#### APPLICATION FOR TECHNOLOGY NEEDS ASSESSMENT

Name of Enterprise: LGU Victoria Materials Recovery Facility		
Contact Person:	Position in the Enterprise:	
Mrs. Caroline G. Manuel	Municipal Planning Officer	
Office Address:	Tel. No. / Mobile No.	Fax No.
Poblacion I, Victoria, Oriental Mindoro		
	E-mail Address:	
Factory Address:	Tel. No.	Fax No.
Malabo, Victoria, Oriental Mindoro		
	E-mail Address:	
Website:		

#### **GENERAL AGREEMENTS:**

- 1. The applicant shall, at the earliest opportunity, make available to the DOST Regional Office No. IV B (DOST-MIMAROPA) all information (manuals, procedures, etc.) required to establish the technology status of the selected core business functions and management systems;
- 2. If DOST-MIMAROPA is not satisfied that all the requirements for business registration are complied with, it shall inform the applicant of the observed deficiencies before starting the assessment;
- 3. When the required inputs to the assessment are already supplied by the applicant, including Attachment A, the DOST-MIMAROPA will assess the firm through the core business functions and management systems, whichever is applicable, to identify technology needs and verify compliance to standards vis-à-vis existing practices;
- 4. When the DOST-MIMAROPA has completed the technology assessment, a report will be prepared on the results of the assessment with accompanying recommendations and opportunities for improvement. The report prepared will define the scope of activities, functions, management practices, and locations assessed. The applicant shall not claim or otherwise imply that the report applies to other locations, products, or activities not covered by the report;

- 5. The applicant agrees that the report will not be used until permission has been granted by the DOST-MIMAROPA;
- 6. The applicant agrees that the receipt or acknowledgment of the report ends the assessment stage; any technical assistance ensuing from the recommendations of the report will be viewed as a separate project.

#### **UNDERTAKING**

I agree to undertake and observe the above General Agreements as stipulated by the Department of Science and Technology Regional Office No. IVB DOST-MIMAROPA

CÁROLISE G. MANUEL
Signature over Printed Name

Municipal Planning Officer, LGU-Victoria

Position in the Enterprise

June 30, 2022

Date

## Attachment A

## **Enterprise Profile**

Name of Enterprise Material Recovery Facility – LGU-Victoria		
Production Site/Location Brgy. Malabo, Victoria, Oriental Mindoro		
Business Permit No. N/A Year Registered		
Brief Enterprise Background		
Victoria is a second-class municipality in Oriental Mindoro and has a population of 52,175 people based on the 2020 census. It has a total land area of 146.23 km2, is politically subdivided into 32 barangays, and is known as the "Fruit Basket of Oriental Mindoro. The municipality recorded a total waste generation of 36 per day or 13,051 tons per annum based on the 2018 waste assessment conducted by the LGU-Victoria. In adherence to the RA 9003, LGU-Victoria established the Material Recovery Facility (MRF) in a one (1) hectare land area situated at Brgy. Malabo started its operation in July 2021.		
At present, the facility caters to the wastes collected from 11 barangays, which produces an enormous volume of waste in the municipality but plans to accommodate 8 additional barangays for its full operation. Among the production equipment present in the facility are 1 unit hopper and conveyor, 1 unit plastic pulverizer, 1 unit waste crusher, 1 waste mixer, 1 unit rapid composter with squeezer, and 1 unit rotary composter and 3 units shredder. The facility has 8 employed workers composed of 5 males and 3 females.		
Meanwhile, based on the current operation of the MRF, it accepts an average of 5-10 metric cons of waste per week. These are composed of residential and commercial wastes categorized as recyclable wastes (plastics and bottles), biodegradable wastes (fruits and vegetables), and residual wastes. Upon the acceptance of wastes, it undergoes a sorting process to segregate them according to classification. Recyclable wastes such as plastics and glass bottles commonly undergo pulverization and crushing methods to transform them into valuable by-products such as pillow stuffing materials for clastics and concrete bricks with crushed glass bottles and pebbles for crushed bottles. On the other hand, biodegradable wastes generated are converted into organic fertilizer. These waste by-products are offered to the communities for free.		
Based on the latest records of the MRF, approximately 40-60% of the total wastes collected were unutilized or residual wastes which are commonly disposed of at the designated municipal landfill. Additionally, the facility also encounters inefficient handling of the bulk volume of solid waste for disposal which incurs additional hauling expenses. One of the significant constraints that contributed to the large volume of unutilized waste in the facility is the lack of appropriate production equipment which limits its capacity to produce other novelty items from recycled waste materials.		
Year enterprise was established: 2021 Initial capitalization: PhP2,000,000.00		
Type of Organization: Single proprietorship		
/ Cooperative/ Association/Organization/LGU		
Partnership		

Co	rporation				
	Profit				
	Non-profi	it			
Enterprise Registration No.			Ye	ear Registered	
Classification according to capital (P	HP)		Present capitaliza	ition	PhP3,124,960.00
Micro (less than 1.5 N	<b>/</b> I)				
/ Small (1.5 – 15 M)					
Medium (15 – 100 M	)				
Classification according to employm	ent (numbe	er of emp	loyees)		
/ Micro (1 – 9)					
Small (10 – 99)					
Medium (100 – 199)					
Number of Employees:					
Direct Workers	M: 5	F: 3			
Production	M: 5	F: 3			
Non-production	M:_	F: _			
Indirect/Contract Workers	M:	F: _			
Total	M: <b>5</b>	F: <b>3</b>			
Business Activity:					
Food processing (please s	pecify comn	modity)	_		
Furniture (please specify c	ommodity)		-		
Gifts, decors, handicrafts (	please spec	ify comm	odity)		
Metals and engineering (p	lease specif	y commo	dity)		
Agriculture/Marine/Aquad	ulture (plea	ase specif	y commo	dity)	

/ Others, please specify	Environment: Waste Management	
Specific product or service the enterprise offers its customers:		
The MRF of LGU Victoria serves as	s a facility for the management and segregation of solid wastes	
materials collected from selected	barangays in the municipality. This facility also engaged in the	
production of reusable products f	from wastes such as pulverized plastics, crushed glass bottles,	
Concrete bricks with crushed glass	s bottles and organic fertilizers.	
2. Reasons why assistance is beir	ng sought:	
To acquire additional technology	that will enable the facility to maximize the conversion of	
residual wastes into valuable by-p	products.	
3. Have you consulted any other individual/organization for any assistance?  If Yes, which company/ agency?  Please specify the type of assistance sought		
/ If No, why not?	al funds to finance the establishment and energtion of its	
MRF.	al funds to finance the establishment and operation of its	
Organizational Structure		
	AA stitudAA sa	
	Municipal Mayor	
	Municipal Planning Officer	
	1	

Staff/Workers

4. Enterprise's plan for the next 5 years?

LGU-Victoria MRF plans to continuously upgrade its equipment to further improve its services of transforming waste into valuable products.

Next 10 years?

The establishment of the LGU Victoria Materials Recovery Facility equipped with the latest technologies envision to resolve the alarming waste management concerns in the municipality and create opportunities to transform recyclable and reusable waste materials into valuable products.

5. Current agreements and alliances undertaken

The MRF is solely funded by LGU-Victoria and does not enter into a greement with any public or private organization.

#### **BENCHMARK INFORMATION**

#### Production and Supply Chain

#### Raw Material

Raw Material	Source	Unit Cost (PHP)	Volume Used/Year
Residential and Commercial Waste (Recyclable wastes, biodegradable wastes, residual wastes)	8 Barangays in the municipality	N/A	480 MT

#### Production

The volume	Volume of Production/Year	Selling Price (P)	Annual Gross Sales (P)
Pulverized Plastics	2,340 kgs	N/A	N/A
Crushed Glass Bottles	66,792 kgs	N/A	N/A
Concrete Bricks with crushed glass bottles	1,200 pcs	N/A	N/A
Organic Fertilizer (50 kg/sack)	600 sacks	N/A	N/A

TOTAL	N/A	N/A

### Existing Functional Production Equipment\*

Type of Equipment	Specifications	Capacity
1 unit Hopper and Conveyor		
1 unit Plastic Pulverizer		
1 unit Waste Crusher		
1 unit Waste Mixer		
1 unit Rapid Composter with Squeezer		
1 unit Rotary Composter		
3 units Shredder		

#### Production Problems and Concerns

Based on the latest records of the MRF, approximately 40-60% of the total wastes collected were unutilized or residual wastes which are commonly disposed of at the designated municipal landfill. Additionally, the facility also encounters inefficient handling of the bulk volume of solid waste for disposal which incurs additional hauling expenses. One of the significant constraints that contributed to the large volume of unutilized waste in the facility is the lack of appropriate production equipment which limits its capacity to produce other novelty items from recycled waste materials.

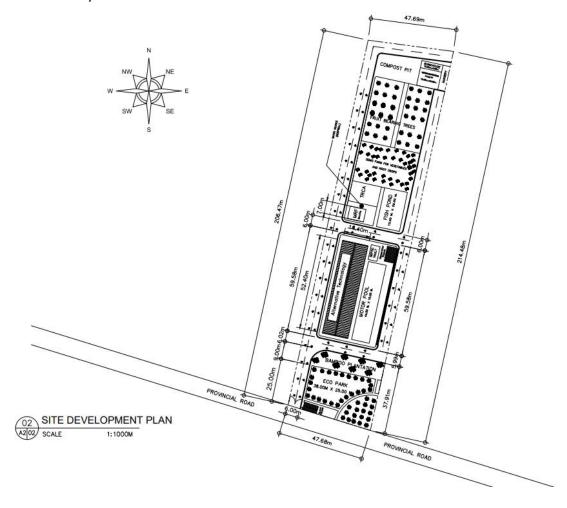
#### Production Waste Management System

Wastes are received undergo a segregation process wherein residentially and commercial wastes are classified as recyclable wastes (plastics and bottles), biodegradable wastes (fruits and vegetables), and residual waste. Recyclable wastes such as plastics and glass bottles commonly undergo pulverization and crushing methods to transform them into valuable by-products such as pillow stuffing materials for plastics and concrete bricks with crushed glass bottles and pebbles for crushed bottles. On the other hand, biodegradable wastes generated are converted into organic fertilizer. These waste by-products are offered to the communities for free. Meanwhile, residual wastes that can no longer be recycled or reused are commonly disposed of at the designated municipal landfill.

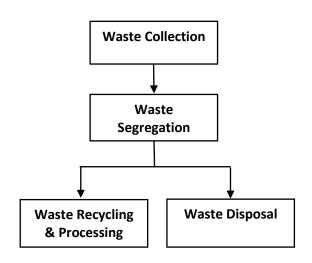
#### Production Plan

The management currently follows a standard operating procedure from the collection of wastes up to the distribution of valuable by-products, and disposal of residual wastes to avoid the large volume of wastes stocked in the facility.

## Plant Lay-Out



## ➤ Process Flow



Inventory System

The management properly records the volume of waste received as well as the volume of segregated wastes and their classification. It also documents the total volume of by-products produced and residual wastes disposed to the designated municipal landfill.

Maintenance Program

The facility is provided with sufficient funds for the annual management and maintenance of the existing equipment. Workers are trained in the basic maintenance and troubleshooting of equipment but during major defects, the management sought services of the concerned technician.

CGMP/HACCP Activities

Not applicable

Supplies/Purchasing System

The MRF is equipped a with garbage collection truck that gathers wastes from 11 Barangays

## Marketing

Marketing Plan

The by-products produced in the facility are not intended for sale since it is made available to the communities for free to be used as raw materials to support their income generating projects.

Market Outlets and Number

The facility is situated at Brgy. Malabo, Victoria, Oriental Mindoro.

Promotional Strategies

By-products produced at the MRF are promoted to interested communities through the

word		
of mouth and during meetings with Barangay Officials in the locality.		
Market Competitor	s	
The MRF is the sole facility in	the municipality that involves in waste management and	
products valuable wastes by-		
De also sin s		
Packaging		
<ul> <li>Nutrition Evaluation</li> </ul>	X	
o Bar Code	Χ	
<ul> <li>Product Label</li> </ul>	X	
<ul><li>Expiry Date</li></ul>	X	
- -		
Finance		
Cash Flow or other	related documents	
T / OCC:	g funds are properly accounted intended for the Municipal	
Source(s) of capital	/credit	
Funds used for the maintenar	nce and operation of the facility are allocated by LGU-Victoria	
From the annual budget.		
Accounting System		
All the financial matters relat	ed to the MRF's operation are monitored and managed by	
the Municipal Accounting Off	ice.	
Human Resources		
Hiring and Criteria		

Р

The hiring of workers undergoes is by the se Victoria.	election guideline and criteria set by LGU-
Incentives to Employees	
Regular workers are entitled to the benefits employees which include bonuses, PAGIBIG,	
Training and Development	
-	ng and development plan for its workers but
willing to allot funds to enhance the skills of	tis employees if necessary.
Safety Measures Practiced	
	s whenever they entered the MRF premises.
The management plans to provide training of Training to its workers.	on Occupational Sajety and Health (OSH)
Trummy to its workers.	
> Other Employee Welfare	
Sick workers are strictly advised not to repo	rt to the facility.
Other Concerns	
None	
epared by:	Validated by:
CAROLINE G. MANUEL	JESSE M. PINE
Printed Name and Signature of Owner/Chair/Representative	Printed Name and Signature of PSTD
June 30, 2022	June 30, 2022
Date	Date

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TECHNOLOGY NEEDS ASSESSMENT (TNA) REPORT		
COMPANY:	LGU Victoria Materials Recovery Facility	
ADDRESS:	Brgy. Malabo, Victoria, Oriental Mindoro	

#### SCOPE OF ASSESSMENT

- A. Strategic Directions
  - a. Vision and Mission
  - b. Goals and Objectives
  - c. Strategic Alliances
- B. Management Aspects
- C. Technical Aspects
- D. Marketing Aspects
- E. Financial Aspects

#### SUMMARY OF ASSESSMENT

## **BACKGROUND**

Victoria is a second-class municipality in Oriental Mindoro and has a population of 52,175 people based on the 2020 census. It has a total land area of 146.23 km2, is politically subdivided into 32 barangays, and is known as the "Fruit Basket of Oriental Mindoro. The municipality recorded a total waste generation of 36 per day or 13,051 tons per annum based on the 2018 waste assessment conducted by the LGU-Victoria. In adherence to the RA 9003, LGU-Victoria established the Material Recovery Facility (MRF) in a one (1) hectare land area situated at Brgy. Malabo started its operation in July 2021.

At present, the facility caters to the wastes collected from 11 barangays, which produces an enormous volume of waste in the municipality but plans to accommodate 8 additional barangays for its full operation. Among the production equipment present in the facility are 1 unit hopper and conveyor, 1 unit plastic pulverizer, 1 unit waste crusher, 1 waste mixer, 1 unit rapid composter with squeezer, and 1 unit rotary composter and 3 units shredder. The facility has 8 employed workers composed of 5 males and 3 females.

Meanwhile, based on the current operation of the MRF, it accepts an average of 5-10 metric tons of waste per week. These are composed of residential and commercial wastes categorized as recyclable wastes (plastics and bottles), biodegradable wastes (fruits and vegetables), and residual wastes. Upon the acceptance of wastes, it undergoes a sorting process to segregate them according to classification. Recyclable wastes such as plastics and glass bottles commonly undergo pulverization and crushing methods to transform them into valuable by-products such as pillow stuffing materials for plastics and concrete bricks with crushed glass bottles and pebbles for crushed bottles. On the other hand, biodegradable wastes

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generated are converted into organic fertilizer. These waste by-products are offered to the communities for free.

Based on the latest records of the MRF, approximately 40-60% of the total wastes collected were unutilized or residual wastes which are commonly disposed of at the designated municipal landfill. Additionally, the facility also encounters inefficient handling of the bulk volume of solid waste for disposal which incurs additional hauling expenses. One of the significant constraints that contributed to the large volume of unutilized waste in the facility is the lack of appropriate production equipment which limits its capacity to produce other novelty items from recycled waste materials.

#### **METHODOLOGY**

A one-on-one interview using a pre-assessment information sheet as a take-off point was conducted with the management of LGU Victoria Materials Recovery Facility headed by the Municipal Planning Officer, Mrs. Caroline G. Manuel.

#### **SUMMARY OF FINDINGS**

## 1. Strategic Direction

#### a. Vision and mission

The establishment of the LGU Victoria Materials Recovery Facility equipped with the latest technologies envisions to resolve the alarming waste management concerns in the municipality and create opportunities to transform recyclable and reusable waste materials into valuable products.

#### b. Plans and Objectives

This project generally envisions providing S&T interventions to LGU-Victoria's Material and Recovery Facility (MRF) for enhanced solid waste management operation through provisions of appropriate technology.

Specifically, the project seeks to:

- a. Provide innovation system support for enhanced solid wastes management services through the acquisition of:
  - i. 1 unit Plastic/Styro Densifier; and
  - ii. 1 unit Residual Heavy-duty Double Shaft Shredder
- Increase worker's awareness and skills on the basic operation and maintenance of additional equipment, and good housekeeping through a series of capability building enhancement activities;

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- c. Reduce the volume of residual wastes disposed of by the MRF by as much as 30%;
- d. Promote the DOST-ITDI developed technologies (tabletops, plastic planters, and catwalk blocks)
- e. Create direct and indirect job opportunities for the communities; and
- f. Conduct of pre- and post-evaluation of the project to determine the impact of technological assistance.

## c. Strategic alliances and current agreements

The LGU-Victoria has no alliances or any formal agreements with other companies or institutions the company had entered at present.

## 2. Management Aspect

#### a. Human resources

At present, the MRF has 8 regular works composed of 5 males and 3 females. All workers are directly involved in the production. Female workers are assigned to the waste segregation, while the male workers in-charge in the operation of all the existing equipment.

### b. Purchasing

The MRF is equipped with a garbage collection truck that gathers wastes from 11 Barangays in the municipalities. All raw materials used in the operation of the facility are funded by the LGU which undergoes the usual government procurement process.

#### c. Work environment

The current layout of the facility has sufficient space for its production equipment and free movement of its workers. The facility has secured a Certificate of Non-Coverage (CNC-OL-R4B-2021-05-00812) from DENR.

#### d. Business ethics and social responsibility

The LGU established a good relationship with the community since it provides employment opportunities for the community members. It religiously compensates for its taxes and other obligations.

#### e. Occupational health and safety management

All workers are strictly required to wear PPEs whenever they entered the MRF premises. The management plans to provide training on Occupational Safety and Health (OSH) Training to its workers.

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### 3. Technical Aspect

## a. Operational and outsourcing practices

### **Production system**

The facility operates from Monday to Sunday. The management currently follows a schedule for the garbage collection for 11 Barangays. Upon arrival at MRF, collected wastes undergo a segregation process wherein residential and commercial wastes are classified as recyclable wastes (plastics and bottles), biodegradable wastes (fruits and vegetables), and residual waste. Recyclable wastes such as plastics and glass bottles commonly undergo pulverization and crushing methods to transform them into valuable by-products such as pillow stuffing materials for plastics and concrete bricks with crushed glass bottles and pebbles for crushed bottles. On the other hand, biodegradable wastes generated are converted into organic fertilizer. These waste by-products are offered to the communities for free.

## Production planning and control

The management currently follows a standard operating procedure from the collection of wastes up to the distribution of valuable by-products, and disposal of residual wastes to avoid the large volume of wastes stocked in the facility.

#### **Production layout**

The MRF is designed to accommodate the wastes generated from 19 Barangays in the municipality that produces the largest volume of waste per annum. The existing plan layout provides enough space for production equipment and has sufficient space for the free movement of the workers.

## **Work Study/Improvement**

The management conducts frequent monitoring and observation of the day-to-day activity of the facility to identify the possible improvement in its operation that needs to be addressed.

## **Equipment management and maintenance**

The facility is provided with sufficient funds for the annual management and maintenance of the existing equipment. Workers are trained in the basic maintenance and troubleshooting of equipment but during major defects, the management sought the services of the concerned technician.

#### **Quality assurance system**

In terms of producing reusable waste by-products such as pulverized plastics, crushed glass bottles, concrete bricks with crushed glass, and organic fertilizer, the management ensures

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that it satisfies the required quality of its community beneficiaries.

## **Outsourcing practices**

The firm does not practice outsourcing services.

## b. Product and process performance and improvement

### Re-engineering and research development

The LGU-Victoria is not involved in research and development but is willing to adopt existing technology developed by R&D institutions to further improve its services.

#### Performance measures and results – Process

Set standard procedures for MRF operations are strictly followed by the LGU to properly monitor the volume of wastes processed per day.

#### Performance measures and results - Product

Concerning the quality of by-products, the LGU will ensure that it will offer the best quality that will meet clients' standards and will contribute to minimizing residual wastes to be disposed of in the landfill.

## **Procedures for continuous improvement**

The proposed technological intervention will enable the MRF of LGU-Victoria to transform collected solid waste materials such as styrofoam and plastics into new useful by-products such as tabletops, colored garden pots, and tiles/paving blocks.

#### **Product quality standards**

The LGU always ensures that the quality of products is attained by the necessities of its clients.

#### c. Environmental management system

The LGU is already practicing conducting waste characterization studies (WACS) in determining the amount of each material the facility must process and store and the number of residuals that must be disposed of or subjected to further processing.

#### 4. Marketing Aspect

#### a. Marketing plan

The by-products produced in the facility are not intended for sale since it is made available to the communities for free to be used as raw materials to support their incomegenerating projects.

Reported by JESSE M. PINE Signature

Name of TNA Team Leader

Attested by ENGR. JERRY B. MERCADO Signature

Name of ARD

Date July 1, 2022

Date July 8, 2022

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#### b. Market outlets

The facility is situated at Brgy. Malabo, Victoria, Oriental Mindoro

#### c. Promotional activities

By-products produced at the MRF are promoted to interested communities through word of mouth and during meetings with Barangay Officials in the locality.

## d. Market competitors

The MRF is the sole facility in the municipality that involves in waste management and valuable waste by-products.

#### 5. Finance

#### Cash flow and other related documents

All the incoming and outgoing funds are properly accounted for by the Municipal Treasurer's Office.

### b. Source of capital/credit

Funds used for the maintenance and operation of the facility are allocated by LGU-Victoria from the annual budget.

## c. Accounting system

All the financial matters related to the MRF's operation are monitored and managed by the Municipal Accounting Office.

## **CONCLUSIONS**

- The current operation of LGU-Victoria MRF is not yet fully maximized due to the absence
  of essential production equipment that can be used in transforming other residual waste
  into valuable by-products.
- Workers have limited knowledge of occupational safety and health practice.
- The facility is situated in an area far away from residential areas.
- The facility helps other communities to generate income through the utilization of produced by-products as raw materials for its livelihood projects.

Reported by JESSE M. PINE
Name of TNA Team Leader

Attested by ENGR. JERRY B. MERCADO Signature
Name of ARD

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#### **RECOMMENDATIONS**

The following are recommended by the TNA team:

- a. Provision of technical assistance to improve the operation of LGU-Victoria MRF through the acquisition of 1 unit plastic/styro densifier and 1 unit residual heavy-duty double shaft shredder;
- b. Series of training for the operation and maintenance of additional equipment, and production of new product lines.
- c. Training on Occupational Safety and Health (OSH) and good housekeeping to increase workers' awareness;
- d. LGU-Victoria should allocate funds to hire additional employees that will manage the operation of the additional equipment;
- e. The company is suggested to undergo Energy Audit to determine to apply necessary calibration if needed; and
- f. All documentary requirements should be prepared and submitted to DOST-MIMAROPA.

## **TNA Team Composition:**

Team Leader: **JESSE M. PINE** 

Members: ENGR. ZALDIE C. GAWAD

Reported by <u>JESSE M. PINE</u> Signature

Name of TNA Team Leader

Attested by ENGR. JERRY B. MERCADO Signature

Name of ARD

\_\_Date \_\_July 1, 2022\_