

ISBN :



CONFERENCE PROGRAMS AND ABSTRACT

**ADVANCING SUSTAINABLE SCIENCE AND TECHNOLOGY
THROUGH EFFECTIVE COLLABORATION**

OCTOBER 20-21, 2021

**Palembang, Province of South Sumatera
Indonesia**

Organized By :



FOREWORD FROM GENERAL CHAIR 5th FIRST 2021 INTERNATIONAL CONFERENCE



Assalamu'alaikum wr wb,

Alhamdulillahirobbil 'alamin, Thank to the God, almighty, due to His bless and love, we are granted good health and opportunity so that we can meet here in the event of the 5th FIRST and the 3rd SNAPTEKMAS 2021.

The honorable keynote speakers of the 5th FIRST and the 3rd SNAPTEKMAS 2021

Dra. Nana Yuliana, MA., Ph.D., as The Indonesian LBBP Ambassador for the Republic of Cuba, concurrently with the Commonwealth of the Bahamas, Jamaica, the Dominican Republic and Haiti

Prof. Ramaraj Boopathy. from U Alcee Fortier Distinguished Service Professor of Biological Sciences At the Nicholls State University, USA

Dr. Ing. Ahmad Taqwa, the Director of State Polytechnic of Sriwijaya.

The honourable keynote speakers, distinguished guests, all participants, ladies and gentlemen,

For the beginning of my speech, let me welcome all of you with my great warm hug. It is a great honor for me that you choose the 5th FIRST and the 3rd SNAPTEKMAS 2021 as your conference. I am so proud that the authors still become enthusiastic to develop the knowledge although in this pandemic situation. Let us still work hard to support the development of the world through the research, science, and technology in many parts of the knowledge, as what has been purposed by the FIRST conference itself.

In this occasion, I would like proudly to inform you that the 5th FIRST and the 3rd SNAPTEKMAS 2021 as the forum to share knowledge, to search, to find, and to enlarge the link with other industries and universities has attracted so many authors from abroad, such as from: Politeknik Tun Syed Nasir Syed Ismail; MARA University; Politeknik Mukah Sarawak; University Sultan Zainal Abidin, Terengganu, Malaysia; Politeknik Melaka (PMK) Malaysia; Iloilo Science and Technology University (ISAT-U) Philipina; Politeknik Kota Kinabalu; Universiti Teknologi Malaysia; The National University of Malaysia; National Chin-Yi University of Technology (NCUT); Accounting Research Institute UiTM-Malaysia; Management and Science University Malaysia; AlBaha University, KSA, Saudi Arabia; Politeknik Melaka (PMK), Malaysia; Kuantan Community College, Pahang, Malaysia; Universiti Brunei Darussalam; and Ferdowsi University of Mashhad, Iran.

Welcome to all of the researchers that become the collaborators in our research and community service. It is our great honour to have you as our collaborators and participants in the 5th FIRST and the 3rd SNAPTEKMAS 2021.

The honourable keynote speakers, distinguished guests, all participants, ladies and gentlemen,

In this chance, I would like to say thank you very much to the Director of State Polytechnic of Sriwijaya for his full support in the development of the Research and Service Community programs. Due to his hard work and his belief to all of the committee so that this event can be held.

In this occasion, I also would like to convey my big thank to all of the keynote speakers, invited guests, all the participants, all reviewers, and all committee of the 5th FIRST and the 3rd SNAPTEKMAS 2021. Without you all, this event will be nothing. May Allah SWT gives His reward for your sincerity. As the time goes by, it is hoped that our cooperation and coordination in the FIRST and SNAPTEKMAS can be maintained and improved. I hope that you can enjoy this conference and can get a big benefit from this event. I also wish that we can meet again in the forthcoming FISRT ad SNAPTEKMAS

Wassalamu'alaikumwaraahmatullahi wabarakatuh

FOREWORD FROM DIRECTOR OF STATE POLYTECHNIC OF SRIWIJAYA



The honorable, FIRST 2021 and SNAPTEKMAS 2021 keynote speakers,

Dra. Nana Yuliana, MA., Ph.D., as The Indonesian LBBP Ambassador for the Republic of Cuba, accredited to the Bahamas, Republic of Dominican, Republic of Haiti and Jamaica

Prof. Ramaraj Boopathy., from U Alcee Fortier Distinguished Service Professor of biological sciences at the Nicholls State University, USA

Dr. Ing. Ahmad Taqwa, MT., as Director of Politeknik Negeri Sriwijaya

Assalamualaikum wr wb,

Let us extend our gratitude to Allah SWT, the most gracious, the most merciful. Due to His bless, we can gather here, at the Opening Ceremony of the FIRST 2021 and SNAPTEKMAS 2021

First of all, Please let me deliver my warm welcome to all keynote speakers and all participant of FIRST 2021 and SNAPTEKMAS 2021. It is my great pleasure to meet and see you in this event.

Although, there are so many obstacles that should be faced in the pandemic situation, however, as young generation, we should be optimistic, stay strong and be active in searching and finding the solution. The FIRST 2021 and SNAPTEKMAS 2021 as the DIES of State Polytechnic of Sriwijaya annual event will become one of the media to support those activities. The researchers could share knowledge, find partners, and enlarge the collaboration through this event.

Based on the change in the model of the teaching learning activity that focuses on the MERDEKA BELAJAR, State Polytechnic of Sriwijaya has a big desire in getting acceleration in the internationalization of the institution. One of them by improving the overseas and industrial collaboration, especially in joint research and joint publication. In the beginning of 2021, the research and community service unit in Politeknik Negeri Sriwijaya has launched new schemes of research and community service, namely the Overseas Collaboration Research and Overseas Collaboration Community Service. Thanks to God, those schemes have attracted researchers not only from Asia but also several other countries outside Asia, such as: research and community service collaboration with Al Baha University from Saudi Arabia, with Ferdowsi University of Mashhad from Iran, and with Princess Sumaya University of Technology from Jordan, as well as several other foreign universities.

In this occasion, I also would like to welcome all the researchers that become the collaborators in our new scheme of research and community service. It is our great honour to have you as our collaborators.

The honourable participants,

At this time, State Polytechnic of Sriwijaya has held 5 times of FIRST. FIRST publications from previous conferences have been successfully indexed not only in SCOPUS, but also in WOS. This 5th FIRST seminar will be conjugated with the 3rd National Seminar on Community Service SNAPTEKMAS. (National seminar of applied technology for public). All of these are the efforts to improve the quality of Polsri lecturers which significantly have a positive effect on the learning process of Polsri students.

Before ending my speech, I would like to congratulate the participants of The FIRST 2021 and SNAPTEKMAS 2021. May the noble efforts, support, and cooperation of researchers in this conference will continue. Special thanks to the organizer and co-organizer committee of The FIRST 2021 and SNAPTEKMAS 2021 for the hard work and the commitment in realizing this conference. Do maintain the spirit of working in a team and continue to unite in order to display a culture of excellence in the eyes of the country and the world.

With Bismillahirrahmanirrahim, I officiate The FIRST 2021 and SNAPTEKMAS 2021.
Wassalamu'alaikum warrahmatullahi Wabarakatu

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KEYNOTE SPEAKER



Dra. Nana Yuliana, MA., Ph.D.

The Indonesian LBBP Ambassador for the Republic of Cuba, concurrently with the Commonwealth of the Bahamas, Jamaica, the Dominican Republic and Haiti

Her Excellency Ambassador Nana Yuliana, Ph.D arrived in Havana, Cuba on December, 23rd, 2020 to serve her duties as the Ambassador Extraordinary and Plenipotentiary of the Republic of Indonesia to Republic of Cuba, Commonwealth of Bahamas, Dominican Republic, Republic of Haiti and Jamaica. She was appointed by the President of the Republic of Indonesia on October 19th, 2020. Prior to her position as Ambassador Extraordinary and Plenipotentiary, she was Consul General of the Republic of Indonesia in Houston, Texas, United States of America from 2017 –2020, after she was the Director of Mid-Career Diplomatic School at the Ministry of Foreign Affairs of Indonesia from 2014 – 2017. Her first diplomatic assignment was as First Secretary of Political Affairs at the Embassy of Indonesia in Manila from 2001-2005. From 2008 to 2012, she was the Counsellor of Economic Affairs of the Embassy of Indonesia in Bangkok and Permanent Representative of Indonesia to the United Nations Economic and Social Commission for Asia and Pacific (UNESCAP). She attended several meetings related to Millennium Development Goals (MDGs) or Sustainable Development Goals (SDGs) issues. Her bachelor's degree was English Education from Institute of Teacher's Training in Jakarta, then she pursued her Master Degree in Applied Linguistics for Macquarie University in Sydney, Australia and also International Relations from University of Indonesia in Jakarta, Indonesia. She completed her Doctoral Degree in Development Studies from the University of Santo Tomas, Manila, Philippines in 2006. While serving as a diplomat since 1995, her passion in teaching and learning encourages her as well to share her knowledge and teaches at the University in Jakarta, Indonesia. During her tenure as Consul General, she was very active in promoting Trade, Tourism, Inbound and Outbound Investments and very keen to engage with Universities for cooperation in human capital development.

KEYNOTE SPEAKER



Prof. Ramaraj Boopathy

Alcee Fortier Distinguished Service Professor of biological sciences
at the Nicholls State University, USA

Fulbright Scholar Fulbright Senior Specialist World Class Professor-Government of Indonesia. Honorary Visiting Professor, ITB, Indonesia Alcee Fortier Distinguished Service Professor John Brady Endowed Professor in Biological Sciences Nicholls State University Business Address: Alcee Fortier Distinguished Service Professor John Brady Endowed Professor in Biological Sciences Department of Biological Sciences Nicholls State University Thibodaux **EDUCATION:** B.Sc. Zoology, University of Madras, India; 1979 M.Sc. Environmental Biology, Tamil Nadu Agricultural University, India; 1981 Ph.D. Environmental Biology, University of Madras, India; 1986 **UNIVERSITY RESPONSIBILITIES:** Responsibilities include Teaching Environmental Biotechnology, a Senior and Graduate level course, Marine and Environmental Biology (Graduate Course), Microbiology and Environmental Biology courses. Research interests include Bioremediation of Hazardous Chemicals and Anaerobic Microbiology. Service includes advising students, participate in Departmental and University committees and serving the local and regional communities. Advisor to Masters Program in Marine and Environmental Biology. **PROFESSIONAL EXPERIENCE:** January 2013 – Present: John Brady Endowed Professor in Biological Sciences, Department of Biological Sciences, Nicholls State University, Thibodaux. Teaching, Research, and Service to the University and Community. August 2012 – Present: Alcee Fortier Distinguished Service Professor, Department of Biological Sciences, Nicholls State University, Thibodaux. Teaching, Research, and Service to the University and Community. August 2004 – Present: Distinguished Service Professor, Department of Biological Sciences, Nicholls State University, Thibodaux. Teaching, Research, and Service to the University and Community. **MAJOR AREAS OF RESEARCH INTERESTS:** Anaerobic digestion, Composting, Biodegradation of hazardous chemicals. Antibiotic resistant bacteria and Antibiotic resistance genes in the aquatic ecosystem. Isolation and identification of novel bacteria. Anaerobic degradation of explosive chemicals with particular reference to sulfate reducing bacteria. Design and development of biological reactor systems. Microbial immobilization of

heavy metals and radionuclides. Alcohol production from agricultural residues. Water quality in the wetlands. Alternative to sugarcane burning, Biological control of termites. Organic ways to control land loss and coastal restoration.

KEYNOTE SPEAKER



Dr. Ing. Ahmad Taqwa, MT.

Director of Politeknik Negeri Sriwijaya Indonesia


Director of State Polytechnic of Sriwijaya, other than that, he is still active at Head of The Research and Publication Commission Forum Director of State Polytechnical In Indonesia, Founder of The Online Journalist Board (IWO) Sumsel, Chairman of The Advisory Board of UKM Nusantara Palembang and Assessor of Higher Accreditation Board. **EDUCATION:** Diplom Ingenieur Electrical Engineering HTL, Ingenieurschule Beider Basel, Switzerland; 1994, Magister (2005) and Doctoral (2010) at Electrical Engineering, Bandung Institute of Technology, Indonesia. **RESEARCH:** Head of Research Assignment “Mini PLTS Periodic Cooling System to Overcome Overheating in Palembang City” (2019), Member of The Research Assignment “Effects of Sea Salt Dust Collection on Output Loss and Solar Panel Output Efficiency” (2020), and Head of Research Assignment “Design and Build of Wireless Sensor Network Prototype Detection Of Landslides Based on IOT and LORA” (2020). **DEDICATION:** “The Design and Evaluation of Virus Scan in The E-Mail System in SMA N 5 Palembang” (2018), Assignment Service “Utilization of WSN Technology in Parking Air Monitoring Foundation SMP Harapan Mulia Palembang” (2019), Development of Teaching Materials with Interactive Multimedia with Education Game for Harapan Mulia Junior High School Students” (2020). **AWARD:** Certificate In Participating In The 200 Hour Advanced Technical Teacher Training awarded by FONTYS and PEDC (1998), Satyalancana Karya Satya X Year 2011 And Satyalancana Karya Satya XX Year 2017 by The President of The Republic of Indonesia. **WORKSHOP:** Seminar and Focus Group Discussion Forum The Rector of Indonesia “Economic Stability In The Vuca Area”, Ujung Pandang (2020), Workshop on Using Integrated Resources Information System Applications For Lecturers of State Polytechnical Polytechnic, Palembang (2019) And Workshop of Learning Methodology of Polsri Lecturers and Outside Education Domicile (PDD) as a Source Person, Palembang (2019).

RUNDOWN
The 5th FIRST 2021 INTERNATIONAL CONFERENCE
(FORUM IN RESEARCH SCIENCE AND TECHNOLOGY)
SNAPTEKMAS (Seminar Nasional Aplikasi Teknologi pada Masyarakat) 2021
Palembang, South Sumatera, Indonesia
Thursday, October 21, 20201

		Thursday, October 21, 20201			
No.	Session	Person in Charge	Time Allotment (WIB)	Liaison Officer	
1.	Registration	Event Section Committee	07.00 – 08.00	Doeslohal Djumrianti, S.E.MIS., Ph.D	
2.	The Opening Ceremony				
3.	Do'a				
4.	Indonesian National Anthem				
5.	Chair Report Speech				
6.	Speech and Opening Remarks by Director of State Polytechnic of Sniwijaya	Event Section Committee	08.00 – 09.00		
7.	Souvenirs Gift, Group Photos				
PLENARY SESSION					
No.	Keynote Speaker	Affiliation	Time Allotment (WIB)	Moderator	Liaison Officer
1.	Dra. Nana Yuliana, MA., Ph.D.	The Indonesian LBBP Ambassador for the Republic of Cuba, concurrently with the Commonwealth of the Bahamas, Jamaica, the Dominican Republic and Haiti	09.00 – 10.00	Tiur Simanjuntak M.Pd.	Doeslohal Djumrianti, S.E.MIS., Ph.D
2.	Prof. Ramaraj Boopathy	Alcee Fortier Distinguished Service Professor of biological sciences at the Nicholls State University, USA	10.00 – 11.00	Prof. Hasan Basri	Dr. Nyayu Latifah Husni, M.T.
3..	Dr. Ing. Ahmad Taqwa, MT.	Director of Politeknik Negeri Sriwijaya, Indonesia	11.00 – 12.00	Jaksen M. Amin, M.Si.	Dr. Martha Aznury, S.Pd., M.Si.

PARALLEL SESSION

No.	Theme	Room	Time	Moderator	Articles
1.	TRACK 1 (Engineering and Science)	1	13.00 – 16.00	Dr. Eng Tresna Dewi, M.Eng./ Ika Sulianti, ST, MT	15
2.	TRACK 1 (Engineering and Science)	2	13.00 – 16.00	Dr. Martha Aznury, M.Si./ Indah Purnamasari, M.Eng.	14
3.	TRACK 1 (Engineering and Science)	3	13.00 – 16.00	Fatahul Arifin, M.Eng, Ph.d./ Dr. Indrayani, S.T., M.T.	13
4.	TRACK 2 (Computer Science, Computer Engineering, Information System, Informatics Management)	4	13.00 – 16.00	Rika Sadariawati, M.Si./ M.Miftakul Amin, S.Kom., M.Eng	13
5.	TRACK 2 (Computer Science, Computer Engineering, Information System, Informatics Management)	5	13.00 – 16.00	Dr. Nyayu Latifah H, MT./ Lindawati, S.T., M.TI	12
6.	TRACK 3 (Social Science)	6	13.00 – 16.00	Doeslohah Djumrianti, S.E.MIS., Ph.D/ Dr. Marieska Lupikawati	13
7.	TRACK 3 (Social Science)	7	13.00 – 16.00	Dr. Sari Lestari ZR/ Dr. Rita Martini	14
8.	SNAPTEKMAS 1	8	13.00 – 16.00	Yumi Oklarina, ST, MT/ Mouland Irwadi, SE. M.Si.	15
9.	SNAPTEKMAS 2	9	13.00 – 16.00	Leni Novianti, M.Kom./ Maivi Kusnandar, M.Kom	15
10	SNAPTEKMAS 3	10	13.00 – 16.00	M Husni Mubarak, M.Si./ Martinus Mujur, ST, MT	15
11	SNAPTEKMAS 4	10	13.00 – 16.00	Dr. Ade Silvia H, MT./ M. Sopian Soim, ST, MT	13



CLOSING SESSION

Event	Time	Room
<ul style="list-style-type: none">- Closing Ceremony- Announcement of:<ol style="list-style-type: none">1. Best Paper FIRST IC 20212. Best Paper SNAPTEKMAS 20213. Best Presenter FIRST IC 20214. Best Presenter SNAPTEKMAS 2021- Quiz Online	16.00– 17.00	Main Room

TRACK 3 (Social Science)

ROOM : 6
 TIME : Thursday, 21 October, 2021/ 13.00 - 16.30
 ARTICLES : 13
 MODERATOR : Doeslohal Djumrianti, S.E.MIS., Ph.D/ Dr. Marieska
 Lupikawati

NO	Time	ID	AUTHORS	TITLE	AFFILIATION
1	13.00-13.10	3847	Ayu Chotibah, Bainil Yulina, Desi Apriyanty, Evada Dewata, Pridson Mandiangan	THE INNOVATION OF SOUTH SUMATERA TRADITIONAL BATIK E-COMMERCE APPLICATIONS	State Polytechnic of Sriwijaya
2	13.10-13.20	3683	M. Thoyib, Riza Wahyudi, Firmansyah, Darul Amri	THE ANALYSIS OF COST QUALITY ON PRODUCTIVITY OF IRON RAILING PRODUCTS IN SMALL AND MEDIUM BUSINESS IN PALEMBANG	State Polytechnic of Sriwijaya
3	13.20-13.30	3757/3756	Nelly Masnila, Firmansyah, Jovan Febriantoko, Riana Mayasari, Jamaliah Said	Quality of Financial Reporting and Impact of GGG Implementation: Study on Local Government in Indonesia	State Polytechnic of Sriwijaya
4	13.30-13.40	3796	Evi Agustina Sari, Sri Gustiani, Yusri, Tiur Simanjuntak	An Error Analysis of English Sentence Construction in Writing Subject Made by the Students of the English Department at Sriwijaya State Polytechnics	State Polytechnic of Sriwijaya
5	13.40-13.50	3827	Edwin Frymaruwah, Farah Aida Ahmad Nadzri, Periansya, Evada Dewata	DISCLOSURE OF SUSTAINABLE PERFORMANCE IN HIGHER EDUCATION IN INDONESIA	State Polytechnic of Sriwijaya, UiTM
6	13.50-14.00	3976	Hendra Hadiwijaya Febrianty Rezanisa Agramanisti Azdy	Improvement of LPKA Class 1 Palembang Electronic Dashboard with Field Performance Monitoring	Palcomtech Polytechnic, STMIK PalComTech
7	14.00-14.10	3853/4034	Neneng Miskiyah, Purwati, Yulia Pebrianti, Keti Purnamasari, Nyimas Miftahul Jannah,	OPTIMIZATION OF INCOME PARAMETERS OF SONGKET CRAFTSMEN ON KOPERASI SONGKET PALEMBANG	State Polytechnic of Sriwijaya

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Biogas and Electrical Energy Production from Market Waste at Fixed Dome Bio-digester in Talang Banjar Jambi

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ABSTRACT

The waste problem commonly is almost the same in every big city. When it is not managed properly, it will be piled up very quickly. The city of Jambi produces approximately 1,838.48 m³/day of waste. Organic waste originating from market waste in Jambi City is dominated by vegetable waste, so that its organic content can be converted into biogas energy. This abundant of waste is managed in *Talang Banjar* in Jambi City which is to be converted into biogas in order to reduce environmental pollution and also convert organic waste into useful materials what it is so called biogas that can be used by the community. This waste treatment used a fixed-dome type bio-digester. The purpose of the study was to analyze the production of biogas and electrical energy generated from waste processing at a fixed-dome bio-digester in Talang Banjar Jambi. Based on the results of the study, it found out that the average methane gas content produced was above 60% with an average biogas volume of 5 m³/hour, and the electrical energy produced 58.5 kWh/hour.

Keywords: Organic waste, fixed dome digester, biogas, electrical energy

1. INTRODUCTION

Based on Law No. 18 of 2008 that waste is part of something that is useless, disliked or something that must be thrown away, which is generally solid material. Regarding to its nature, waste is divided into organic waste and inorganic waste. Organic waste is easily decomposed such as food scraps, vegetables, dry leaves, and so on. It can be further processed into compost. Meanwhile, inorganic waste is waste that cannot be decomposed easily, such as plastic food packaging containers, paper, plastic toys, bottles and drinking glasses, cans and so on.

The City of Jambi, like other big cities, produces 1,838.48 m³/day of waste. The characteristics of waste from this place are dominated by market waste in the form of inorganic waste, average amount of 67.02%

and organic waste by 32.98% [1]. This organic waste is processed in *Talang Banjar* in Jambi City using an anaerobic digestion system. Anaerobic digestion is a process of decomposition of biodegradable materials under controlled conditions without oxygen and at temperatures suitable for *mesophilic* or *thermophilic* or facultative bacterial species to be converted into biogas and digestate products [2]. The most widely used anaerobic digestion technologies are Fixed dome digester, Floating drum digester, and Tubular digester. Fixed dome type anaerobic digestion technology is the type used in this study to treat market waste in *Talang Banjar* Jambi City. There are 4 anaerobic digestion reactors with a volume of 30 m³. The total processing capacity is 1 ton/day.

The fixed-dome digester design was first developed in China in 1936, and then widely developed around the world with 6 volumes, 8, and 10 m³ [3,4,5]. The digester design consists of an underground digester section with a dome-shaped lid made of brick, stone or concrete. Another part is the slurry reservoir which is open to atmospheric pressure. The gas produced in the digester accumulates in the dome of the digester. The pressure from the biogas that is formed will press the slurry into the slurry reservoir. Examples of fixed-dome digesters are the Chinese fixed-dome digester and Indian-fixed dome (Deenbandu, Nepalese fixed dome (GGC-2047), etc. [6]. The Chinese fixed-dome digester can be seen in Figure 1. below:

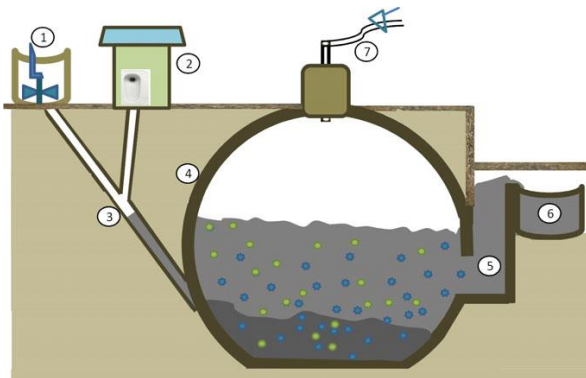


Figure 1 Chinese fixed-dome digester [6]

Based on working principle of the biodigester, organic waste or waste after being mixed with water in a certain ratio, in general such a 1:1 or 1:2 ratio is used and then the mixture is put into the biodigester. The effective volume of the biodigester is 80% filled with slurry and 20% is used for biogas to be produced from the anaerobic digestion process [7]. The working principle of a fixed-dome digester in general can be seen in Figure 2 below:

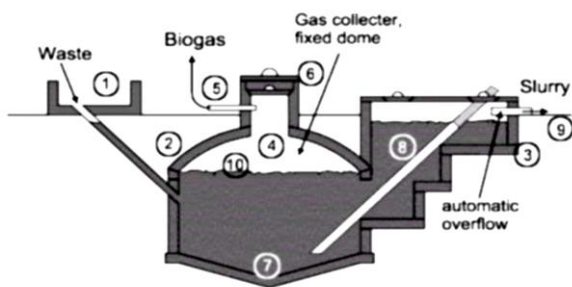


Figure 2 Working Principles of Fixed Dome Biodigester [7]

2. MATERIALS AND METHODS

2.1 Materials

The raw material for biogas production in this study was market organic waste which was dominated by cabbage and pineapple which were not suitable for consumption from the *Talang Banjar* market, Jambi City. While the equipment used was 1 unit of biogas processing owned by *Talang Banjar* Jambi City which consisted of 4 inlet tanks, 4 fixed dome digesters, gas bags, multi meter and biogas analyzer.



Figure 3 Biogas unit in *Talang Banjar* Jambi

2.2. Methods

The procedures for making biogas in *Talang Banjar* Jambi as follows:

1. First of all, organic waste such as cabbage and pineapples taken from the *Talang Banjar* market were sorted by separating plastic or other impurities. Then the organic wastes were chopped using a chopper machine;
2. After chopping the wastes were put into the inlet tub with the ratio between the chopped waste and water was 1: 1;
3. Then, it was stirred manually with long bamboo;
4. Each inlet tank was filled with mixed organic waste with a 7-day interval of filling, after that routinely in 1 week 3 times filling; on Tuesday, Thursday, and Saturday. Each inlet tub was connected to the digester.
5. The anaerobic digestion process will occur in the digester and produce biogas.
6. Biogas was then channeled and collected in storage bags/balloons.
7. Sampling of biogas was taken using a biogas sample bag or tedlar bag and brought to the laboratory for analysis its content.

2.3. Biogas analysis

Biogas analysis was carried out by first measuring the CH₄ content of biogas using a bosean gas analyzer. Furthermore, the volume of gas produced from the fixed dome digester unit was measured for 4 weeks. The results of the biogas volume data were then converted to energy using a source [8] where 1 m³ of biogas was equivalent to 11.17 kWh of electricity.

3. RESULTS AND DISCUSSION

3.1. Concentration of methane gas from biogas

The results from measuring the quality of biogas, especially for the concentration of methane gas produced from the anaerobic digestion process at the Fixe Dome Digester in *Talang Banjar*, Jambi City, are shown in Table 1. below:

Table 1. Results of measuring the quality of CH₄

Samples	Methane (CH ₄)
1	68%
2	64%
3	64%
4	69%
5	66%

Based on the data from the biogas test results in Table 1 above, in the test using a portable gas analyser on the first sample that the methane gas content was 68%, the second test decreased methane gas content by 64%, in the 3rd test the methane gas content was stable by 64%, in the 4th test the methane gas content increased by 69%, and in the 5th test was a 66% decreasing in methane gas content. In conclusion that the average methane gas content produced was above 60%. Meanwhile, from the same study used organic materials as materials for biogas production, methane gas was produced [9] in his research, the levels of methane gas using organic waste materials were 68.5% and the smallest was 67.75%. While in research [10] the content of methane gas using organic waste from the market was 52.8%. Thus the results of the biogas produced were line with theory [11] says the composition of biogas for methane (CH₄) gas with a concentration range of 50-70%.

The biogas produced in the fixed dome digester in *Talang Banjar* Jambi City can be used directly by the surrounding community for biogas stoves and lighting lamps in the *Talang Banjar* market using biogas

generator. In the equivalence according to [12] for 1 m³ of biogas equals to 0.46 kg of LPG, 0.62 liters of kerosene, 0.8 L gasoline, 2.5 kg of firewood and 0.52 diesel oil.

3.2. Volume and Electrical Energy of Biogas

From the results of measuring the volume of biogas formed during observations in April 2021, the following are the results of the average measurement of the volume of biogas obtained.

Table 2. Biogas volume

Week	Average Biogas Volume (m ³ /hour)
I	4,3
II	4,5
III	5,6
IV	5,6

Based on the data in Table 2. The volume of biogas produced in the fixed dome digester of *Talang Banjar* Jambi, in the first week of April, the average biogas volume was 4.3 m³, for the second week of April, the average biogas volume was 4.5. m³, then in the third week of April, the average biogas volume was 5.6 m³ and at the end of the month or at fourth week, the biogas volume was 5.6 m³. So that, the average biogas production for four weeks was 5 m³.

From the biogas volume data obtained for 4 weeks of measurement, it can be calculated the amount of electrical energy produced. The following table 3 is the result of the conversion of biogas volume to electrical energy.

Table 3. Electrical Energy from Biogas (1 m³ equals to 11.17 Kwh)

Week	Biogas Volume (m ³)	Electric energy (Kwh)
I	4,3	50,31
II	4,5	52,65
III	5,6	65,52
IV	5,6	65,52

Based on Table 3. Electrical energy produced in *Talang Banjar* Jambi City, the average generated in the first week obtained electrical energy of 50.31 kWh, for the second week electrical energy was obtained at 52.65 kWh, for the third week obtained electrical

energy was 65.52 kWh, in the fourth week the average electrical energy was 65.52 kWh, so that the average electrical energy for four weeks was 58.5 kWh.

4. CONCLUSION

Based on the research results of Biogas Production and Electrical Energy from Market Waste at Fixed Dome Biodigester in *Talang Banjar* Jambi, it was found that the methane gas content obtained exceeds 60% with an average biogas volume of 5 m³/hour, and the electrical energy produced was 58.5 kWh/hour.

AUTHORS' CONTRIBUTIONS

All authors in this publication have jointly carried out research activities and writing this article.

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