



# PROGRAM BOOK

4th International Symposium of Earth, Energy, Environmental Science and Sustainable Development

**AUGUST 26-27, 2023**

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## PROGRAM BOOK

4th International Symposium (Hybrid) of Earth, Energy, Environmental Science and Sustainable Development 2023

August 26<sup>th</sup> – 27<sup>th</sup>, 2023

11.36-11.39		<b>Q&amp;A</b>
11.39-11.48	JESSD-105	<p><b>Relative and absolute sea level change variability in the Palabuhanratu Bay waters</b></p> <p><b>Author</b> Eva Novita<sup>1,4</sup>, Masita Dwi Mandini Manessa<sup>2*</sup> and Mufti Petala Patria<sup>3</sup></p> <p><b>Affiliation</b> <sup>1</sup> Master Program of Marine Science, Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Depok, Indonesia <sup>2</sup> Department of Geography, Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Depok, Indonesia</p>

Time (AM/GMT+7)	ID	Event
		<p><sup>3</sup> Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Depok, Indonesia <sup>4</sup> Geospatial Information Agency of Indonesia, Bogor, Indonesia</p>
11.48-11.51		<b>Q&amp;A</b>
11.51-12.00	JESSD-30	<p><b>Characteristics and antioxidant activity of liquid smoke produced from gelam wood (<i>Melaleuca cajuputi</i>), alaban wood (<i>Vitex pubescens</i> Vahl), and coconut shells (<i>Cocos nucifera</i> L.)</b></p> <p><b>Author</b> Ahmad Budi Junaidi<sup>1,2,*</sup>, Abdullah<sup>1</sup>, Utami Irawati<sup>1</sup>, Yuspihana Fitri<sup>3</sup>, and Uripto Trisno Santoso<sup>1</sup></p> <p><b>Affiliation</b> <sup>1</sup>Program Study of Chemistry, Faculty of Mathematic and Natural Science, Lambung ULM Jl. A. Yani km 36 Banjarbaru Kalimantan Selatan-Indonesia <sup>2</sup>Doctoral Program Study of Agriculture Science, Lambung Mangkurat University Jl. Ahmad Yani km 36 Banjarbaru Kalimantan Selatan-Indonesia <sup>3</sup>Program Study of Fishery Product Processing, Faculty of Fisheries and Marine, ULM Jl. A. Yani km 36 Banjarbaru Kal Sel-Indonesia</p>
12.00-12.03		<b>Q&amp;A</b>
12.03-12.12	JESSD-70	<p><b>Methane Gas Management Policy Based on Emission Estimates at Gunung Kupang Final Processing Site Landfill</b></p> <p><b>Author</b> Nurul Listiyani<sup>1*</sup>, Khenza Atthaya Namira Yulianto<sup>2</sup></p> <p><b>Affiliation</b> <sup>1</sup> Legal Studies, Faculty of Law, Islamic University of Kalimantan MAB Banjarmasin, Banjarmasin, 70123, Indonesia <sup>2</sup> Environmental Engineering, Faculty of Engineering, Sepuluh Nopember Institute of Technology, Surabaya, 60111, Indonesia</p>
12.12-12.15		<b>Q&amp;A</b>
12.15-12.24	JESSD-73	<p><b>Separation performance of lithium and calcium from synthetic geothermal brine using electric field-assisted membrane</b></p> <p><b>Author</b> D P A Sudarmaja<sup>1</sup>, V S H Sujoto<sup>1</sup>, C E Suryanaga<sup>1</sup>, H T B M Petrus<sup>1*</sup>, Sutijan<sup>1</sup> and W Astuti<sup>2</sup></p> <p><b>Affiliation</b> <sup>1</sup> Department of Chemical Engineering (Sustainable Mineral Processing Research Group), Faculty of Engineering, Universitas Gadjah Mada, Jalan Grafika No. 2 Kampus UGM Bulaksumur, D. I. Yogyakarta 55281, Indonesia <sup>2</sup> Research Unit for Mineral Technology, Indonesian Research and Innovation Agency (BRIN), Jl. Ir. Sutami Km. 15, Tanjung Bintang, Lampung Selatan, Lampung 35361, Indonesia</p>
12.24-12.27		<b>Q&amp;A</b>
12.27-12.36	JESSD-74	<p><b>Biodegradable Food Container from Rice Straw and Sugarcane Bagasse with Orange Peel Addition</b></p> <p><b>Author</b> E M S E Tibalia<sup>1</sup>, Joko Wintoko<sup>1</sup>, Chandra Wahyu Purnomo<sup>1</sup></p>

JESSD-70

## Methane Gas Management Policy Based on Emission Estimates at Gunung Kupang Final Processing Site Landfill

Nurul Listiyani<sup>1\*</sup>, Khenza Atthaya Namira Yulianto<sup>2</sup>

<sup>1</sup> Legal Studies, Faculty of Law, Islamic University of Kalimantan MAB Banjarmasin, Banjarmasin, 70123, Indonesia

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**Abstract.** Methane gas (CH<sub>4</sub>) is one of the main Greenhouse Gases (GHG), which contributes 14.5% to global warming. Gunung Kupang Final Processing Site is a Final Processing Site that serves the Banjarbaru City area in addition to the Banjarbakula Regional Final Processing Site, with waste coming in every day which continues to increase and has the potential to generate emissions. The purpose of this research is to analyze the characteristics in the form of waste generation and composition at the Gunung Kupang Final Processing Site and to analyze the estimation of methane gas from the Gunung Kupang Final Processing Site landfill activities using LandGEM methods. The methods used in this study are the Landfill Gas Emission Model (LandGEM). Total greenhouse gas emissions produced in the LandGEM method from 2014- 2020 were 3.96 Gg/year. It certainly need for local government participation in the form of waste management policies which has an impact on reducing methane gas.

\*The title on abstract of paper section is just temporary so the title can be changed





**METHANE GAS MANAGEMENT POLICY BASED ON ESTIMATION AT**

**GUNUNG KUPANG  
FINAL PROCESSING  
SITE LANDFILL**





# BACKGROUNDS

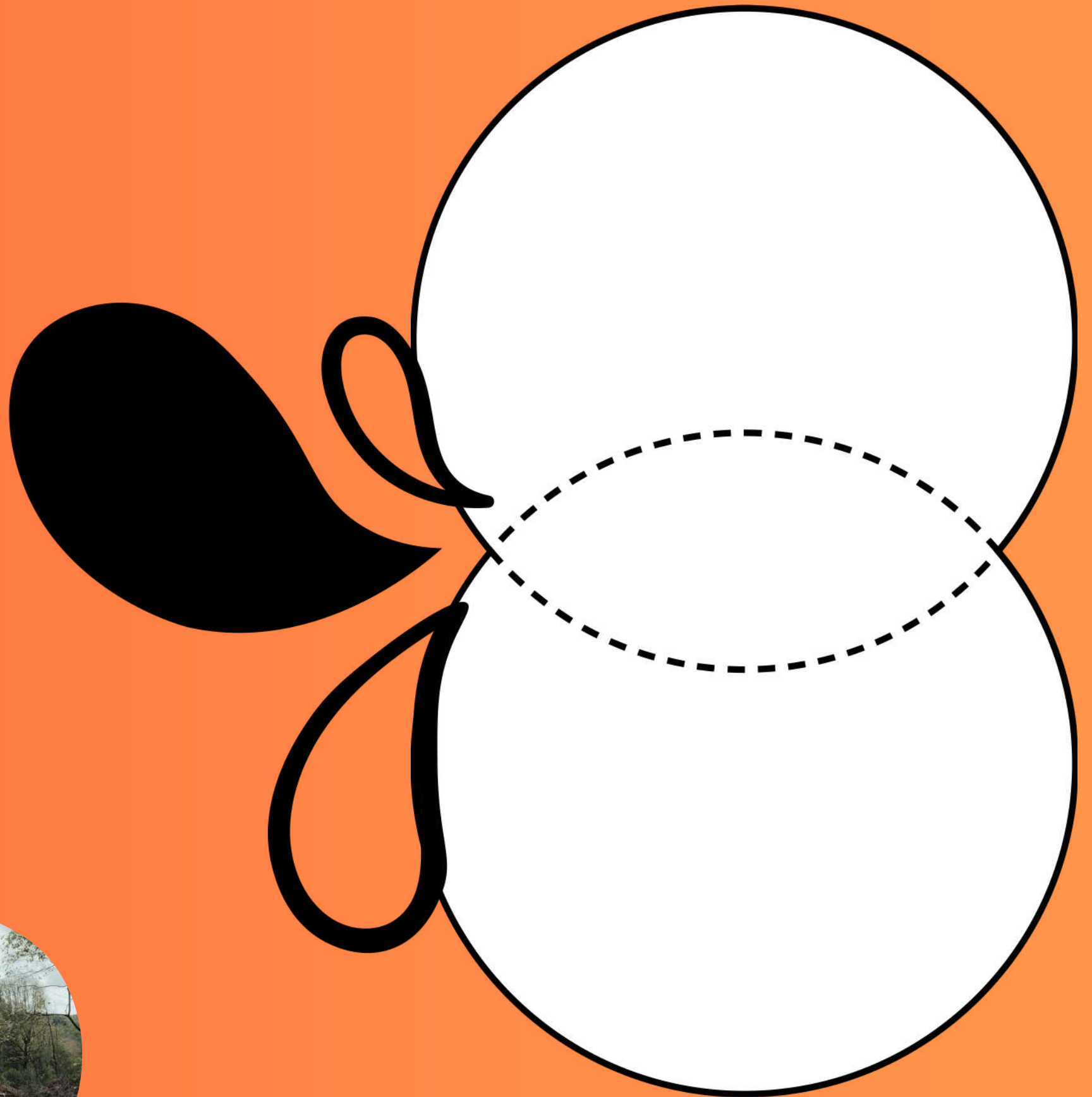
Improper management of landfills can lead to uncontrolled amounts of LFG gas emission and nature disasters. Most of the waste in Indonesia's Final Processing Site was not processed first and directly dumped into the ground without adequate layers so the material can cause environmental pollution such as soil and air pollution.





# BACKGROUNDS

Gunung Kupang Final Processing Site located in Banjarbaru city and divided into two landfill cells with the second cells still operating from 2021 until now. Methane gas produced by the landfill is converted into biogas and there's no other method to treat methane gas.





# BACKGROUNDS

Methane gas in Gunung Kupang Final Processing Site landfill never measured with real measuring instruments. The role of governments in protecting and managing the environment through waste management policies must be seriously considered.





## TYPE OF RESEARCH

Qualitative-quantitative research. Methane gas production is calculated using the LandGEM method and through a sociological approach, waste management policies will become the legal umbrella for local government in determining appropriate strategy

## RESEARCH TIME

The research was conducted from January-June 2023

## RESEARCH EQUIPMENT

Sampling equipment are rubber gloves, hanging scales, bamboo baskets, 500 liter density box, sickles, masks, safety shoes/boots, stationery and others.

## TYPES OF DATA

Primary data is the generation and existing condition of Gunung Kupang Final Processing Site landfill. Secondary data consists of Gunung Kupang Final Processing Site design capacity, planned year operation, and the waste management policies

**METHODS**







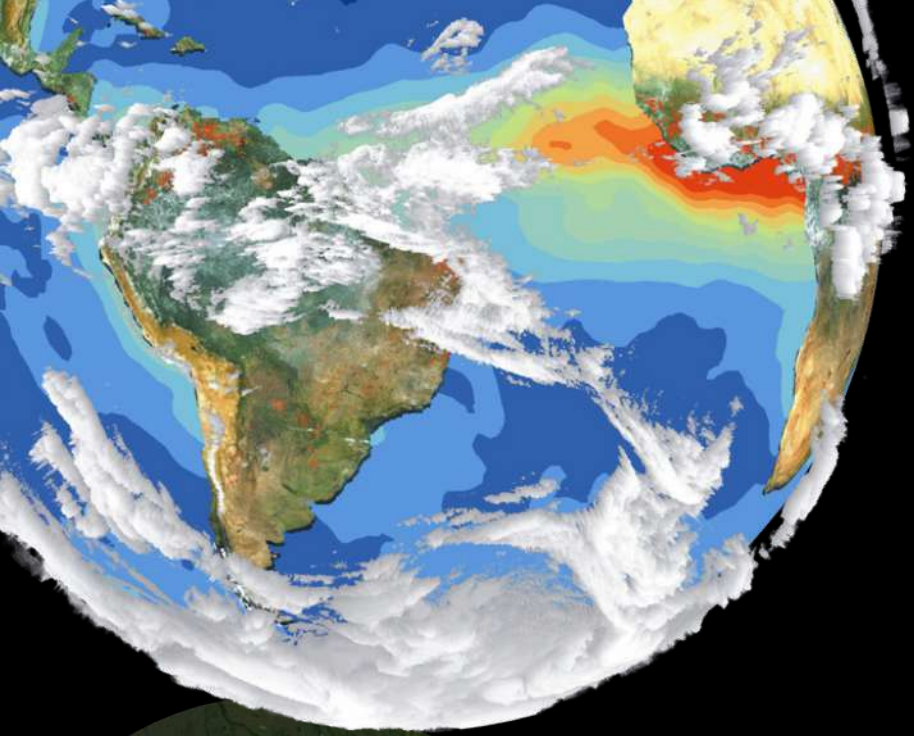
# METHODS

The main procedures are sampling of waste generation and composition, calculation waste data entering Gunung Kupang, population and landfill waste projection, landfill service life estimation, analysis of estimated methane gas production, determine the appropriate policy based on result analysis

Data collection techniques divided into 5 methods which are observation, interview, experiment, documentation, and literature studies







## MEASUREMENT OF METHANE GAS USING LANDGEM

Banjarbaru City and Gunung Kupang landfill waste projection was calculated for the first step using the least square method with  $r$  amount of 0,9322

Year	<i>Least-Square</i>
2021	258,753
2022	266,041
2023	271,500
2024	276,960
2025	282,420
2026	287,879
2027	293,339
2028	298,798
2029	304,258
2020	309,717
2031	315,177
2032	320,636
2033	326,096

*Source:  
Research  
Data, 2023*



# RESULT AND DISCUSSION



Table 1.  
Population  
Projection  
Calculation with  
Least Square  
Method



Total estimated methane gas production using LandGEM on landfill cell 1 is 3,96 Gg/year

USER INPUTS Landfill Name or Identifier: TPA Gunung Kupang

1. PROVIDE LANDFILL CHARACTERISTICS

Landfill Open Year: 2014  
 Landfill Closure Year: 2020  
 Use Model Calculate Closure Year?  Yes  No  
 Waste Design Capacity: megagrams

2. DETERMINE MODEL PARAMETERS

Methane Generation Rate,  $k$  ( $\text{year}^{-1}$ ): CAA Conventional - 0.05  
 Potential Methane Generation Capacity,  $L_0$  ( $\text{m}^3/\text{Mg}$ ): CAA Conventional - 170  
 NMOC Concentration (ppmv as hexane): CAA - 4,000  
 Methane Content (% by volume): CAA - 50% by volume

4. ENTER WASTE ACCEPTANCE RATES

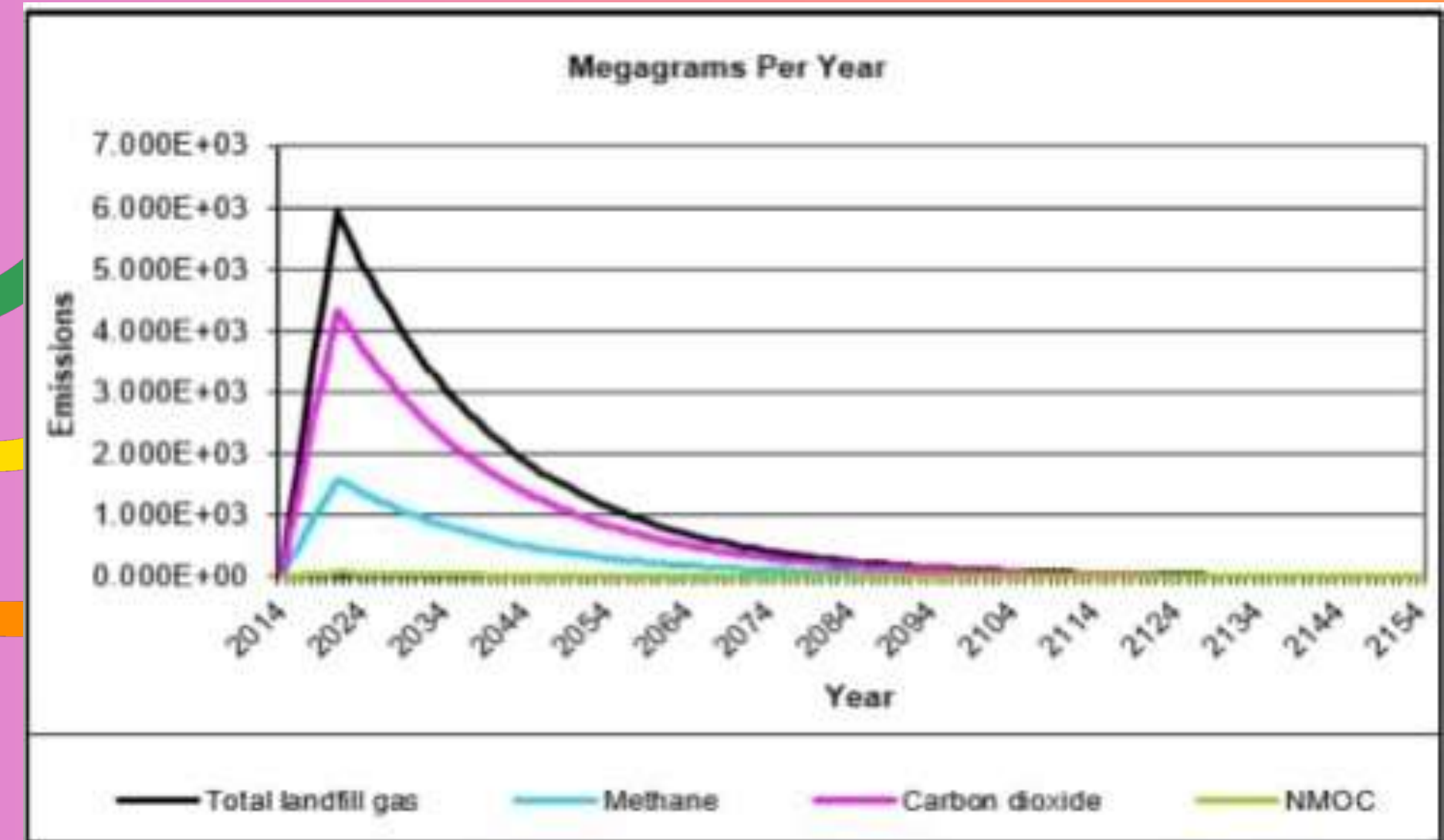
Input Units: Mg/year

Year	Input Units (Mg/year)	Calculated Units (short tons/year)
2014	29,838	32,822
2015	33,734	37,107
2016	37,824	41,606
2017	42,102	46,312
2018	46,584	51,242
2019	51,239	56,362
2020	49,399	54,338
2021		
2022		
2023		
2024		
2025		
2026		

Table 2. Estimated Methanes Gas Emission from Landfill Cell 1

year	Mg/Year	gg/Year
2014	160	0.00
2015	166	0.17
2016	344	0.34
2017	537	0.54
2018	745	0.74
2019	967	0.97
2020	1.204	1.20
<b>Total</b>		<b>3.96</b>

(Source: Research Data, 2023)



**RESULT AND DISCUSSION**



# RESULT AND DISCUSSION

Total estimated methane gas production using LandGEM on landfill cell 2 is 1,9351 Gg/year

Table 3. Estimated Methanes Gas Emission from Landfill Cell 2

<i>Year</i>	<i>Mg/Year</i>	<i>Gg/Year</i>
2021	0	0.0000
2022	315	0.3152
2023	641	0.6410
2024	979	0.9789
<b>Total</b>		<b>1.9351</b>

LANDFILL INPUTS Landfill Name or Identifier: TPA Gunung Kumpang

PROVIDE LANDFILL CHARACTERISTICS

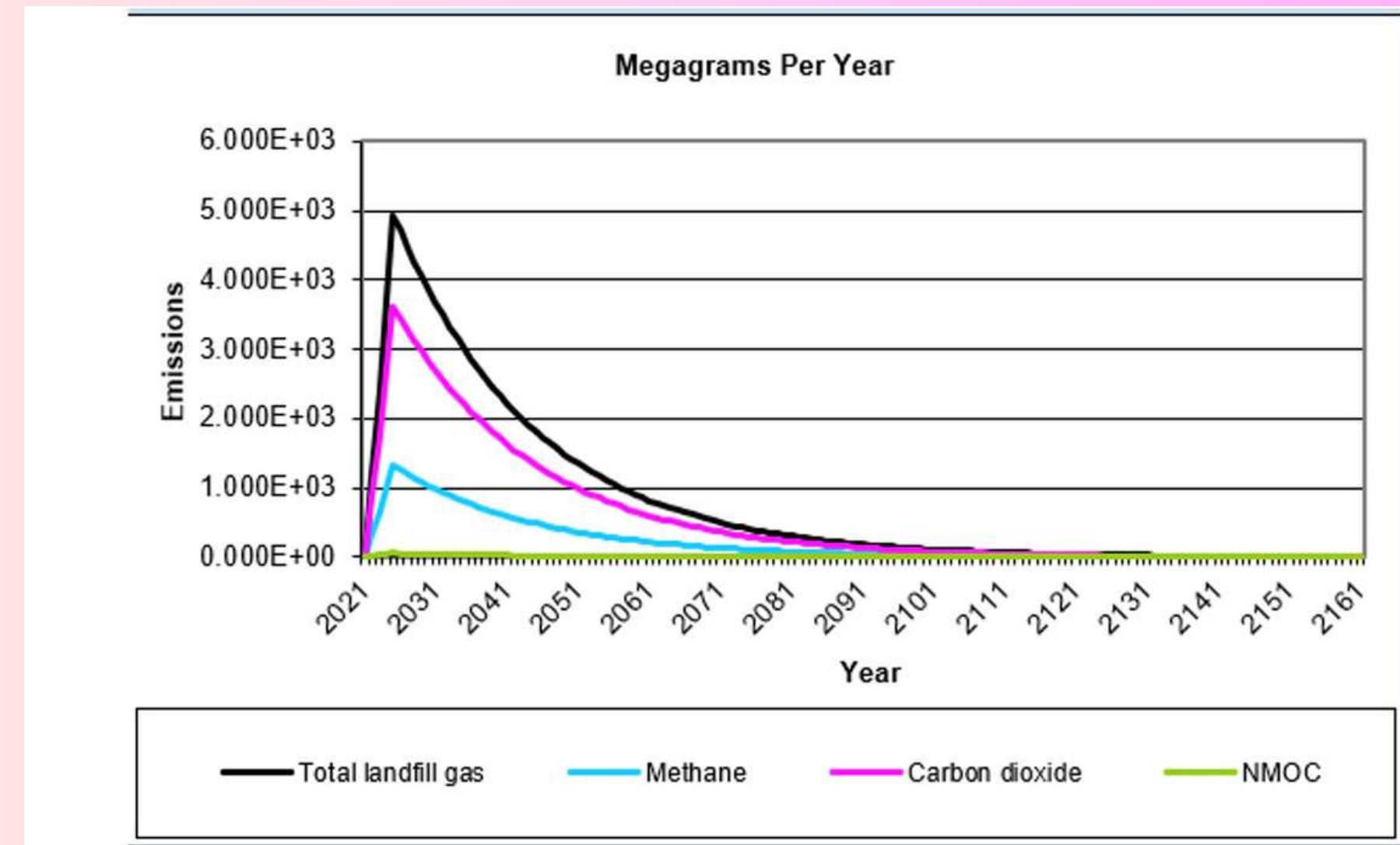
Landfill Open Year: 2021  
 Landfill Closure Year: 2024  
 Use Model Calculate Closure Year?  Yes  No  
 Waste Design Capacity: megagrams

4. ENTER WASTE ACCEPTANCE RATE  
 Input Units: Mg/year

Year	Input Units (Mg/year)	Calculated Units (short tons/year)
2021	56,839	62.5
2022	61,523	67.6
2023	66,576	73.2
2024	70,056	77.0
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		

DETERMINE MODEL PARAMETERS

Decomposition Rate, k (year<sup>-1</sup>): AA Conventional - 0.05  
 Potential Methane Generation Capacity, L<sub>0</sub> (m<sup>3</sup>/Mg): AA Conventional - 170  
 DOC Concentration (ppmv as hexane): AA - 4,000  
 Methane Content (% by volume): AA - 50% by volume

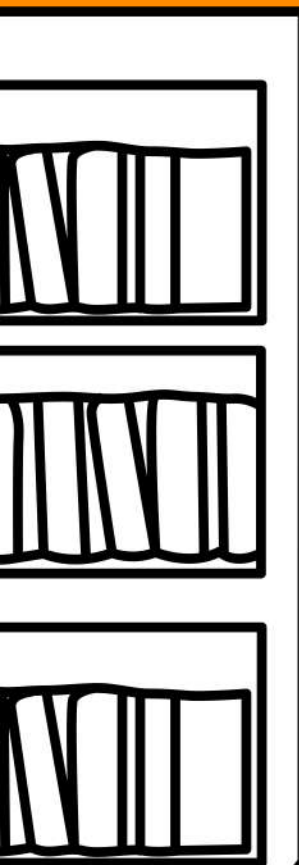






# WASTE MANAGEMENT POLICY

The effectiveness of waste management can only be achieved through 3 (three) pillars, namely the government, the wider community and the business world which work in an integral (integrated), comprehensive (overall) and mutualistic (mutually beneficial) manner. Implicitly this concept carries the principle of mutual cooperation in waste management as a strategic social capital (Islamy, 2009).

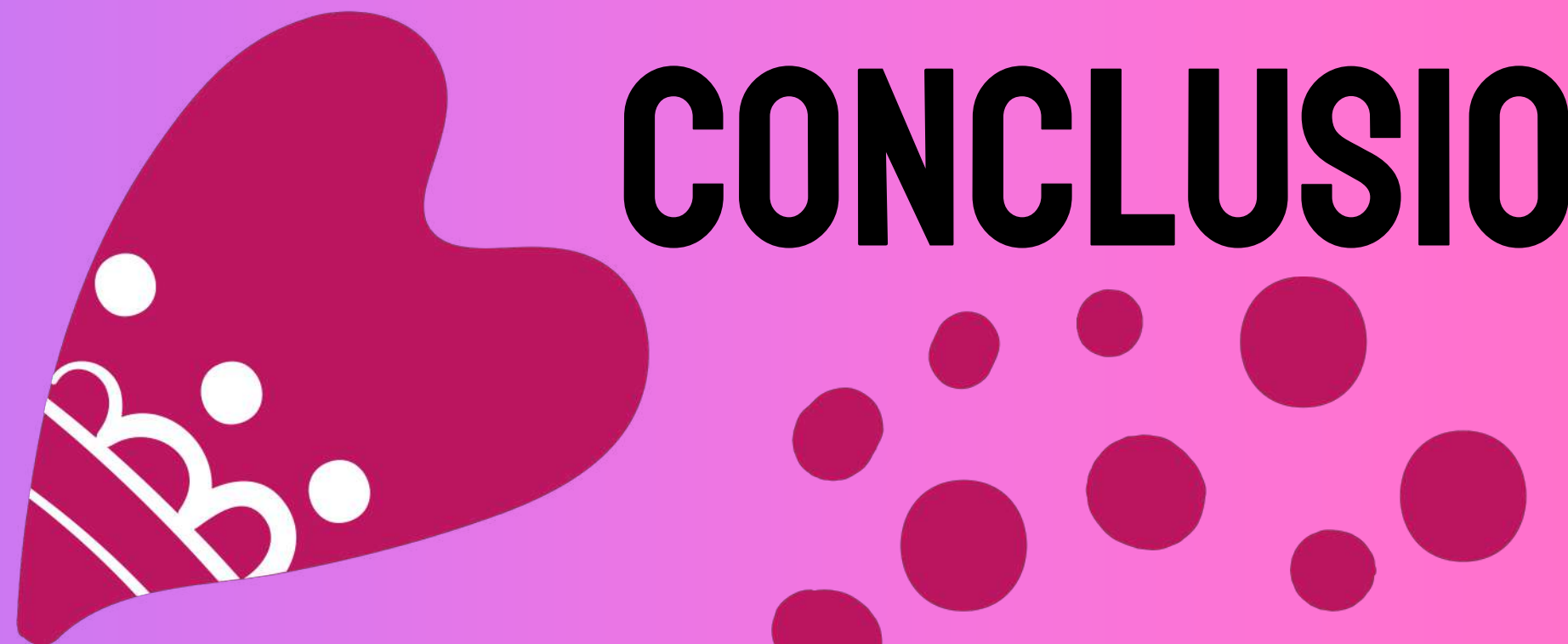




- Based on LandGEM , methane gas estimation emissions in latest Gunung Kupang landfill cell from 2021-2024 is 1.935 Gg/year
- Effectiveness of waste management can only be achieved through the government, the wider community and the business world.
- Limitation of this research lies in the weak regulations governing waste management in Banjarbaru City which procedurally forms the legal basis for determining management steps and strategies, one of which is the methane gas measurement strategy at Gunung Kupang Final Processing Site.



**CONCLUSION**





# LET'S WORK TOGETHER

TO PROTECT  
OUR PLANET  
AND ENSURE A  
SUSTAINABLE  
FUTURE FOR  
GENERATIONS  
TO COME.





# CERTIFICATE

as a PRESENTER to

**Nurul Listiyani**

Paper ID: JESSD-123

*"Determination Strategies for HDI Improvement Using SWOT Matrix Toward Sustainable Development and Good Environment"*

in 3rd International Symposium (Virtual) of Earth, Energy, Environmental  
Science and Sustainable Development

August 27, 2022

<https://symposiumjessd.ui.ac.id/> - <https://scholarhub.ui.ac.id/jessd/>

August 29, 2022

Director, School of Environmental Science, Universitas Indonesia



Dr. dr. Tri Edhi Budhi Soesilo, M.S.

## 3rd International Symposium (Virtual) of Earth, Energy, Environmental Science and Sustainable Development

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