

Biomass valorization to bioenergy: Assessment of biomass residues availability and bioenergy potential in Nigeria

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Table S1- S6

Table S1: Annual wood production

Year	Round wood total (m ³) x 10 ⁶	Wood fuel (m ³) x 10 ⁶	wood charcoal (m ³) x 10 ⁶
2008	71.8	62.4	3.76
2009	72.2	62.8	3.85
2010	72.6	62.8	3.94
2011	73.0	63.6	4.02
2012	73.4	64.0	4.11
2013	73.8	64.4	4.19
2014	74.9	64.8	4.28
2015	75.3	65.3	4.37
2016	75.6	65.6	4.44
2017	75.9	65.9	4.52
2018	76.2	66.2	4.60

Source: FAOSTAT [18]

Table S2: Annual industrial round wood production

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity in million (m ³)	9.418	9.418	9.418	9.418	9.418	9.418	10.022	10.022	10.022	10.022	10.022

Table S3: Forestry Residue

Year	NO-PRETREATMENT				WITH PRE-TREATMENT			
	Cellulosic ethanol		Biogas (industrial scale)		Cellulosic ethanol		Biogas (industrial scale)	
	ML/yr	Mtoe	[Mm ³ CH ₄ /year]	Mtoe	ML/yr	Mtoe	[Mm ³ CH ₄ /year]	Mtoe
2008-2013	75.05	0.041	67.51	0.058	318	0.174	67.51	0.058
2014-2018	78.96	0.043	71.03	0.061	335	0.232	71.03	0.061

Table S4: Annual livestock production

Animals	Population (Heads) x10⁶										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cattle	16.30	16.40	16.60	19.00	19.20	19.40	19.80	20.20	20.60	21.00	21.40
Chicken	174.0	183.0	192.0	149.00	159.00	135.0	137.0	143.00	147.0	143.0	139.0
Goats	53.80	55.10	56.50	67.30	69.00	70.70	72.00	72.50	73.80	78.00	79.30
Pigs	6.910	7.180	7.470	6.280	6.530	6.800	6.990	7.370	7.480	7.500	7.500
Sheep	33.90	34.70	35.50	38.40	39.30	40.30	41.30	41.60	42.10	42.50	43.00
TOTAL	274.0	285.0	297.0	308.0	280.0	293.0	272.0	277.0	285.0	291.0	292.0

Source: FAOSTAT [20]

Table S5: Municipal solid waste generated and bioenergy potential

Year	Population 10⁷	Waste/day 10⁷	Waste/yr 10⁹	Organic fraction 10¹¹	TS in Organic wasted generated 10¹¹	CH₄ potential Mm³	Mtoe
2008	2.55	1.51	5.52	3.25	1.41	56545.56	48.82
2009	2.63	1.56	5.69	3.35	1.46	58320.71	50.35
2010	2.72	1.61	5.88	3.46	1.50	60159.28	51.94
2011	2.80	1.66	6.06	3.57	1.55	62064.37	53.58
2012	2.89	1.71	6.26	3.68	1.60	64044.29	55.29
2013	2.98	1.77	6.46	3.80	1.65	66084.90	57.05
2014	3.08	1.83	6.67	3.92	1.70	68197.63	58.88
2015	3.18	1.89	6.89	4.05	1.76	70388.54	60.77
2016	3.28	1.95	7.11	4.18	1.82	72657.90	62.73
2017	3.39	2.01	7.34	4.31	1.88	75011.05	64.76
2018	3.50	2.08	7.59	4.45	1.94	77455.19	66.87

Table S6: Municipal liquid waste generated and bioenergy potential

Year	Population 10^7	MLW generated/day (g) 10^9	MLW generated/yr (ton) 10^6	TS Organic waste generated 10^5	CH ₄ potential Mm ³	Mtoe
2008	2.55	6.38	2.33	2.08	70.92	0.061
2009	2.63	6.58	2.40	2.14	73.16	0.063
2010	2.72	6.79	2.48	2.21	75.48	0.065
2011	2.80	7.00	2.56	2.28	77.88	0.067
2012	2.89	7.23	2.64	2.36	80.38	0.069
2013	2.98	7.46	2.72	2.43	82.96	0.072
2014	3.08	7.70	2.81	2.51	85.64	0.074
2015	3.18	7.95	2.90	2.59	88.41	0.076
2016	3.28	8.21	3.00	2.68	91.29	0.079
2017	3.39	8.48	3.09	2.76	94.28	0.081
2018	3.50	8.76	3.20	2.85	97.39	0.084