change, combating desertification and management of non-depleting substances and management of other environmental matters.
- (o) managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organisations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade, and use the natural resources in environmental conservation works.

This legislation states the duties and powers of the Environmental Conservation of the Ministry to maintain the cleaner, greener, and healthier community for everyone.

## Chapter 7: Environment Conservation

**Article 13.** The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in coordination with relevant Government departments and organisations in the following matters:

- (a) the use of agro-chemicals which cause to impact on the environment significantly.
- (b) transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries.
- (c) disposal of wastes come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems.
- (d) carrying out waste disposal and sanitation works.
- (e) carrying out development and constructions.
- (f) arrying out other necessary matters relating to environmental pollution.

**Article 14.** A person causing a point source of pollution shall treat, emit, discharge, and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.

**Article 15.** The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose of the wastes in accord with environmentally sound methods.

**Article 16.** A person or organisation operating business in the industrial estate or business in the special economic zone or category of business stipulated by the Ministry:

(a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste.

(b) shall contribute the stipulated users' charges or management fees for the environmental conservation according to the relevant industrial estate, special economic zone and business organisation.

## 2. Case Studies

### Case Study 1

#### Savings by storing coal under shed

**Before:** In a rolling mill, coal was stored under the open in damaged shed. This led to reduction in coal quality because of rain and dust surrounding which further led to high moisture content in coal increasing its consumptions and time for burning in the furnace.

**After:** A shed was constructed for the storage of coal protecting the stored coal from rain, dust and contamination. Dry coal burns more effectively



#### Costs/benefits

Cost: MMK 1,698,000

Annual savings: MMK 6,339,200

Payback: 4 months

(25.5 t of coal)

## Case Study 2

### Reduction of plastic waste

**Before:** Disposable, single use plastics cups were used for serving tea to the employees in canteen. Around 100 plastic cups are disposed of every day after drinking tea or water at the canteen.

**After:** The disposable plastic cups were replaced with steel tumblers. This led to plastic waste elimination of up to 180 kg annually. Recurring cost for purchase of plastic cups is now avoided by one time investment of steel tumblers. Furthermore the cost of plastic waste disposal is also avoided.

#### Costs/benefits:

Investment: Internally by company

Annual savings: 180 kg of plastics

Payback: Immediate



## Case Study 3

### Reduction of packaging waste

**Situation before:** In a electrical manufacture company, the packing of products was done in a card board carton by 2 plastic strips.

**Improvement done:** Packing of Card Board Carton with a plastic strip was reduced from 2 strips to 1 strip.

**Savings/year:** MMK 3801483.00

**Investment:** Nil

**Payback:** Immediate



## Case Study 4

### Reducing bead wire waste by root cause findings and 3Cs approach

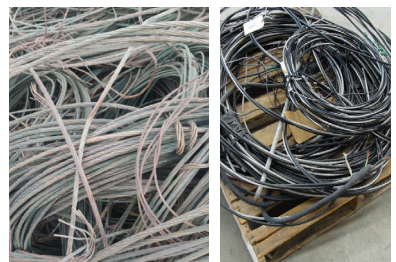
#### Before

Bead wire waste

2018 August >>> 450 Kgs 2018 Sept >>> 477 Kgs

2018 Oct >>> 298 Kgs

Average Bead wire waste per month >>>408.3 kgs  
(Kaizen start introduced) 0.403 metric ton



**After**

Bead wire waste

2018 Nov >>> 27 Kgs 2018 Dec >>> 29 Kgs

2019 Jan >>> 26 kgs 2019 Feb >>> 23 Kgs

Average Bead wire waste per month > > 26.25 kgs  
0.026 metric ton



**Costs/benefits**

Saving for buying new bead wire : MMK 105,484/-

Annual savings: MMK 1,265,804 /-

(950.04 kg of new bead wire)

Payback: Immediate

Investment : Nil in cash.



**Case Study 5**

**Reducing tyre building bladders waste by root cause findings and 3Cs approach**

**Before**

27 times of Bladder damage on Oct18.

2018 Nov start record Bladder curing time

37 Men-hours used for changing bladder / month.

25 Tyres are damaged by bladder damaged / month.



**After**

15 times of Bladder damage on Nov18, Jan 19, Feb19

16 times of Bladder damage on Dec 18.

25 Men-hours used for changing bladder / month.

15 Tyres are damaged by bladder damaged / month.

**Costs/benefits**

Saving for buying new bladder : MMK 6,662,692 /-

Annual savings: MMK 79,952,304 /.

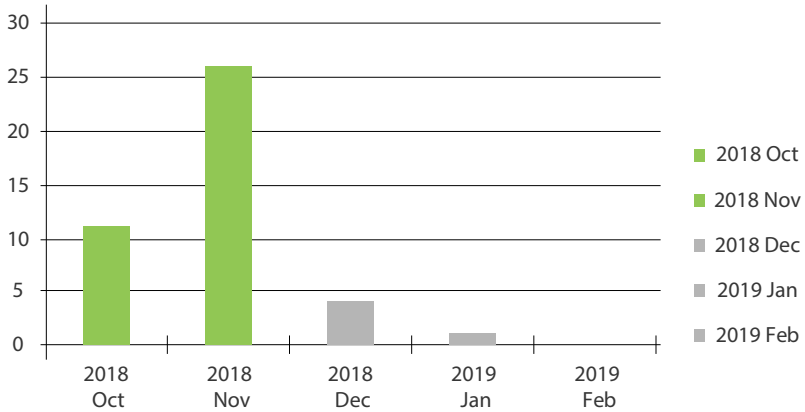
(120 bladder waste can be saved from landfilling )

Payback: Immediate

Investment : Changing hot water utility line cost only  
50,000 MMK



## Total No: Utility Line (Hot Water) Damage



## Case Study 6

### Reducing new carton boxes by reusing carton boxes from suppliers

#### After

Reusing old cartonnage boxes from coffee suppliers. And can reduce upto 200 new cartonnage boxes per Month. Delivering reuse boxes to internal stores .

#### Before

Using new cartonnage boxes in delivery of finished bakery goods to customers, distribution centers, Even for own stores, they use brand new boxes. 1000 boxes per month.(record from purchaser of inventories)

#### Costs/benefits

Reducing : 200 Cartonnage boxes per month. Saving resources from buying new boxes.

Annual savings: MMK 720,000 /-  
(2400 of new boxes)

Payback: Immediate

Investment : Internally by company





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