

Theoretical Biomethane and Electricity-Generation Potential of Municipal Solid Waste in Nigeria: A Composition-Based Sensitivity Analysis

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Abstract: Municipal solid waste (MSW) represents a potential renewable-energy resource in Nigeria due to its substantial organic content. This study estimated the theoretical biomethane potential (TBMP) and corresponding electricity-generation potential of representative Nigerian MSW using literature-derived physical and elemental composition data. A 100 kg wet-waste reference basis was adopted, giving 35.73% moisture and 64.27% dry matter, with food waste constituting the dominant fraction at 51.46%. The dry-basis elemental composition was 43.54% C, 5.49% H, 24.76% O, 0.85% N and 0.17% S, with 25.20% inerts. Following normalization of the non-inert elemental fraction, the modified Buswell–Mueller equation gave an ideal TBMP of 0.63 m³ CH₄/kg VS. Application of an adopted biodegradability factor of 67% reduced the methane potential to 0.42 m³ CH₄/kg VS, corresponding to 4.20 kWh/kg VS of methane energy and 1.47 kWh/kg VS of electricity at an electrical conversion efficiency of 35%. Sensitivity analysis was performed by varying biodegradability from 50–80% and electrical efficiency from 30–40%. The combined analysis produced electricity potentials ranging from 0.945 to 2.016 kWh/kg VS, demonstrating the influence of biological conversion and power-generation efficiency on the predicted energy recovery. The results establish a composition-based theoretical framework for assessing biomethane and electricity recovery from Nigerian MSW and highlight the importance of accounting for conversion uncertainty when evaluating waste-to-energy potential. The study contributes to SDGs 7, 11, 12 and 13 through renewable-energy recovery, sustainable waste management, resource valorisation and climate-change mitigation.

Keywords: Municipal Solid Waste; Theoretical Biomethane Potential; Anaerobic Digestion; Buswell Equation; Biodegradability; Sensitivity Analysis; Electricity Generation; Nigeria.

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I. INTRODUCTION

Municipal solid waste (MSW) management remains a major environmental challenge in Nigeria due to increasing waste generation, inadequate collection and disposal infrastructure, and the continued reliance on uncontrolled or poorly managed dumpsites. Nigerian MSW is characterized by a substantial organic fraction, although its composition varies with location, socioeconomic conditions and consumption patterns. Studies across Nigerian cities have reported organic fractions of approximately 43–68%, while a recent national synthesis estimated an average organic content of about 55% (Iorhemen et al., 2016; Alamu, 2025). This high organic content presents both a waste-management challenge and an opportunity for renewable-energy recovery. Anaerobic digestion (AD) provides a suitable pathway for recovering energy from the biodegradable organic fraction of

MSW by converting organic matter into biogas under oxygen-free conditions. Biogas consists principally of methane (CH₄) and carbon dioxide (CO₂), with methane providing the recoverable chemical energy for heat and electricity generation. Consequently, controlled anaerobic digestion can simultaneously reduce the quantity of biodegradable waste requiring disposal and recover renewable energy that would otherwise be lost through uncontrolled decomposition. This approach is particularly relevant to Nigeria, where improved waste management and diversification of energy resources remain important development priorities (Abila, 2014; Ogunjuyigbe et al., 2017).

The energy-recovery potential of organic waste can be assessed using its biochemical methane potential (BMP). Where experimental BMP measurements are unavailable,

theoretical biomethane potential (TBMP) can be estimated from the elemental composition of the substrate. The Buswell–Mueller equation provides an established stoichiometric method for estimating methane and carbon dioxide production from the empirical composition of organic matter (Buswell & Mueller, 1952). The resulting TBMP represents an ideal stoichiometric upper limit because actual methane production is affected by substrate biodegradability, microbial activity, operating conditions and the presence of refractory organic materials (Chickering et al., 2022). Incorporating a biodegradability factor therefore provides a means of examining how incomplete biological conversion influences the theoretical methane and energy-recovery estimates. Previous studies have demonstrated considerable waste-to-energy potential from Nigerian MSW using landfill-gas models, waste-generation projections and technology-specific conversion factors (Abila, 2014; Ogunjuyigbe et al., 2017). However, comparatively limited attention has been given to directly linking the elemental characteristics of representative Nigerian MSW to its stoichiometric methane potential and subsequently examining how uncertainty in biodegradability and energy-conversion efficiency affects the estimated electricity recovery. Such analysis is important because electricity potential derived from theoretical methane estimates is sensitive to the assumptions adopted for biological and electrical conversion. Accordingly, this study estimates the theoretical biomethane and electricity-generation potentials of representative Nigerian MSW using literature-derived physical and elemental composition data. A 100 kg wet-waste reference basis was used to establish the elemental composition, from which an empirical substrate formula was derived and applied to the modified Buswell–Mueller equation. The resulting methane potential was converted to chemical-energy and electricity-generation potentials, while sensitivity analysis was performed to evaluate the influence of biodegradability and electrical

conversion efficiency on the predicted energy recovery. The study therefore provides a transparent composition-to-energy framework for preliminary assessment of MSW valorisation through anaerobic digestion in Nigeria.

II. MATERIALS AND METHODS

➤ *Characterization of Municipal Solid Waste (MSW)*

Municipal solid waste data used in this study were obtained exclusively from reputable literature sources, including peer-reviewed journal articles, national reports, and international databases. The data comprise MSW composition, used for proximate and ultimate analysis of the waste stream. This approach was adopted due to the inherent variability of MSW and the practical limitations associated with obtaining a single, universally representative experimental dataset. Literature-based data provide a robust and widely accepted basis for modelling studies, particularly when combined with sensitivity analysis. For clarity and ease of analysis, all waste characterization and calculations were carried out on a 100 kg reference basis to simplify compositional analysis and maintain unit consistency.

• *Numerical Characterization of the MSW*

A numerical characterization of the municipal solid waste (MSW) feedstock was carried out using stoichiometric and computational methods. The proximate and ultimate analyses were determined from literature data and validated through elemental mass-balance relationships, while the theoretical biochemical methane potential (BMP) was estimated using Buswell's equation. All percentage compositions and moisture contents values were calculated relative to this 100 kg reference sample. Table 1 shows the waste composition data used in this study.

Table 1 Waste Composition and Heat Content (Orhorhoro & Oghoghorie 2019)

Component	% Content (wt)	% Average Moisture
Organic (Food)	51.46%	65.00%
Paper	9.30%	7.00%
Ferrous Metal	1.92%	4.00%
Non Ferrous Metals	1.92%	3.00%
Glass	3.50%	2.50%
Other (Plus Textile)	9.47%	9.00%
Plastic and Rubber	22.43%	2.50%

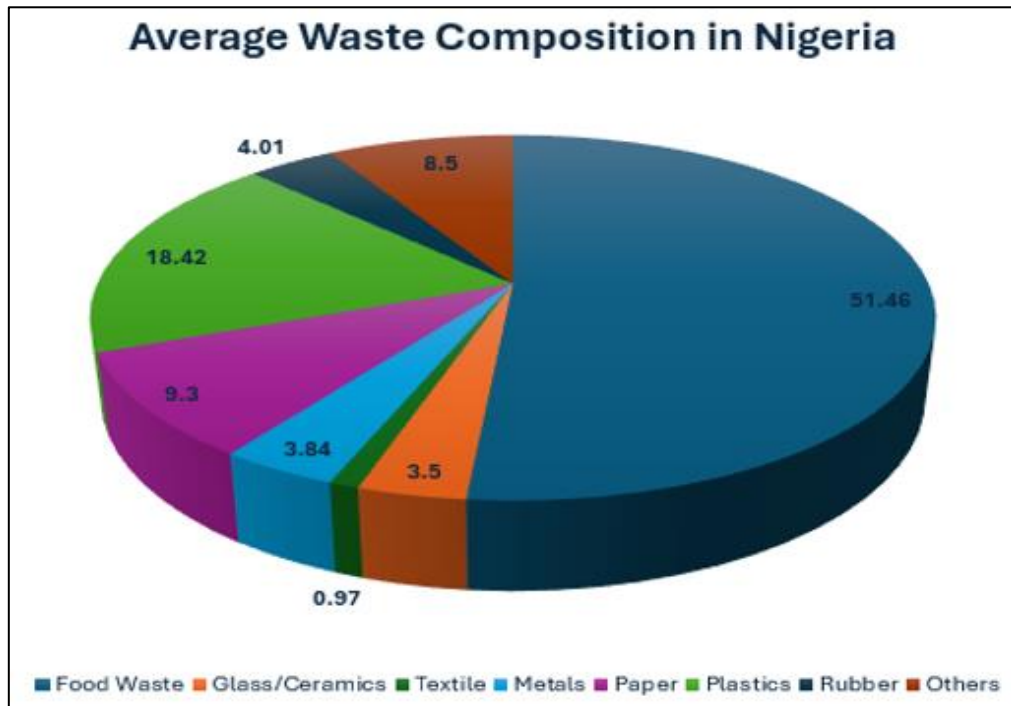


Fig 1 Average Waste Composition in Nigeria (Orhorhoro & Oghoghorie 2019)

Table 2 Elemental Mass Distribution of Municipal Solid Waste (Green & Southard, 2019)

Component	C	H	O	N	S	Inerts	Total
Organic (Food)	8.645	1.153	6.772	0.468	0.072	0.901	18.011
Paper	3.762	0.519	3.806	0.026	0.017	0.519	8.649
Ferrous Metal	0.083	0.011	0.079	0.002	0.000	1.668	1.843
Non Ferrous Metals	0.084	0.011	0.080	0.002	0.000	1.685	1.862
Glass	0.017	0.003	0.014	0.003	0.000	3.375	3.413
Other (Plus Textile)	2.266	0.259	0.172	0.043	0.017	5.860	8.618
Plastic and Rubber	13.122	1.575	4.986	0.000	0.000	2.187	21.869
Total	27.979	3.530	15.909	0.544	0.107	16.195	64.265

Waste Composition and Moisture Balance

For each waste component i , the mass of moisture is calculated from the wet mass of the component and its moisture content:

$$M_{w,i} = M_i \left(\frac{MC_i}{100} \right) \quad (1)$$

Where: $M_{w,i}$ = mass of moisture in component i (kg); M_i = wet mass of component i (kg) MC_i = moisture content of component i (%).

The dry mass of each component is:

$$M_{d,T} = \sum_{i=1}^n M_{d,i} \quad (2)$$

The percentage contribution of each component on a dry basis is:

$$X_{d,i} = \frac{M_{d,i}}{M_{d,T}} \times 100 \quad (3)$$

Where:

$$M_T = \sum M_i = 100 \text{ kg} \quad (4)$$

For 100 kg reference basis adopted in this research.

Hence;

$$M_{w,T} = \sum M_{w,i} \quad (5)$$

Ultimate Analysis of the MSW

For each waste component, the ultimate analysis gives the mass percentages of carbon, hydrogen, oxygen, nitrogen and sulphur.

The inert fraction is obtained from:

$$I_i = 100 - (C_i + H_i + O_i + N_i + S_i) \quad (6)$$

Where:

C_i = carbon content (%); H_i = hydrogen content (%); O_i = oxygen content (%); N_i = nitrogen content (%); S_i = sulphur content (%); I_i = inert fraction (%)

- *Elemental Mass Distribution*

The mass of each element contained in each dry waste component is calculated by multiplying the dry mass by the corresponding elemental percentage. Equation (7) represents the general equation for the determination of the elemental mass of each element in the waste sample.

$$M_{k,i} = M_{d,i} \left(\frac{k_i}{100} \right) \quad (7)$$

The elemental mass balance for each component is therefore the total mass of each element in the entire MSW sample is then obtained by summation:

$$M_{k,T} = \sum_i M_{k,i} \quad (8)$$

The overall elemental percentage is calculated relative to the total dry mass of the waste.

$$C_{MSW} = \frac{M_{k,T}}{M_{d,T}} \times 100 \quad (9)$$

Where: k represents carbon, hydrogen, oxygen, nitrogen, sulphur and inert

- *Proximate Analysis*

The proximate analysis divides the MSW into moisture, volatile/combustible organic matter, and inert/ash material.

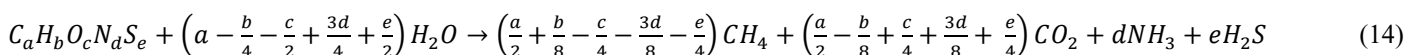
Since the calculation uses a 100 kg basis, the percentage of each proximate component is numerically equal to its mass in kilograms:

$$VM(\%) = \frac{M_{VM}}{M_T} \times 100 \quad (10)$$

$$Ash(\%) = \frac{M_A}{M_T} \times 100 \quad (11)$$

- *Estimation of Renewable-Energy Potential*

The methane yield obtained from the theoretical biomethane analysis was converted into corresponding energy and electricity-generation potentials using the lower heating value of methane and an assumed electrical conversion efficiency. The methane-energy output was calculated as:



Equation (14) was applied to predict the biochemical methane potential assuming complete degradation of the organic matter. However, since not all volatile solids in MSW are readily degradable, a biodegradability correction factor was later introduced to adjust the theoretical yield to a more realistic value. This approach ensures that the model simulations are grounded in thermodynamic consistency while accounting for the practical limitations of biological conversion efficiency.

- ✓ *Methane Energy Output*

$$E_{CH_4} = Y_{CH_4} \times LHV_{CH_4} \quad (12)$$

Where:

E_{CH_4} = methane energy output (kWh/kg VS)

Y_{CH_4} = methane yield (m³ CH₄/kg VS)

LHV_{CH_4} = lower heating value of methane (kWh/m³ CH₄)

- ✓ *Electricity-Generation Potential*

The theoretical electricity-generation potential was calculated by applying the assumed electrical conversion efficiency to the methane-energy output:

$$E_{el} = E_{CH_4} \times \eta_{el} \quad (13)$$

Where:

E_{el} = electricity-generation potential (kWh/kg VS)

η_{el} = electrical conversion efficiency

- *Determination of Theoretical Biomethane Potential Using the Modified Buswell Equation*

The Buswell and Mueller approach is widely used to estimate the theoretical methane potential of organic substrates based on their elemental composition, providing an upper limit for biogas production under ideal anaerobic digestion conditions (Buswell & Mueller, 1952). The theoretical biomethane potential of the municipal solid waste (MSW) was determined using the Buswell and Mueller approach to establish the maximum possible methane yield based on the elemental composition of the biodegradable fraction. The calculation utilises data from the proximate and ultimate analyses of the waste to estimate the proportions of carbon, hydrogen, oxygen, nitrogen, and sulphur that contribute to methane formation under ideal anaerobic conditions.

III. RESULTS AND DISCUSSIONS

The results of the numerical characterization and theoretical resource-recovery assessment of the representative municipal solid waste are presented and discussed in this section. The analysis first examines the physical composition and moisture distribution of the waste stream, followed by its proximate and ultimate characteristics. These properties provide the physicochemical basis for deriving the empirical composition of the organic fraction and estimating its theoretical biomethane potential using the modified Buswell–Mueller equation. The resulting

methane potential is subsequently translated into biogas, methane-energy and electricity-generation potentials to demonstrate the renewable-energy recovery associated with the biodegradable fraction of the waste.

➤ Results

Table 3 presents the physical composition, moisture distribution and resulting dry-matter fractions of the representative 100 kg MSW sample. The waste stream contained 35.73 kg of moisture and 64.27 kg of dry matter,

demonstrating the considerable influence of moisture on its overall composition. Food waste constituted the largest wet fraction at 51.46%, of which approximately 33.45 kg was moisture and 18.01 kg was dry matter. Plastics and rubber represented 22.43% of the wet waste but contributed approximately 21.87 kg, or 34.0%, of the total dry matter because of their comparatively low moisture content. Paper and other/textile materials contributed 13.5% and 13.4% of the dry fraction, respectively, while metals and glass constituted relatively smaller proportions.

Table 3 Physical Composition and Moisture Content of Municipal Solid Waste

Component	Content (kg)	Moisture (kg)	Content (dry) (kg)	% Content (dry)
Organic (Food)	51.46	33.45	18.01	28.0%
Paper	9.30	0.65	8.65	13.5%
Ferrous Metal	1.92	0.08	1.84	2.9%
Non Ferrous Metals	1.92	0.06	1.86	2.9%
Glass	3.50	0.09	3.41	5.3%
Other (Plus Textile)	9.47	0.85	8.62	13.4%
Plastic and Rubber	22.43	0.56	21.87	34.0%
Total	100.00	35.73	64.27	100.0%

The predominance of food waste indicates strong potential for anaerobic resource recovery because of its high biodegradable organic content, while the presence of plastics, metals and glass highlights the need for segregation and pretreatment before digestion. The relatively high moisture content of the waste also favours biological conversion over thermochemical processing by reducing the need for extensive drying, although the reported 35.73% moisture represents the mixed MSW stream rather than the separated organic fraction ultimately fed to the digester.

• Ultimate and Proximate Characteristics

Table 4 presents the dry-basis ultimate composition of the individual MSW components used in the elemental mass

balance, while Table 5 presents the resulting weighted ultimate composition of the overall MSW mixture. The latter provides the elemental basis for normalization and subsequent theoretical biomethane estimation using the modified Buswell–Mueller equation. The numerical ultimate analysis produced an overall dry-basis composition of 43.54% carbon, 5.49% hydrogen, 24.76% oxygen, 0.85% nitrogen and 0.17% sulphur, with an inert fraction of 25.20%. Carbon was therefore the dominant elemental constituent, followed by oxygen and hydrogen. These three elements are particularly important in theoretical biomethane estimation because their relative proportions determine the stoichiometric partitioning of the biodegradable substrate into methane and carbon dioxide according to the Buswell relationship.

Table 4 Component-Level Ultimate Analysis

Component	Content (kg)	%C	%H	%O	%N	%S	%inerts
Organic (Food)	18.01	48.0	6.4	37.6	2.6	0.4	5.0
Paper	8.65	43.5	6.0	44.0	0.3	0.2	6.0
Ferrous Metal	1.84	4.5	0.6	4.3	0.1	0.0	90.5
Non Ferrous Metals	1.86	4.5	0.6	4.3	0.1	0.0	90.5
Glass	3.41	0.5	0.1	0.4	0.1	0.0	98.9
Other (Plus Textile)	8.62	26.3	3.0	2.0	0.5	0.2	68.0
Plastic and Rubber	21.87	60.0	7.2	22.8	0.0	0.0	10.0
Total	64.27						

The relatively low nitrogen and sulphur concentrations are also relevant to anaerobic conversion. Nitrogen is associated with the potential formation of ammonia during degradation of nitrogen-containing organic matter, whereas sulphur may contribute to hydrogen sulphide formation.

Although present at much lower concentrations than carbon, hydrogen and oxygen, these elements are therefore important when characterizing the potential composition and quality of the resulting biogas.

Table 5 Ultimate Analysis

	%C	%H	%O	%N	%S	%inerts
Ultimate Analysis	43.54%	5.49%	24.76%	0.85%	0.17%	25.20%

The proximate characteristics presented in Table 6 further show that the representative MSW contained 48.07% volatile matter, 35.73% moisture and 16.19% inert material on the adopted wet-waste reference basis. The volatile fraction represents the largest of the three numerically derived

proximate fractions, indicating an appreciable proportion of potentially convertible material. The 16.19% inert fraction, however, does not contribute directly to biological methane generation and reinforces the importance of waste segregation before anaerobic treatment.

Table 6 Proximate Analysis

Proximate Analysis	Volatile Matter	Inerts	Moisture	Total
Weight (kg)	48.07	16.19	35.73	100.00
%	48.07%	16.19%	35.73%	100.00%

➤ Discussions

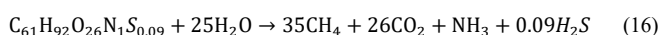
• MSW Numerical Characterization Results

✓ Theoretical Biomethane Potential Using the Modified Buswell Equation

The theoretical biomethane potential of the municipal solid waste (MSW) sample was estimated using the Modified Buswell & Mueller (1952) equation, which predicts the stoichiometric methane and carbon dioxide yields based on the elemental composition of the biodegradable fraction of the waste. This method provides the upper biochemical limit of methane production under ideal anaerobic digestion conditions, assuming complete conversion of organic carbon to methane and carbon dioxide. The empirical formula of the degradable fraction of the waste was derived from the ultimate analysis (Table 5) and normalized to exclude inert components (Table 6). Based on the elemental composition (C = 43.54%, H = 5.49%, O = 24.76%, N = 0.85%, S = 0.17%), the empirical formula of the organic matter was determined as:



The stoichiometric reaction for complete anaerobic digestion of the substrate was expressed using the Modified Buswell equation (14) as:



The molar mass of the substrate was calculated as 1256.88 g·mol⁻¹, giving 0.8 mol of substrate per kilogram of

volatile solids (VS). Hence, the theoretical methane yield was obtained as:

$$BMP_{CH_4,th} = 0.8 \times 35 \times 22.4 = 627 \frac{L CH_4}{kg VS} = 0.63 \frac{m^3 CH_4}{kg VS} \quad (17)$$

This value represents the maximum stoichiometric methane potential assuming full biodegradation of all organic matter. To account for incomplete biodegradation of heterogeneous MSW, a biodegradability factor of 0.67 was adopted as a scentoio parameter. Consequently, the biodegradability-adjusted methane potential was calculated as:

$$BMP_{CH_4,adj} = f_b \times Y_{CH_4,th} \quad (18)$$

$$BMP_{CH_4,adj} = 0.67 \times 0.63 = 0.42 \frac{m^3 CH_4}{kg VS} \quad (19)$$

• Biomethane and Electricity-Generation Potential

Table 8 and Figure 2 summarises the biomethane and energy-recovery potential of the MSW. The modified Buswell analysis gave an ideal theoretical biomethane potential of 0.63 m³ CH₄/kg VS, which decreased to 0.42 m³ CH₄/kg VS after applying the adopted biodegradability correction. Assuming a methane content of 60%, this corresponds to a biogas yield of 0.70 m³/kg VS. Using a methane lower heating value of 10 kWh/m³ CH₄, the corrected methane yield corresponds to 4.20 kWh/kg VS of chemical energy. At an assumed electrical conversion efficiency of 35%, the resulting electricity-generation potential is 1.47 kWh/kg VS.

Table 8 Comparative Analysis of Methane Production from Buswell and Characterization Analysis

Parameter	Buswell	Unit
Methane yield	0.42	m ³ CH ₄ /kg VS
Biogas yield	0.70	m ³ biogas/kg VS
Methane energy output	4.20	kWh/kg VS
Electricity potential	1.47	kWh/kg VS

Figure 2 therefore illustrates the progression from methane recovery to useful energy generation, although the plotted quantities have different units and their numerical magnitudes should not be directly compared.

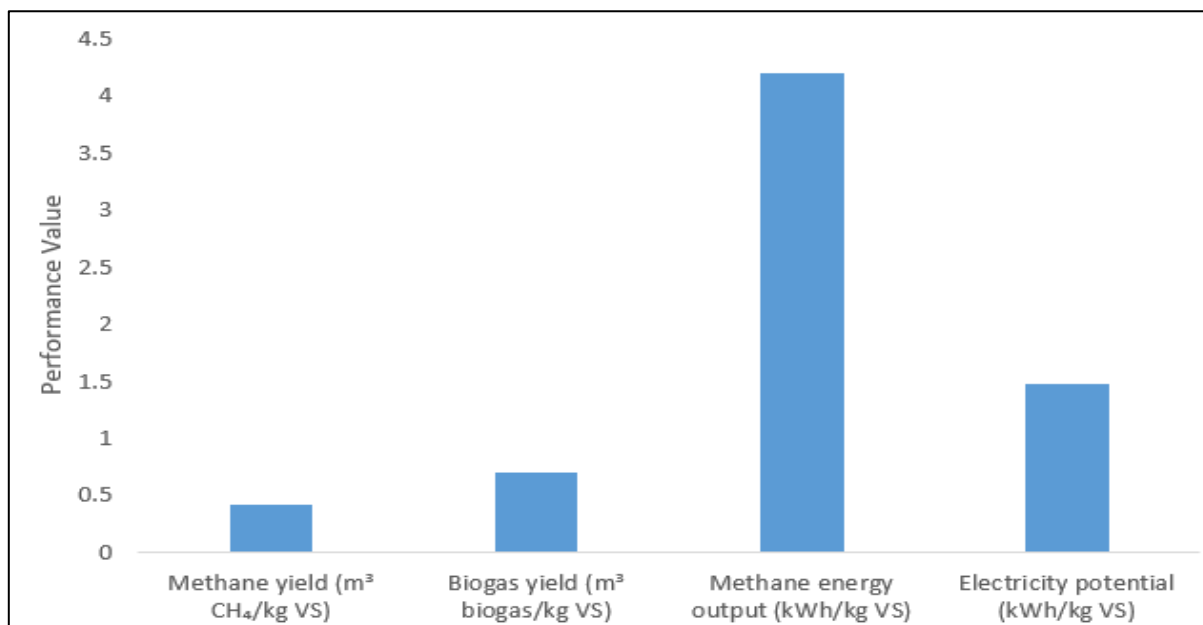


Fig 2 Performance Metrics for the MSW with BMP

The results demonstrate that the organic fraction of the MSW has appreciable potential for renewable methane and electricity recovery through anaerobic digestion. However, the estimated values represent theoretical potentials rather than experimentally measured yields. The Buswell calculation assumes ideal conversion of the normalized organic fraction, whereas some constituents of heterogeneous MSW may be poorly biodegradable or refractory. Actual electricity generation would also depend on digester performance, biogas quality, conversion technology and auxiliary energy requirements.

• Sensitivity Analysis

The estimated electricity-generation potential depends on assumptions regarding the extent of substrate

biodegradation and the efficiency of converting methane energy into electricity. A sensitivity analysis was therefore performed to evaluate the influence of these parameters on the predicted energy recovery. The biodegradability factor was varied from 50% to 80%, while electrical conversion efficiency was varied from 30% to 40%, around the adopted base-case values of 67% and 35%, respectively. The ideal TBMP of $0.63 \text{ m}^3 \text{CH}_4/\text{kg VS}$ and methane lower heating value of $10 \text{ kWh}/\text{m}^3 \text{CH}_4$ were maintained constant to isolate the effects of the two selected parameters.

Figure 3 illustrates the combined influence of biodegradability and electrical efficiency under low, base and high scenarios. The low case, corresponding to 50% biodegradability and 30% electrical efficiency, produced an electricity potential of $0.945 \text{ kWh}/\text{kg VS}$.

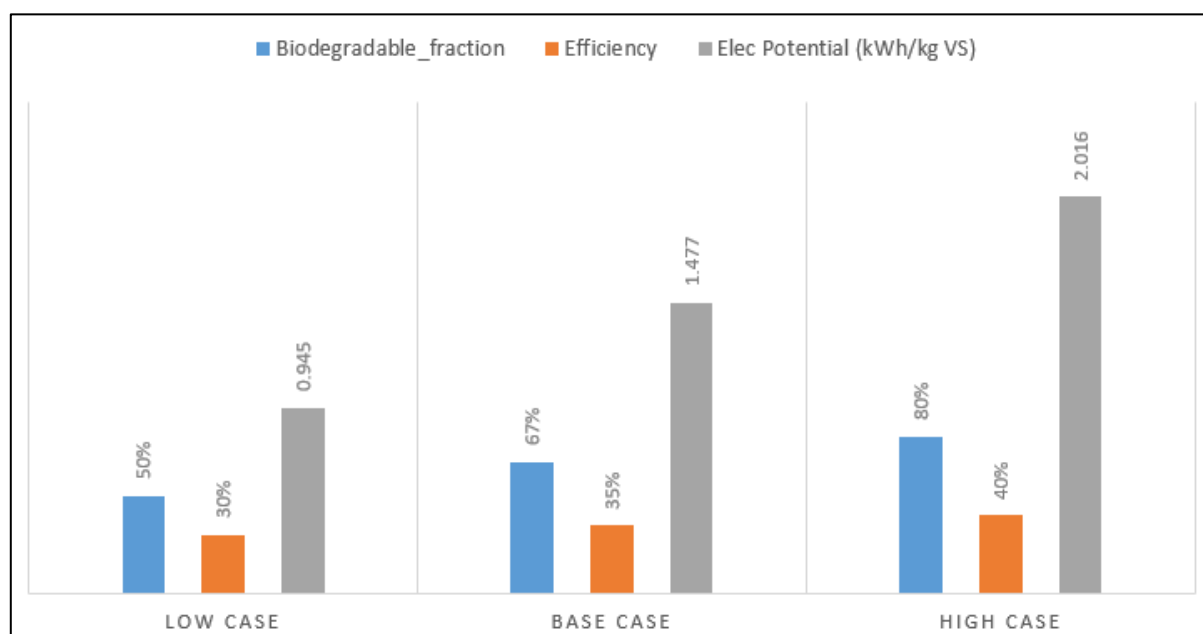


Fig 3 Electricity Potential Sensitivity ($\text{kWh}/\text{kg VS}$)

At the base conditions of 67% biodegradability and 35% efficiency, electricity generation increased to 1.477 kWh/kg VS, while the high case of 80% biodegradability and 40% efficiency produced 2.016 kWh/kg VS. Thus, the combined variation of the two assumptions produces more than a twofold difference between the low and high electricity estimates, demonstrating that the predicted energy recovery is strongly dependent on both biological conversion and power-generation performance.

Figure 4 isolates the effect of electrical conversion efficiency while maintaining the base biodegradability factor at 67%. Increasing electrical efficiency from 30% to 40% increased the electricity potential linearly from 1.266 to 1.688 kWh/kg VS, while methane chemical energy remained constant at approximately 4.22 kWh/kg VS.

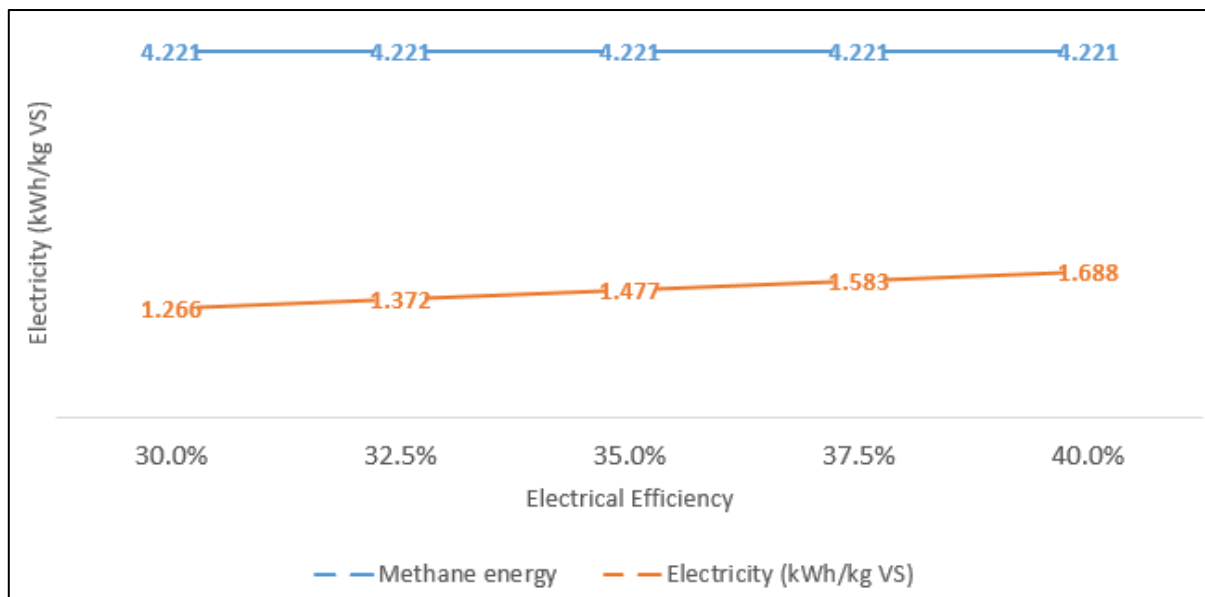


Fig 4 Effect of Electrical Efficiency

This behaviour is expected because electrical efficiency does not alter methane production or its chemical-energy content; rather, it determines the fraction of that energy converted into useful electricity. The result highlights the importance of power-conversion technology in determining the practical energy benefit obtained from recovered methane.

Figure 5 shows the influence of biodegradability on adjusted methane and electricity potentials. Increasing the biodegradability factor from 50% to 80% increased the adjusted methane potential from 0.315 to 0.504 m³ CH₄/kg VS, with a corresponding increase in electricity potential from 1.103 to 1.764 kWh/kg VS at the fixed electrical efficiency of 35%.

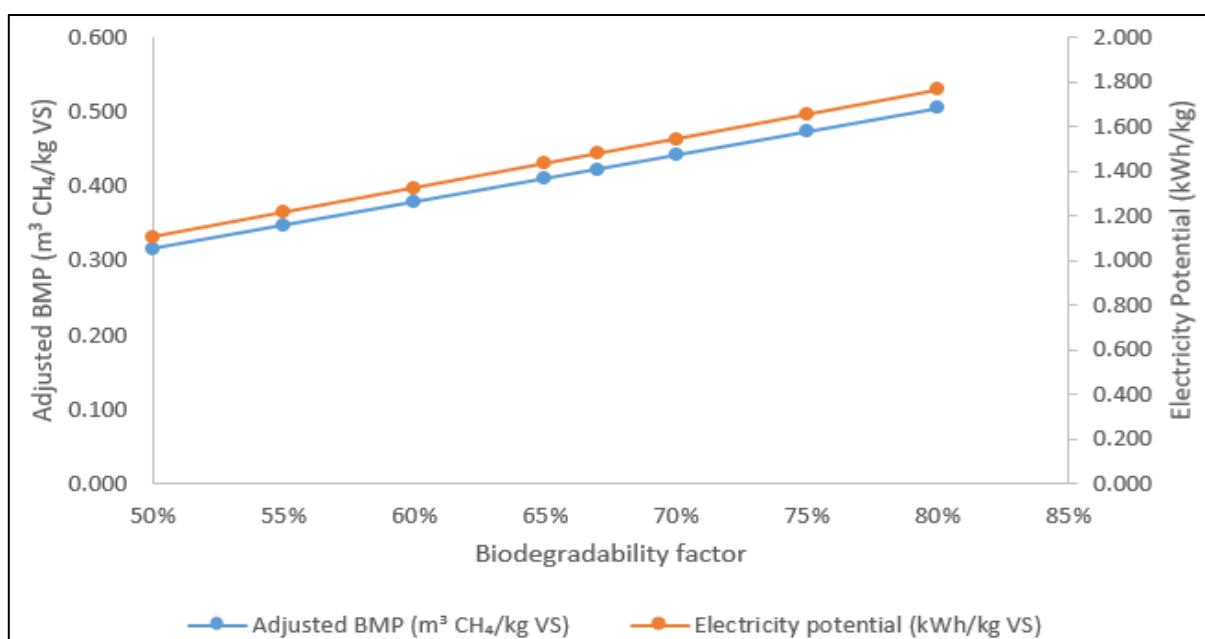


Fig 5 Effect of Biodegradability Factor

The approximately linear trends arise directly from the proportional relationship between biodegradability, recoverable methane and electricity generation. The result confirms that assumptions regarding the biologically convertible fraction of heterogeneous MSW are particularly important when translating an ideal Buswell TBMP into a more practically representative energy estimate.

IV. CONCLUSION

This study evaluated the theoretical biomethane and electricity-generation potentials of representative Nigerian MSW using literature-derived physical and elemental characteristics. On a 100 kg wet-waste basis, the MSW contained 35.73 kg moisture and 64.27 kg dry matter, with food waste constituting the dominant fraction at 51.46%. The dry-basis elemental composition comprised 43.54% C, 5.49% H, 24.76% O, 0.85% N and 0.17% S, with 25.20% inerts. Application of the modified Buswell–Mueller equation to the normalized non-inert elemental composition produced an ideal TBMP of 0.63 m³ CH₄/kg VS. At the adopted biodegradability factor of 67%, the adjusted methane potential was 0.42 m³ CH₄/kg VS, corresponding to approximately 4.20 kWh/kg VS of methane energy and 1.47 kWh/kg VS of electricity at 35% electrical conversion efficiency. Sensitivity analysis demonstrated that the electricity estimate is strongly dependent on the assumed biological and electrical conversion performance. Combined variation of biodegradability from 50–80% and electrical efficiency from 30–40% produced electricity potentials ranging from 0.945 to 2.016 kWh/kg VS, with the base case giving 1.477 kWh/kg VS. Independently, increasing electrical efficiency from 30% to 40% increased electricity potential from 1.266 to 1.688 kWh/kg VS, while increasing biodegradability from 50% to 80% increased adjusted BMP from 0.315 to 0.504 m³ CH₄/kg VS and electricity potential from 1.103 to 1.764 kWh/kg VS. These results demonstrate the potential contribution of Nigerian MSW to renewable methane and electricity recovery while emphasizing that the predicted outputs are theoretical and assumption dependent. Experimental BMP determination using segregated organic MSW is therefore recommended to validate the theoretical estimates and provide a stronger basis for subsequent process-scale energy assessment.

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