

PROJECT PROPOSAL  
2022 DOST-GIA FUNDING

**I. PROJECT PROFILE**

<b>(1) Project Title: Innovative Solutions for Solid Waste Management in LGU-Victoria's Materials Recovery Facility (MRF)</b>					
<b>(2) Project Leader/Sex: Hon. Joselito C. Malabanan/ M</b> <b>Agency: LGU-Victoria</b> <b>Address/Telephone/Fax/Email: Poblacion I, Victoria, Oriental Mindoro</b>					
<b>(3) Cooperating Agency/ies: DOST-MIMAROPA</b>					
<b>(4) Site/s of Implementation</b> (Municipality / District / Province / Region) <b>Base Station: Malabo, Victoria, 1<sup>st</sup> District, Oriental Mindoro, MIMAROPA Region</b> <b>Other Implementation Site (s): n/a</b>					
<b>(5) Project Duration:</b> 12 months (1 year)					
<b>(6) Total Project Cost:</b> (indicate Counterpart Funds; use Form A for the Line-Item Budget)					
Source of Fund / Site(s) of Implementation	PS	MOOE	EO	FA	Total
DOST-MIMAROPA		126,000.00	1,842,150.00		<b>1,968,150.00</b>
LGU-VICTORIA	660,000.00	314,960.00	150,000.00	2,000,000.00	<b>3,124,960.00</b>
<b>TOTAL</b>	<b>660,000.00</b>	<b>440,960.00</b>	<b>1,992,150.00</b>	<b>2,000,000.00</b>	<b>5,093,110.00</b>

**II. PROJECT SUMMARY**

<p><b>(7) Rationale</b> (Not to exceed one page)</p> <p>The Philippines' waste generation relatively rises with the increase in population, improved living standards, rapid economic growth, and industrialization, especially in urban areas. Considering a population of over a 100 million and a weighted average per capita generation of 0.4 kilos, the country is producing over 21 million metric tons of waste per annum which is beyond its solid waste management capacity. With this information, it can be said that solid waste management is one of the most serious environmental issues the country is facing.</p> <p>In response to the looming waste mismanagement issues, the RA 9003, otherwise known as Ecological Solid Waste Management Act of 2000, was enacted. This law declares the state's policy in adopting a systematic, comprehensive environment and the proper segregation, collection, transport, storage, treatment, and disposal of solid waste through the formulation and adoption of best environmental practices. Moreover, it illustrates the potential and benefits of recycling in addressing waste management problems and alleviating poverty.</p> <p>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 km<sup>2</sup>, politically subdivided into 32 barangays, and known as the "Fruit Basket of Oriental Mindoro. The municipality recorded a total waste generation of 36 per day or 13,051 ton 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 and started its operation in July 2021.</p> <p>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, 1 unit rotary composter and 3 units shredder. The facility has 8 employed workers composed of 5 males and 3 females.</p> <p>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</p>
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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.

***Existing Volume of Production of the LGU-Victoria's MRF***

<b>Products</b>	<b>Volume of Products/month</b>
Pulverized Plastics	195 kgs
Crushed Glass Bottles	5,566 kgs
Concrete Bricks with crushed glass bottles	100 pcs
Organic Fertilizer (50 kg/sack)	50 sacks

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.

Hence, this project was conceptualized to seek technological assistance from DOST-MIMAROPA to realize the acquisition of 1 unit plastic/styro densifier, and 1 unit residual heavy-duty double shaft shredder for enhanced waste management services of LGU-Victoria's Material Recovery Facility. It also envisions adopting the DOST-ITDI developed technologies such as tabletops, plastic planters, and catwalk blocks which are also valuable by-products from recyclable wastes.

**(8) Project Description** (Not to exceed 15 pages)

**OBJECTIVES** (General and Specific)

This project generally envisions to provide 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:

1. Provide innovation system support for enhanced solid wastes management services through acquisition of:
  - a. 1 unit Plastic/Styro Densifier; and
  - b. 1 unit Residual Heavy-duty Double Shaft Shredder
2. Increase workers awareness and skills on the basic operation and maintenance of additional equipment, and good housekeeping through series capability building enhancement activities;
3. Reduce volume of residual wastes disposed by the MRF by as much as 30%;
4. Promote the DOST-ITDI developed technologies (tabletops, plastic planters, and catwalk blocks)
5. Create direct and indirect job opportunities to the communities; and
6. Conduct of pre- and post-evaluation of project to determine the impact of technological assistance.

**METHODOLOGY**

A project staff from each agency will be assigned and therefore compose the Project Management Team (PMT) which will oversee the implementation of the project.

Once the project is approved, procurement of the requested production equipment will be facilitated by DOST-MIMAROPA in coordination with LGU-Victoria. Upon delivery of equipment, the PMT will conduct inspection and facilitate series of test runs of the production equipment. Capability-building activities will be undertaken to increase workers' awareness on the basic operation and maintenance of the proposed equipment, enhance their skills in the production of DOST-ITDI developed technologies such tabletops, plastic planters, and catwalk blocks.

An evaluation will be done before, during, and after the implementation of the project to monitor the impacts of the provided technology in terms of measurable indicators and outcomes, other relevant information would be gathered along the project implementation.

After one year, the project should have been implemented and data gathering would go on for another year. The impact of the project would be assessed based on its objectives and would be reported after the second year.

### **EXPECTED OUTPUTS**

**Publication:**

One (1) article on success stories of projects in MIMAROPA STARS.

**Patent/Intellectual Property:** n/a

**Product:**

Production of tabletops, plastic planters, and catwalk blocks.

**People Service:**

This project targets to increase workers' awareness of the basic operation and maintenance of additional production equipment and capacitate them in the production of DOST-ITDI developed technologies such as tabletops, colored garden pots, and tiles/paving bricks. Likewise, it intends to create direct and indirect employment opportunities for the community.

**Place and Partnership:**

This project will be implemented at the Material Recovery Facility of LGU-Victoria situated at Brgy. Malabo, Victoria, Oriental Mindoro. This undertaking will mark a collaboration between DOST-MIMAROPA through DOST-Oriental Mindoro and LGU-Victoria. DOST-ITDI will also be tapped to provide series of Training on the operation and maintenance of the equipment, and the production of new product lines.

**Policy:**

This project will strengthen the implementation of RA 9003 in the municipality of Victoria.

### **EXPECTED OUTCOMES**

The main objective of this project is to provide technological interventions that will reduce the volume of residual wastes by the MRF by as much as 30% and enhance the waste management services of the facility.

With the use of plastic/styro densifier, the MRF will maximize the conversion of styrofoam and plastic wastes and transform them into other useful products such as table-tops, plastic garden pots, and tiles/paving bricks. This will eventually translate into minimizing residual wastes to be disposed of in the landfill. This intervention will also provide employment opportunities.

On the other hand, residual heavy-duty double shaft shredder will address the inefficient handling of the bulk volume of solid wastes for disposal which will also reduce transportation expenses. Based on the current operation of the MRF serving 11 barangays, it usually delivers residual waste from the facility to the designated municipal landfill twice a week. Every hauling process requires at least 5 manpower (labor fee:300.00/day) to load and haul the residual wastes while 30 liters of fuel are consumed.

#### **Expected Hauling Expenses for Residual Wastes per Week**

<b>Particular</b>	<b>Before Intervention</b>	<b>After Intervention</b>
Frequency of Hauling	2	1
Manpower Requirement per Hauling	5	5
Labor Expenses (PhP 300.00/manpower)	3,000.00	1,500.00

Fuel Expenses (30 liters/hauling @78.00/liter )	4,680.00	2,340.00
Total Expenses per Week	7,680.00	3,840.00
<b>Total Expenses Per Month</b>	<b>30,720.00</b>	<b>15,360.00</b>

***MRF's Expected Volume and Value of Production After Intervention***

Products	The Volume of Products/Mo	Unit Price (PHP)	Value of Products / Mo
<b>Existing Products</b>			
Pulverized Plastics	225 kgs	5.00/kg	1,125.00
Crushed Glass Bottles	6,400 kgs	2.50/kg	16,000.00
Concrete Bricks with crushed glass bottles	115 pcs	15.00/pc	1,725.00
Organic Fertilizer (50 kg/sack)	60 sacks	350.00/sack	21,000.00
<b>Additional Products</b>			
Tabletops	20 pcs	250.00/pc	5,000.00
Plastic Planters	75 pcs	35.00/pc	2,625.00
Catwalk Blocks	100 pcs	25.00/pc	2,500.00
<b>TOTAL</b>			<b>49,975.00</b>

*Note: The unit price of each product is estimated based on the current market value.*

**Return on Investment (Profitability)**

Income less Initial Investment	( 2,493,410.00)
Divided by: Initial Investment	3,093,100.00
Return on Investment	( 0.8860 )
	<b>-80.61%</b>

**Note:** Investment is higher than the generated income, therefore, losses are incurred during the first year.

**Proposed Payback Period**

Initial Investment	3,093,100.00
Divided by: Net Income (Cash Flow from Operating Expenses)	784,020.00
Payback Period	<b>estimated 3 years and 11 months</b>

**Note:** After the payback period, the firm has already covered its initial investments and profit will then be generated.

**PERCEIVED IMPACT**

**Social Impact**

This project aims to address the waste management concerns of the LGU-Victoria's MRF while promoting cost-effective and environment-friendly technologies. A lesser volume of wastes that can no longer be utilized will be disposed to the designated landfill. The long-term effect of this project will be very beneficial to the entire municipality as this will gradually eradicate the harmful threats of environmental pollution to the health and life of the people caused by improperly managed wastes.

**Economic impact**

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. LGU-Victoria will utilize these products to support its projects and provide raw materials used by the communities as raw materials for their respective income-generating projects. It will also provide employment opportunities to displaced workers in the community.

### **SUSTAINABILITY PLAN**

With rapid population growth and urbanization, the annual volume of waste generation is also projected to increase. The existence of a Materials Recovery Facility in the locality will directly address the alarming waste management concerns. Since the MRF is a government-owned facility, a regular annual fund from LGU-Victoria will be utilized to ensure its continuous and sustainable operation. 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.

The proposed S&T intervention which targets to make the MRF operation sustainable will have a significant impact on the environmental, economic, and social aspects of development. The facility can help in protecting and preventing environmental pollution/problems caused by improper waste management. This will result in a healthy environment for people to live and thrive, while also creating livelihood opportunities for community members. The MRF also creates opportunities to transform wastes into valuable and commercially viable products that can provide additional income to the community beneficiaries.



*Figure 1. Sustainability Model*

#### **(9) Workplan** (See Form B)

#### **(10) Project Management** (not to exceed one page)

The project will be implemented and managed by LGU-Victoria through its Material Recovery Facility (MRF). Project staff from DOST-Oriental Mindoro and LGU-Victoria will oversee the implementation of the project.

##### **DOST-MIMAROPA:**

- Provide technological assistance for the acquisition of 1 unit plastic/styro densifier, and residual heavy-duty double shaft shredder
- Facilitate procurement of the proposed production equipment;
- Assist during the conduct of capability-building activities in coordination with DOST-ITDI; and
- Conduct project monitoring, documentation, and evaluation.


##### **LGU-VICTORIA**

- Assist in the procurement of the proposed production equipment;
- Provide space, maintain and safely keep the equipment to be provided by DOST-MIMAROPA;
- Provide operating and maintenance funds to support the day-to-day operation of MRF;
- Designate employees that will be directly involved in the operation of the MRF;

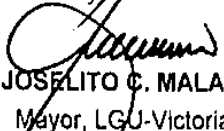
- Adopt the DOST-ITDI developed technologies for valuable waste products such as tabletops, plastic planters, and catwalk blocks;
- Assist during the conduct of capability-building activities; and
- Conduct project monitoring, documentation, and evaluation.

**III. ATTACHMENTS** (Please refer to the DOST-GIA Guidelines for the necessary documents.)


Prepared by:

  
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Endorsed by:

  
**HON. JOSELITO C. MALABANAN**  
Mayor, LGU-Victoria

Recommending Approval:

  
**JESSE M. PINE**  
Provincial S&T Director, DOST-Oriental Mindoro

Approved by:

  
**DR. MA. JOSEFINA P. ABILAY**  
Regional Director, DOST-MIMAROPA

**DOST Form A**  
**DEPARTMENT OF SCIENCE AND TECHNOLOGY**  
**Project Line-Item Budget**  
**CY 2022**

Program Title : Grants-in Aid  
Project Title : Innovative Solutions for Solid Waste Management in LGU-Victoria's Material Recovery Facility (MRF)  
Implementing Agency : LGU-Victoria  
Total Duration : One (1) Year  
Current Duration : September 2022 - August 2023  
Program Leader : DR. MA. JOSEFINA P. ABILAY  
Project Leader : HON. JOSELITO C. MALABANAN  
Monitoring Agency : DOST-MIMAROPA / DOST-Oriental Mindoro

		<b>Counterpart Funding</b>	
		<b>LGU-Victoria</b>	<b>DOST-MIMAROPA</b>
<b>I. Personal Services</b>	P		P
<u>Direct Cost</u>			
Salaries	10 workers @ PhP 275.00/day	660,000.00	
Honoraria			
<u>Indirect Cost</u>			
<b>(Implementing Agency)</b>			
Salaries			
Honoraria			
<b>(Monitoring Agency)</b>			
Salaries			
Honoraria			
<b>Sub-total for PS</b>	P	<b>660,000.00</b>	P <b>-</b>
<b>II. Maintenance and Other Operating Expenses</b>			
Traveling Expenses - local			
Training Expenses			

[illegible]



**1 unit Plastic/Styro Densifier,**

ITDI-developed; Capacity: 50 kg/batch; Motor: 1.5 HP Single phase 220 VAC, 60 Hz; Fuel: LPG; Burner: Cast Iron Fuelled-Segment; Kettle Bottom Material: Stainles 304; Mixing Paddle: Worn Gear Reducer, Bottom Driven; Structure: All Steel Welded Construction made of 3 mm & 4 mm Metal Plate; Accessories: 2 sets Brick mould 2" x 5 1/2" x 9" (5pcs), 2 sets Brick Mould 2" x 6 1/2" x 7 1/2" (5pcs), 2 sets Flower Pot Square Cone Type 1" x 5" x 6"

P 495,000.00

**1 unit Residual Heavy-duty Double Shaft Shredder**

Capacity: 500 kg/hr; Spindle Power: 4-7.5 kw; Number of blades 20 x 20; Feed Hopper Size: 400 x 350 mm; Blade Diameter:505 mm; Type: Double Shafting; Power: Electric Minimum of 2 x 7.5hp three phase 220 v with panel board and safety switch; Dimension: 2 x 1.2 x 1.5 m; Weight: 1.8 ton

1,347,150.00

**1 set 100 kVA Transformer**

Power rating: 100kVA; Number of Phase: 3 Phase; Winding Material : Aluminum; Frequency: 60 hz; Cooling Type: ONAN; Impedance: 4%

150,000.00

**Sub-Total for EO**

P 150,000.00 P 1,842,150.00

**IV. Fixed Asset**

MRF Land and Building

P 2,000,000.00 P

**Sub-Total for Fixed Asset**

P 2,000,000.00 P -

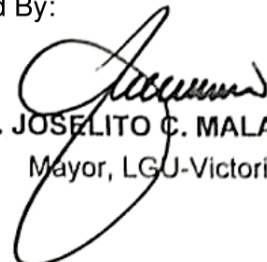
**GRAND TOTAL**

P 3,124,960.00 P 1,968,150.00

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Noted By:

  
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Certified Funds Available:

  
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**DOST Form B**  
**PROJECT WORKPLAN**

(1) Program Title: GIA

(2) Project Title: Innovative Solutions for Solid Waste Management in LGU-Victoria's Material Recovery Facility (MRF)

(3) Total Duration (in months): 12

(4) Planned Start Date: July 2022

(5) Planned End Date: June 2023

(6) OBJECTIVES	(7) TARGET ACTIVITIES	(8) TARGET ACCOMPLISHMENTS (quantify, if possible)	2022				2023				2024
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Provide innovation system support for enhanced solid wastes management services	1. Coordination / Linkages 2. Project proposal preparation 3. Proposal revision and compliance of documentary requirements	Project proposal presented to RTEC and revised accordingly		X							
	4. MOA-signing & approval	MOA signed based on the completion of documentary requirements			X						
	5. Procurement of equipment and accessories 6. Commissioning, installation, and testing of equipment	Procurement and installation of equipment			X	X					
	7. Operationalization	System ready for operation					X	X	X	X	X
Increase workers awareness and skills on the basic operation and maintenance of additional equipment, and good housekeeping through series capability building enhancement activities	Trainings / skills enhancement	Training on Operation, Maintenance, and Troubleshooting of Equipment					X				
Reduce volume of residual wastes disposed by the MRF by as much as 30%;	Introduction of additional valuable product from recyclable wastes	Production of tabletops, plastic planters, and catwalk blocks					X	X	X	X	X
Promote the DOST-ITDI developed technologies (tabletops, plastic planters, and catwalk blocks)	Coordination with bLGUs and other government institutions	Intensify promotion of DOST-ITDI developed technologies (tabletops, plastic planters, and catwalk blocks)					X	X	X	X	X
Create direct and indirect job opportunities to the communities	Monthly monitoring / report re: production activities and employment						X	X	X	X	X
Conduct of pre- and post-evaluation of project to determine the impact of technological assistance to the enterprise and the community	Monitoring and evaluation						X	X	X	X	X

(9) EXPECTED OUTPUTS (6Ps)	(10) DETAILS (quantify, if possible)	Y1				Y2				Y3
		Q1	Q2	Q3	Q4	Q <sub>1</sub>	Q2	Q3	Q4	
<b>Publications</b>	One (1) article on success stories of Projects in MIMAROPA Stars									X
<b>Patents/IP</b>	None									
<b>Products</b>	Production of tabletops, plastic planters, and catwalk blocks					X	X	X	X	X
<b>People Services</b>	This project targets to increase workers' awareness of the basic operation and maintenance of additional production equipment and capacitate them in the production of DOST-ITDI developed technologies such as tabletops, colored garden pots, and tiles/paving bricks. Likewise, it intends to create direct and indirect employment opportunities for the community					X	X	X	X	X
<b>Places and Partnerships</b>	This project will be implemented at the Material Recovery Facility of LGU-Victoria situated in Brgy. Malabo, Victoria, Oriental Mindoro. This undertaking will mark a collaboration between DOST-MIMAROPA through DOST-Oriental Mindoro and LGU-Victoria					X	X	X	X	X
<b>Policy</b>	This project will strengthen the implementation of RA 9003 in the municipality of Victoria				X	X	X	X	X	X