

Supplementary material: Estimation of the higher heating value of lignocellulosic materials.

Table S1. Data used for the fit and validation of the correlation. Classification of raw materials for the determination of the correlation coefficient.

N°	Raw material	Proximate analysis				Measured	Reference
		% by wt. dry basis					
		FC	VM	ASH	M	HHV	
A	Coals/coke						
1	Northumberland no.8-Anth	84.59	7.09	8.32	N/A	32.86	[14]
2	German-Anna	79.60	12.00	8.40	N/A	33.00	[14]
3	Coal sample	30.00	30.00	40.00	N/A	14.77	[14]
4	Coal	56.41	18.18	22.24	3.17	27.28	[23]
5	German Braunkohle lignite	46.03	49.47	4.50	N/A	25.10	[14]
6	Coke	91.47	0.92	7.61	N/A	31.12	[14]
7	Gulf Coast Lignite	29.16	31.58	12.52	26.74	17.71	[18]
8	Black Thunder Subbituminous	34.94	30.72	5.19	29.15	20.67	[18]
9	Central Appalachian (Long Fork)	50.09	31.23	11.52	7.16	28.18	[18]
10	Illinois #6	44.98	35.32	7.43	12.27	27.29	[18]
11	High-Sulfur Coal	41.94	34.43	9.66	13.97	25.85	[18]
12	Low-Sulfur Coal	42.15	37.56	5.63	14.66	25.35	[18]
13	Pratt Seam Bituminous Coal	62.64	24.93	11.28	1.15	31.43	[18]
14	Lignite L01	27.72	38.32	33.96	8.97	15.63	[19]
15	Lignite L02	31.76	24.95	43.29	4.05	18.10	[19]
16	Lignite L03	18.24	47.96	33.80	24.43	16.47	[19]
17	Lignite L04	43.48	44.56	11.96	10.03	27.02	[19]
18	Lignite L05	45.31	41.77	12.92	11.31	25.00	[19]
19	Lignite L06	41.40	40.98	17.62	17.92	23.74	[19]
20	Lignite L07	32.06	55.02	12.92	25.32	23.92	[19]
21	Lignite L08	34.83	54.03	11.14	28.02	23.16	[19]
22	Lignite L09	47.47	38.31	14.22	1.32	29.98	[19]
23	Lignite L10	22.93	47.57	29.50	29.29	19.05	[19]
24	Lignite L11	40.50	51.89	7.61	6.58	26.78	[19]
25	Lignite L12	26.54	37.42	36.04	23.67	17.43	[19]
26	Lignite L13	8.73	54.57	36.70	28.04	16.28	[19]
27	Lignite L15	27.50	51.64	20.86	29.19	19.85	[19]
28	Lignite L14	39.37	52.05	8.58	26.84	24.08	[19]
29	Lignite	40.98	48.76	10.26	N/A	25.31	[20]
30	Charcoal	68.10	23.00	2.70	N/A	21.63	[21]
31	Charcoal	61.80	29.59	3.96	N/A	23.46	[21]
32	Charcoal	89.10	9.88	1.02	N/A	34.39	[14]
33	Ptolemais lignite	39.28	47.71	13.01	18.80	16.90	[31]
34	Coal	52.09	35.41	12.50	9.15	28.55	[22]

35	Vegetal coal	68.10	26.00	5.90	5.29	29.71	[17]
B	Manufactured fuel						
36	Cotton shells briquettes	17.10	77.80	5.10	N/A	19.06	[14]
37	Press mud briquettes	8.60	54.70	36.70	N/A	11.97	[14]
38	Field grass pellet	17.29	75.30	7.40	N/A	18.93	[21]
39	Hemp pellet	17.71	74.89	7.40	N/A	20.17	[21]
40	Miscanthus pellet	17.40	80.21	2.37	N/A	19.00	[21]
41	Municipality waste pellet	10.68	77.38	11.90	N/A	17.32	[21]
42	Peanut shell pellet	21.77	74.41	3.82	N/A	20.15	[21]
43	Pine pellet	17.70	81.96	0.33	N/A	20.54	[21]
44	Alfalfa pellet	14.77	74.35	9.96	N/A	17.84	[21]
45	Algae pellet	17.61	76.01	6.37	N/A	18.82	[21]
46	Lantana briquettes	11.90	20.80	67.30	N/A	7.69	[14]
47	Block wood	14.59	83.32	2.09	N/A	18.26	[14]
48	Plywood	21.80	74.20	4.00	N/A	19.72	[14]
49	Plywood	15.77	82.14	2.09	N/A	18.96	[21]
50	CBPs	18.19	70.51	6.10	5.20	17.80	[23]
51	Cotton gin by-products pellets	47.65	46.89	5.58	10.67	18.41	[26]
52	Cotton gin by-products pellets	48.05	47.00	5.22	8.25	18.29	[26]
53	Cotton gin by-products pellets	49.19	46.09	4.88	7.82	20.81	[26]
54	Cotton gin by-products pellets	42.80	47.59	9.75	9.85	17.97	[26]
55	Cotton gin by-products pellets	44.74	47.17	8.17	9.73	17.90	[26]
56	Cotton gin by-products pellets	45.56	46.54	7.72	9.68	20.93	[26]
57	Wood pellets	55.59	43.85	0.49	5.22	19.72	[26]
58	Beet root pellets	15.00	76.00	9.00	12.50	15.10	[17]
59	Briquette	14.20	85.00	0.80	5.84	18.49	[17]
60	Pine and pine apple leaf pellets	21.80	75.00	3.20	8.20	18.15	[17]
61	Pine pellets	15.20	83.50	1.30	6.75	18.84	[17]
62	Straw pellets	11.20	79.00	9.80	7.30	16.58	[17]
63	Wood pellets	17.08	82.00	1.30	7.70	18.22	[17]
64	TW pellet	21.03	74.78	4.19	9.58	17.39	[25]
65	EFB pellet	15.39	83.76	0.86	8.69	16.74	[25]
66	TW-EFB pellet (50:50)	18.21	79.32	2.46	9.06	16.99	[25]
67	100WGP pellet	24.73	67.80	7.47	7.49	19.54	[24]
68	75WGP25PYO pellet	23.05	70.43	6.52	7.10	19.51	[24]
69	50WGP50PYO pellet	21.31	73.48	5.22	7.36	19.48	[24]
70	25WGP75PYO pellet	17.11	78.41	4.48	7.08	19.27	[24]
71	100PYO pellet	12.65	83.64	3.71	7.34	19.13	[24]
C	Pit/shells/seeds/cobs						
72	Peach pit	19.80	79.10	1.10	N/A	19.42	[14]

73	Pine kernel shell	19.70	77.60	2.70	8.33	18.89	[17]
74	Walnut shell	18.70	79.00	2.30	8.70	18.38	[17]
75	Macadamia shell	23.68	75.92	0.40	N/A	21.01	[14]
76	Pistachio shell	16.84	82.03	1.13	N/A	19.26	[14]
77	Pistachio shell	16.20	82.50	1.30	8.75	17.35	[17]
78	coconut shell powder	20.58	79.07	0.35	N/A	19.68	[14]
79	Coconut shell	19.40	79.20	1.40	8.60	18.88	[17]
80	Coconut shell	15.97	83.01	1.02	N/A	20.24	[32]
81	Cotton shells	16.90	68.50	14.60	N/A	16.38	[14]
82	Spire-mint	11.80	70.10	18.10	N/A	15.53	[14]
83	Corncob	16.80	82.10	1.10	N/A	18.80	[14]
84	Corncob	18.54	80.10	1.36	N/A	18.77	[14]
85	Corncob	12.50	86.50	1.00	12.10	17.00	[10]
86	Corncob	7.60	80.72	2.96	8.72	16.99	[27]
87	Corncob	14.60	83.00	2.40	7.00	17.69	[17]
88	Corn stover	19.80	76.10	4.10	65.20	16.84	[18]
89	Corn stover	15.64	71.08	7.05	6.23	16.49	[18]
90	Corn stover	17.60	78.70	3.70	10.60	17.80	[10]
91	Corn stover	19.25	75.17	5.58	N/A	17.65	[21]
92	Corn stover	26.65	66.58	6.73	N/A	17.93	[21]
93	By products of fruits	21.22	74.62	3.91	N/A	19.25	[33]
94	Soft almond shell	21.10	75.80	3.10	8.30	18.01	[17]
95	Almond shells	18.40	80.50	1.10	N/A	19.92	[15]
96	Almond shell	15.80	82.00	2.20	8.68	18.28	[17]
97	Almond shell	14.82	81.70	3.48	N/A	19.53	[32]
98	Peanut shell	16.50	81.00	2.50	5.10	20.09	[17]
99	Plum stone	21.20	77.00	1.80	9.13	19.14	[17]
100	Date stone	16.60	82.00	1.40	9.40	18.15	[17]
101	Nectarine stone	22.90	76.00	1.10	8.20	19.56	[17]
102	Peach stone	23.90	75.60	0.50	8.55	19.59	[17]
103	Olive stones	19.50	78.30	2.20	N/A	20.23	[35]
104	Cherry stone	14.13	85.00	0.87	7.57	19.07	[17]
105	Avocado pear stone	26.00	72.00	2.00	16.70	15.18	[17]
106	Olive stone	20.35	78.30	1.40	11.00	17.88	[17]
107	Apricot stone	17.83	81.13	1.04	N/A	18.80	[21]
108	Apricot stone	16.26	82.03	1.61	N/A	19.79	[32]
109	Peach stone	12.61	86.42	0.97	N/A	20.31	[32]
110	Damson plum stone	16.67	82.03	1.00	N/A	21.23	[32]
111	Cornelian cherry stone	18.67	79.27	2.06	N/A	19.84	[32]
112	Cornelian cherry stone	23.80	73.54	2.96	N/A	19.02	[21]
113	Peach stone	20.79	78.16	1.05	N/A	19.52	[21]
114	Sour cheery stone	14.10	80.85	5.05	N/A	17.59	[21]

115	Hazeinut seedcoat	27.00	71.20	1.80	6.80	19.30	[10]
116	Hazeinut shell	28.30	69.30	1.40	9.00	19.30	[10]
117	Hazelnut shell	20.80	77.00	2.20	8.74	18.87	[17]
118	Palm kernels	17.59	77.28	5.14	11.01	20.71	[22]
119	Palm kernel shell	12.07	70.02	6.04	N/A	16.15	[11]
120	Palm kernel shell	15.15	73.77	11.08	N/A	16.30	[11]
121	Palm kernel shell	18.70	70.50	0.84	N/A	20.10	[11]
122	Palm kernel shell	23.00	74.00	3.00	N/A	17.58	[11]
123	Palm kernel shell	19.70	67.20	2.10	N/A	16.41	[11]
124	Palm kernel shell	10.85	84.86	4.29	N/A	18.81	[11]
125	Empty fruit bunch	15.37	65.01	3.85	N/A	15.49	[11]
126	Empty fruit bunch	16.80	77.10	6.10	N/A	16.80	[11]
127	Oil palm fruit bunch	16.46	78.20	4.53	N/A	16.96	[21]
128	Akhrot shell	18.78	79.98	1.20	N/A	20.01	[21]
129	Almond shells	18.73	77.22	4.05	N/A	17.96	[21]
130	Almond shells	20.71	76.00	3.29	N/A	19.49	[21]
131	Coconut shell	22.10	77.19	0.71	N/A	20.50	[21]
132	Coconut shell	20.92	70.86	0.58	N/A	20.43	[21]
133	Coconut shell	21.60	70.20	1.17	N/A	18.45	[21]
134	Cotton shell	16.90	68.50	14.60	N/A	16.38	[21]
135	Groundnut shell	21.60	72.70	5.70	N/A	19.85	[21]
136	Hazeinut shell	30.00	68.90	1.10	N/A	19.90	[21]
137	Peach pits	19.85	79.12	1.03	N/A	20.82	[21]
138	Peanut shell	13.60	80.41	5.99	N/A	18.46	[21]
139	Peanut shell	13.40	84.90	1.70	N/A	18.60	[21]
140	Pistachio shell	16.95	81.64	1.41	N/A	18.22	[21]
141	Pistachio soft shell	8.69	67.85	14.21	N/A	18.57	[21]
142	Sunflower seed shell	11.70	84.70	3.60	N/A	17.60	[21]
143	Walnut shell	16.94	79.17	3.89	N/A	18.91	[21]
144	Walnuts shells	21.16	78.28	0.56	N/A	20.18	[21]
145	Dried grain-soluble	12.84	82.50	3.89	N/A	21.75	[21]
146	Wet grains	13.58	83.18	2.58	N/A	21.95	[21]
147	Olive kernel	32.80	63.90	1.70	N/A	22.40	[21]
148	Olive kernel B	24.25	73.62	2.13	7.12	19.90	[31]
149	Olive kernel A	24.78	72.64	2.58	7.53	18.90	[31]
150	Olive kernel shell	36.10	60.50	3.30	N/A	21.40	[21]
151	Walnut shell	16.12	82.98	0.90	N/A	20.03	[32]
152	Chestnut shell	29.10	67.00	3.90	24.40	14.31	[17]
153	Olive pits	16.28	82.00	1.72	N/A	21.59	[21]
154	Cedar cones	28.10	70.40	1.50	N/A	21.10	[21]
155	Pine cone	15.15	77.96	6.89	N/A	18.55	[21]
156	Barley	20.10	76.90	3.00	9.90	16.52	[17]
157	Maize	19.05	78.90	2.10	11.10	16.43	[17]
158	Oats bran	18.85	77.00	4.15	9.90	18.06	[17]

159	Rye	19.30	78.90	1.80	10.76	16.14	[17]
160	Soya	18.20	77.00	4.80	10.90	16.71	[17]
161	Wheat	17.20	80.00	2.80	10.30	16.33	[17]
162	Wheat bran	18.50	78.00	3.50	9.00	17.37	[17]
163	Pine cone heart	23.10	66.00	3.50	23.10	16.44	[17]
164	Paper-shelled walnut (PSW)	25.20	74.80	4.80	9.26	14.54	[30]
165	Thin-shelled walnut (TSW)	26.10	73.90	4.27	8.08	18.45	[30]
166	Medium-shelled walnut (MSW)	26.00	74.00	5.84	8.19	13.80	[30]
167	Hard-shelled walnut (HSW)	20.20	79.80	2.01	8.26	14.20	[30]
168	Walnut shells	18.75	78.04	0.64	2.57	17.84	[29]
169	Hornbeam shell	9.37	78.83	9.52	2.28	19.60	[28]
170	Parinari fruit shell	14.51	78.17	4.67	2.65	20.47	[27]
171	Empty fruit bunches	15.43	79.16	5.48	8.93	18.18	[37]
172	Oil palm shell	26.14	72.58	1.35	8.92	18.72	[37]

D	Wood/energy crops						
173	Canyon live Oak	11.30	88.20	0.50	N/A	18.98	[14]
174	Red wood	19.92	79.72	0.36	N/A	20.72	[14]
175	Softwood	28.10	70.00	1.70	8.80	20.00	[10]
176	Spruce wood	28.30	70.20	1.50	7.60	20.10	[10]
177	Eucalyptus saligna	17.90	82.00	0.10	N/A	20.08	[14]
178	Pine wood	15.70	73.60	11.30	N/A	16.64	[14]
179	Subabul wood	18.52	81.02	1.20	N/A	19.78	[14]
180	Eucalyptus	21.30	75.35	3.35	N/A	18.64	[14]
181	Eucalyptus- Grandis	16.93	82.55	0.52	N/A	19.35	[14]
182	Eucalyptus pellita	16.20	83.60	0.20	N/A	20.41	[15]
183	Eucalyptus citridora	13.90	85.70	0.40	N/A	19.35	[15]
184	Subabul	13.80	85.20	1.00	N/A	16.66	[14]
185	PGW	5.64	62.56	31.79	2.50	22.20	[22]
186	MBM	12.71	63.31	23.95	2.50	18.59	[22]
187	Wood chips/ tree species Grasses	22.23	72.69	4.91	N/A	19.56	[33]
188	Quercus rotundifolia	14.10	83.60	2.30	N/A	19.73	[15]
189	Pinus halepensis	17.00	82.50	0.50	N/A	20.22	[15]
190	Pinus caribaea	15.70	83.90	0.40	N/A	19.95	[15]
191	Pinus tropicalis	15.80	83.90	0.30	N/A	20.81	[15]
192	Beech wood	24.60	74.00	1.40	7.40	19.20	[10]
193	Ailanthus wood	24.80	73.50	1.70	8.10	19.00	[10]
194	Hardwood	25.00	72.30	2.70	7.80	18.80	[10]
195	Bamboo wood	11.24	86.80	1.95	N/A	20.55	[21]
196	Black locust	18.26	80.94	0.80	N/A	19.71	[21]
197	B-wood	21.62	76.53	1.85	9.08	20.05	[22]
198	Casurina wood	19.58	78.58	1.83	N/A	18.77	[21]

199	Chaparral wood	18.68	75.19	6.13	N/A	18.61	[21]
200	Douglass fir	25.80	73.00	1.20	N/A	22.10	[21]
201	Douglass fir	17.70	81.50	0.80	N/A	21.05	[21]
202	Douglass fir wood	12.60	87.30	0.10	N/A	20.38	[21]
203	Dry subabul wood	18.52	81.02	1.20	N/A	19.78	[21]
204	Eucalyptus camaldulensis	17.82	81.42	0.76	N/A	19.42	[21]
205	Eucalyptus globulus wood	17.30	81.60	1.10	N/A	19.23	[21]
206	Eucalyptus log	8.05	82.78	0.37	N/A	17.99	[21]
207	Eucalyptus wood	21.30	75.35	3.35	N/A	18.64	[21]
208	Eucalyptus wood	15.91	78.48	4.11	N/A	16.42	[21]
209	Fresh subabul wood	15.20	83.60	1.12	N/A	19.70	[21]
210	Hybrid poplar	6.87	89.69	3.44	N/A	17.14	[21]
211	Hybrid poplar	12.49	84.81	2.70	N/A	19.02	[21]
212	Poplar	16.35	82.32	1.33	N/A	19.38	[21]
213	Jujuba wood	14.14	83.63	2.32	N/A	20.26	[21]
214	Madrone	12.00	87.80	0.20	N/A	19.51	[21]
215	Mango wood	11.36	85.64	2.98	N/A	19.17	[21]
216	Neem wood	12.19	85.86	1.93	N/A	20.26	[21]
217	Oak wood (large branch)	16.18	81.75	2.07	N/A	19.17	[21]
218	Oak wood (medium branch)	16.18	81.75	3.00	N/A	19.24	[21]
219	Oak wood (small branch)	18.50	77.45	4.05	N/A	19.20	[21]
220	Ponderosa pine	17.17	82.54	0.29	N/A	20.02	[21]
221	Red alder	12.50	87.10	0.40	N/A	19.30	[21]
222	Red wood	16.10	83.50	0.40	N/A	21.03	[21]
223	Western hemlock wood	15.20	84.80	2.20	N/A	20.05	[21]
224	White oak	17.20	81.28	1.52	N/A	19.42	[21]
225	Willow wood	16.07	82.22	1.71	N/A	19.59	[21]
226	Ash tree	14.12	80.13	5.75	N/A	18.06	[21]
227	Olive Wood	16.05	79.71	4.24	N/A	20.79	[35]
228	Black poplar wood	12.28	86.00	1.50	7.18	18.39	[17]
229	Forest residue	20.00	79.80	0.20	7.32	19.50	[31]
230	Gorse	50.17	45.20	5.00	43.00	18.60	[17]
231	Miscanthus	11.40	79.00	9.60	7.53	18.07	[17]
232	Oats and vetch	20.67	72.00	7.33	7.80	16.66	[17]
233	Sainfoin	17.80	73.00	9.20	9.60	16.41	[17]
234	Sorghum	21.00	62.00	17.00	6.10	11.87	[17]
235	Triticale	18.80	75.00	6.20	9.80	16.65	[17]
236	Alder	21.45	74.00	4.50	7.40	20.08	[17]
237	Almond tree	19.00	75.60	5.40	7.10	18.35	[17]
238	Apple tree	21.00	74.00	5.00	7.70	17.82	[17]

239	Bamboo	17.33	81.47	1.20	7.93	18.27	[17]
240	Black poplar	15.33	89.00	4.00	8.40	18.41	[17]
241	Camellia	17.82	78.00	4.20	9.00	17.83	[17]
242	Cherry tree	21.50	74.00	4.40	7.70	19.36	[17]
243	Chestnut tree	22.52	74.00	3.50	9.10	16.80	[17]
244	Fig. tree	19.53	73.10	7.40	11.10	17.52	[17]
245	Grapevine	20.90	71.50	7.60	10.40	16.82	[17]
246	Hazelnut tree	15.42	80.60	4.00	8.54	18.19	[17]
247	Horse chestnut tree	19.60	73.50	6.90	8.80	17.47	[17]
248	Kiwi	21.48	74.00	4.50	8.20	17.81	[17]
249	Lemon tree	18.61	76.70	4.70	8.40	17.56	[17]
250	Medlar tree	17.60	74.00	8.40	9.90	17.65	[17]
251	Mimosa	21.00	75.00	4.00	8.28	17.75	[17]
252	Oak tree	17.40	78.40	4.20	8.20	17.72	[17]
253	Orange tree	16.89	79.00	4.50	8.00	16.31	[17]
254	Peach tree	22.20	74.00	3.80	8.10	17.67	[17]
255	Pear tree	19.98	74.60	6.40	10.30	17.46	[17]
256	Plum tree	21.40	72.00	6.60	9.42	17.56	[17]
257	Pine wood	13.15	85.45	1.40	N/A	19.83	[20]
258	Chinese fir	16.68	74.49	1.20	7.63	18.38	[34]

E Barks/prunings

259	White mulberry pruning	30.87	64.00	5.00	33.00	13.17	[17]
260	Grapevine pruning	30.70	64.00	5.30	32.30	17.78	[17]
261	Oak tree pruning	18.70	77.00	4.30	9.80	17.59	[17]
262	Olive tree pruning	9.00	78.00	13.00	8.70	17.34	[17]
263	Orchard Prunings	17.84	80.75	1.41	20.00	16.82	[18]
264	Vineyard Prunings	14.71	83.91	1.38	20.00	19.05	[18]
265	Vine shoot chips	24.30	66.00	9.70	22.00	14.63	[17]
266	Chestnut tree chips	20.50	78.20	1.30	9.83	17.49	[17]
267	Eucalyptus chips	19.10	79.00	1.90	11.00	16.84	[17]
268	Wood chips	29.90	68.60	1.50	25.60	15.16	[17]
269	Hazelnut and alder chips	18.00	77.00	5.00	9.50	17.56	[17]
270	Pine and eucalyptus chips	24.80	71.60	3.60	13.40	16.99	[17]
271	Pine chips	17.80	81.60	0.60	10.25	19.43	[17]
272	Pine chips	21.65	72.40	5.95	7.60	19.79	[22]
273	Holm oak branch chips	17.70	74.90	7.40	11.10	17.18	[17]
274	wood chips	23.50	76.40	0.10	N/A	19.92	[14]

275	Wood chips	15.40	83.40	1.20	N/A	20.03	[14]
276	Douglas Fir	25.80	73.00	1.20	N/A	22.10	[14]
277	Loblolly Pine	33.90	65.70	0.40	N/A	21.77	[14]
278	Loblolly Pine bark	33.90	54.70	0.40	N/A	21.78	[21]
279	Eucalyptus bark	15.30	65.70	19.00	N/A	15.20	[14]
280	Eucalyptus bark	16.80	77.00	6.20	8.60	16.24	[17]
281	Almond	21.54	76.83	1.63	N/A	20.01	[14]
282	Cabernet sauvignon	19.20	78.63	2.17	N/A	19.03	[14]
283	Walnut	20.80	78.50	0.70	N/A	19.97	[14]
284	Olive twigs	10.73	88.25	1.02	N/A	18.70	[35]
285	Coffee chaff	19.60	75.80	4.60	N/A	17.69	[14]
286	Tapero roor skin scale	11.40	35.10	39.20	N/A	9.23	[14]
287	Wood bark	31.80	66.60	1.60	8.80	20.50	[10]
288	Black poplar bark	20.76	71.00	8.00	9.80	17.41	[17]
289	Black walnut pruning	18.56	80.69	0.78	N/A	19.83	[21]
290	Potato peel	9.56	84.15	6.29	N/A	17.18	[21]
291	Orange peel waste	16.82	80.49	2.69	N/A	18.28	[36]
292	Avocado pear peel	14.90	82.00	3.10	9.87	18.74	[17]
293	Pomegranate peel	25.20	68.00	6.80	14.00	15.17	[17]

F Straws

294	Straw	11.90	82.00	6.10	6.80	16.92	[17]
295	Paddy straw	11.80	72.70	15.50	N/A	14.52	[14]
296	Wet straw	17.40	74.50	8.10	N/A	18.15	[15]
297	Rice straw ground	16.20	68.30	15.50	N/A	15.61	[14]
298	Rice straw	13.91	65.70	20.38	N/A	14.85	[21]
299	Rice straw	15.86	65.47	18.67	N/A	15.09	[21]
300	Rice straw	1.33	45.68	45.76	7.23	12.26	[27]
301	Rice straw	13.51	64.59	15.34	6.56	14.64	[34]
302	Coconut stem	23.10	74.40	2.50	N/A	19.44	[14]
303	Corn straw	19.19	73.15	7.65	7.44	17.68	[22]
304	Corn straws	9.70	75.02	6.13	9.15	16.24	[27]
305	Jawar straw	15.15	75.97	8.88	N/A	17.95	[21]
306	Millet straw	16.45	78.28	5.27	N/A	18.05	[21]
307	Rape straw	17.81	76.54	4.65	8.68	18.34	[22]
308	Wheat straw	10.98	82.12	6.90	N/A	17.99	[21]
309	Wheat straw	19.80	71.30	8.90	N/A	17.51	[21]
310	Wheat straw	24.00	69.60	6.40	N/A	18.91	[14]
311	Wheat straw	23.50	63.00	13.50	N/A	17.00	[10]
312	Wheat straw	11.70	80.60	7.70	N/A	17.36	[14]
313	Wheat straw	18.19	76.00	5.30	7.70	17.34	[17]
314	Sugar cane straw	14.60	76.20	9.20	N/A	17.19	[21]
315	Barley straw	16.00	77.90	6.10	9.80	17.37	[17]
316	Rye straw	16.90	79.90	3.20	8.70	17.11	[17]

G Stalks

317	Cornstalk	16.02	76.79	7.19	N/A	16.55	[32]
318	Sunflower stalks	15.86	74.63	9.51	N/A	16.30	[35]
319	Cotton plant stalks	20.33	75.50	4.17	N/A	17.86	[35]
320	Cotton stalk	17.30	65.40	17.30	N/A	15.83	[14]
321	Cotton stalk	18.80	76.10	5.10	N/A	17.40	[21]
322	Cotton stalk	22.43	70.89	6.68	N/A	18.26	[21]
323	Cotton stalks	19.90	62.90	17.20	N/A	15.83	[21]
324	Musturd stalk (A)	21.90	60.90	17.20	N/A	17.49	[14]
325	Eucalyptus stalk	12.20	87.30	0.50	N/A	19.10	[14]
326	Mulberry stick	22.80	75.10	2.10	N/A	18.36	[14]
327	Tobacco stalk	18.00	79.60	2.40	8.90	17.70	[10]
328	Sun flower stalk and stover	5.17	85.85	8.98	N/A	15.87	[21]
329	French bean stalk	4.67	89.01	6.32	N/A	15.41	[21]
330	Sunflower stalk	11.70	84.68	3.62	N/A	17.86	[21]
331	Alfalfa stems	15.81	78.92	5.27	N/A	18.67	[21]
332	Sunflower stem	13.81	75.09	11.10	N/A	16.18	[32]
333	Sour cherry stem	17.16	77.48	5.36	N/A	18.27	[32]
334	Oil palm trunk	16.17	79.98	3.69	8.21	16.11	[37]
335	Pea stem	12.27	74.67	13.06	N/A	16.31	[32]

H Fibrous material/leaves/grass

336	Coconut coir	29.70	66.58	3.72	N/A	20.05	[14]
337	Coconut coir pith	28.82	66.02	5.16	N/A	18.07	[21]
338	Sudan Grass	18.60	72.75	8.65	N/A	17.39	[14]
339	Switchgrass	12.18	65.19	7.63	15.00	15.35	[18]
340	Mechanically Harvested Switchgrass	15.49	69.03	5.95	9.53	17.06	[18]
341	Manually Harvested Switchgrass	5.39	81.79	3.93	8.89	17.26	[18]
342	Mulch Hay	17.10	77.60	5.30	19.50	18.74	[18]
343	Bagasse	7.00	70.90	22.10	N/A	14.26	[14]
344	Bagasse	11.90	86.30	1.80	N/A	18.17	[14]
345	Bagasse	14.95	73.78	11.27	N/A	17.33	[21]
346	Bagasse pith	10.60	86.60	2.80	N/A	17.19	[14]
347	Apricot bagasse	15.80	80.31	3.89	N/A	18.56	[21]
348	Peach bagasse	6.15	91.98	1.87	N/A	16.24	[21]
349	Sugarcane bagasse	8.12	79.45	3.91	8.52	16.88	[27]
350	Sugarcane bagasse	13.15	83.66	3.20	N/A	18.73	[21]
351	Sugarcane bagasse	13.30	81.50	5.20	N/A	17.70	[21]
352	Sugarcane bagasse	14.70	82.60	2.70	N/A	17.32	[21]
353	Sweet sorghum bagasse	5.00	75.00	20.00	N/A	13.73	[14]
354	Moringa-oleifera (leaves)	10.70	67.80	21.50	N/A	14.23	[14]
355	Sena leaves	25.50	57.20	17.30	N/A	18.13	[14]
356	Sugar cane leaves	14.90	77.40	7.70	N/A	17.41	[14]
357	Olive marc	25.83	69.45	4.72	N/A	21.06	[35]
358	Miscalthus	12.40	87.20	0.40	N/A	19.30	[14]

359	Dal lake weed	3.60	47.70	48.70	N/A	8.89	[14]
360	Tea bush	21.80	76.50	1.70	N/A	19.84	[14]
361	Tobacco leaf	11.20	72.60	17.20	8.40	15.00	[10]
362	Oil palm frond	12.01	69.17	2.87	N/A	17.75	[11]
363	Oil palm frond	79.37	20.63	25.60	N/A	17.67	[11]
364	Oil palm fronds	17.87	78.90	3.12	8.11	15.81	[37]
365	Oil palm fiber	18.24	75.43	5.82	9.53	18.20	[37]
366	Palm mesocarp fiber	16.42	67.04	5.66	N/A	16.94	[11]
367	Palm mesocarp fiber	19.72	9.57	9.57	N/A	16.63	[11]
368	Palm mesocarp fiber	20.51	72.46	7.03	N/A	17.13	[11]
369	Carrington intermediate wheatgrass	19.10	76.10	4.80	N/A	16.44	[21]
370	Carrington switch grass	18.70	76.60	4.80	N/A	18.45	[21]
371	Carrington tall wheatgrass	19.30	75.80	4.90	N/A	18.01	[21]
372	Casuarina equisetifolia leaf	16.46	73.50	3.93	N/A	18.48	[21]
373	Lantana camara leaf	11.83	70.46	7.26	N/A	18.50	[21]
374	Streeter intermediate wheatgrass	17.90	74.40	7.80	N/A	18.08	[21]
375	Streeter switch grass	17.70	76.50	5.80	N/A	18.06	[21]
376	Streeter tall wheatgrass	18.20	73.80	8.00	N/A	17.90	[21]
377	Switch grass	14.34	76.69	8.97	N/A	18.06	[21]
378	Pine needles	26.12	72.38	1.50	N/A	20.12	[21]
379	Shea meal	28.70	66.30	5.00	N/A	19.80	[21]
380	Soplillo	20.70	77.80	1.50	N/A	22.58	[21]
381	Pine cone leaf	18.70	80.00	1.30	9.14	18.63	[17]
382	Pine cone leaf	22.20	75.90	1.90	9.30	18.45	[17]
383	Alder leaves	3.40	89.40	7.20	6.27	19.43	[17]
384	Almond tree leaves	3.51	87.19	9.30	7.50	17.56	[17]
385	Apple tree leaves	16.10	71.90	12.00	9.30	17.51	[17]
386	Ash tree leaves	10.16	77.70	12.10	7.80	17.17	[17]
387	Avocado leaves	22.67	70.00	6.90	8.70	17.99	[17]
388	Bamboo leaves	16.90	76.00	7.00	8.10	18.11	[17]
389	Black poplar leaves	21.04	71.20	7.80	9.40	18.17	[17]
390	Boj leaves	3.60	89.90	6.50	8.06	20.72	[17]
391	Camellia leaves	5.90	85.00	9.10	8.90	17.34	[17]
392	Cherry tree leaves	21.60	71.00	7.40	10.40	17.73	[17]
393	Chestnut tree leaves	22.69	72.41	4.90	8.20	18.76	[17]
394	Cypress leaves	17.27	74.10	8.60	9.20	19.54	[17]
395	Elder leaves	13.99	70.00	16.00	10.90	16.50	[17]
396	Eucalyptus leaves	17.11	75.30	7.60	9.20	20.04	[17]
397	Feijoa leaves	22.10	71.20	6.70	6.90	17.81	[17]
398	Fig. tree leaves	15.51	67.10	17.40	13.00	14.38	[17]
399	Grapevine leaves	17.40	72.40	10.20	8.90	17.09	[17]
400	Hazelnut tree leaves	13.43	79.00	8.00	9.10	17.87	[17]
401	Horse chestnut tree leaves	22.30	67.00	10.70	11.70	16.79	[17]

402	Leilandi leaves	16.09	76.00	7.70	8.40	19.73	[17]
403	Lemon tree leaves	14.42	74.70	10.90	8.09	16.35	[17]
404	Mandarin tree leaves	15.53	69.50	15.00	12.50	15.53	[17]
405	Medlar tree leaves	18.77	73.20	8.00	7.60	18.30	[17]
406	Mimosa leaves	19.04	73.10	7.90	7.80	19.44	[17]
407	Oak tree leaves	24.19	72.00	3.80	9.10	17.52	[17]
408	Orange tree leaves	11.45	73.20	15.40	9.20	16.17	[17]
409	Palm tree leaves	21.22	75.70	3.05	8.20	19.53	[17]
410	Peach tree leaves	14.67	75.00	10.20	7.44	18.34	[17]
411	Pear tree leaves	15.73	77.90	6.40	8.90	18.93	[17]
412	Persimmon tree leaves	1.80	84.00	14.20	9.40	16.03	[17]
413	Plagano maple tree leaves	3.02	86.00	10.50	9.00	18.17	[17]
414	Plum tree leaves	18.80	71.00	10.20	8.10	17.93	[17]
415	Raspberry leaves	21.24	68.60	10.20	10.80	17.40	[17]
416	Walnut tree leaves	23.29	66.80	9.90	10.20	17.53	[17]
417	White magnolia leaves	13.55	75.00	11.00	7.70	17.51	[17]
418	Willow leaves	19.10	74.00	6.50	7.70	17.94	[17]
419	Coconut fiber	11.10	80.85	8.05	N/A	19.23	[20]

I	Hull/husk/dust						
420	Sal seed husk	28.06	62.54	9.40	N/A	20.60	[14]
421	Bamboo dust	9.30	74.20	16.50	N/A	15.89	[14]
422	Rice Hulls	15.80	63.60	20.60	7.00	14.89	[18]
423	Eucalyptus saw dust	16.20	83.60	0.20	N/A	18.50	[14]
424	Saw dust	25.00	72.40	2.60	N/A	20.93	[14]
425	Saw dust + musturd	11.90	55.40	32.70	N/A	13.73	[14]
426	Olive husk	26.10	70.30	3.60	9.20	19.00	[10]
427	Almond hulls	20.07	73.80	6.13	N/A	18.89	[21]
428	Rice husk bran	19.53	61.83	18.64	N/A	15.29	[21]
429	Rice husk patni-23	14.90	69.30	15.80	N/A	15.67	[21]
430	Rice husk	8.48	58.22	24.71	8.59	14.08	[27]
431	Rice husk	16.95	61.81	21.24	N/A	14.69	[21]
432	Rice husk	16.30	61.20	22.50	N/A	16.47	[21]
433	Rice husk	13.30	73.00	13.70	7.27	15.90	[17]
434	Broad bean husk	8.68	85.44	5.88	N/A	16.07	[21]
435	Coffe husk	19.10	78.50	2.40	N/A	19.80	[21]
436	Sunflower seed husk	19.30	75.10	5.60	N/A	20.65	[35]
437	Eucalyptus sawdust	15.38	83.70	0.90	7.70	18.05	[17]
438	Sawdust from olive tree	16.10	79.70	4.20	N/A	20.79	[15]
439	Sawdust	9.35	55.03	0.69	34.93	12.63	[18]
440	Green bean stem and husk	12.52	77.88	9.60	N/A	16.86	[32]
441	Red lentil hull	20.03	74.73	5.24	N/A	18.27	[32]
442	Chickpea husk	16.32	79.70	3.98	N/A	18.26	[32]
443	Broad bean husk	17.33	74.97	7.70	N/A	16.24	[32]
444	Cacao husk	20.56	75.03	4.41	N/A	17.85	[32]

445	Peanut husk	20.53	79.32	0.15	N/A	19.16	[32]
446	Broad bean husk	19.40	74.88	5.73	N/A	16.80	[32]
447	Sawdust	17.40	81.00	1.60	11.30	18.02	[17]
448	Wood sawdust	16.40	83.00	0.60	9.20	18.21	[17]
449	Cocoa pod husks	10.96	61.73	16.24	11.07	12.48	[38]
450	Cocoa pod husks	16.80	58.46	13.21	11.53	18.10	[38]
451	Bean husk	18.22	74.00	8.00	9.99	15.11	[17]
452	Cocoa beans husk	21.04	69.00	9.96	8.80	17.31	[17]
453	Coffee husk	18.00	76.20	5.80	9.60	18.33	[17]
454	Green bean husk	9.10	81.00	9.90	8.70	15.63	[17]
455	Pea husk	12.50	83.00	4.50	11.80	15.46	[17]
456	Seed husk	18.10	80.00	1.90	8.20	18.00	[17]

J Others/misc.

457	Mentha piperita	7.50	79.00	13.50	N/A	15.15	[14]
458	Grewia optiva	14.20	85.50	0.30	N/A	18.00	[14]
459	Water hyacinth	1.90	87.30	10.80	N/A	14.81	[14]
460	Ceder cones	28.10	70.40	1.50	N/A	21.10	[14]
461	Camphor	12.53	79.02	1.78	6.67	18.40	[34]
462	Rapeseed	5.60	86.27	8.13	N/A	16.61	[21]
463	Pepper plant	20.86	64.71	14.44	N/A	15.39	[21]
464	Sugarcane	14.95	73.78	11.27	N/A	17.33	[21]
465	Esparto plant	16.80	80.50	2.20	N/A	19.10	[21]
466	Vine shoots	21.49	74.79	3.72	N/A	17.94	[35]
467	Biomass Mix	18.14	69.36	12.49	8.82	18.40	[22]
468	Elaeagnus	22.67	76.43	0.90	N/A	19.80	[32]
469	Cotton cake	11.58	83.65	4.77	N/A	17.50	[21]
470	Soybean cake	16.00	76.86	7.14	N/A	18.30	[21]
471	Caster seed cake	25.20	67.90	6.90	N/A	21.01	[21]
472	Olive cake	34.60	62.10	2.80	N/A	21.60	[21]
473	Jatropha cakes	10.97	72.53	6.47	10.03	21.24	[27]
474	Moringa cakes	8.26	75.08	6.28	10.38	20.47	[27]
475	Oil palm decanter cake	12.75	72.13	14.79	10.38	17.00	[37]
476	Pine cone	17.48	80.92	1.60	N/A	20.07	[32]
477	American oak acorn	20.80	74.00	3.20	8.92	17.37	[17]
478	Cherry-laurel fruit	14.90	80.80	4.30	14.90	19.03	[17]
479	Cypress fruit	23.50	71.80	4.70	10.30	20.17	[17]
480	Eucalyptus fruit	21.70	73.60	4.70	11.70	18.52	[17]
481	Fern	17.05	79.00	4.10	12.30	18.05	[17]
482	Horse chestnut	20.60	75.40	4.00	8.80	17.89	[17]
483	Horse chestnut burr	24.60	70.00	5.40	9.20	17.17	[17]
484	Oak acorn	22.30	75.10	2.60	11.90	16.17	[17]
485	Walnut tree fruit	21.80	71.00	7.20	9.60	17.64	[17]
486	Apricot pulp	20.12	78.80	1.08	N/A	18.52	[32]
487	Peach pulp	23.34	71.21	5.44	N/A	18.23	[32]

488	Apple pulp	15.13	82.56	2.31	N/A	19.85	[32]
489	Locust bean	24.16	70.29	5.54	N/A	18.04	[32]
490	Oil palm roots	22.28	68.32	8.49	11.92	16.30	[37]
491	Thyme	16.00	75.04	8.96	N/A	18.16	[32]
K	Waste material						
492	Soybean residue	13.54	80.01	6.45	N/A	19.26	[32]
493	Tobacco waste	11.78	72.85	15.36	N/A	14.51	[32]
494	Olive Residue	25.48	67.35	7.17	10.63	21.74	[22]
495	Chicken litter	14.40	47.82	37.79	9.29	14.90	[22]
496	Chicken Manure	13.23	66.05	20.72	25.30	15.39	[18]
497	Sheep Manure	14.00	65.10	20.90	47.80	16.04	[18]
498	Dairy Freee Stall Manure	7.40	30.10	62.50	69.80	8.48	[18]
499	Agri-wastes	19.93	71.63	8.43	N/A	18.23	[33]
500	Tea waste	13.60	85.00	1.40	6.50	17.10	[10]
501	Bamboo stick waste	47.70	12.70	39.60	N/A	17.66	[14]
502	Tannary waste	1.00	45.00	54.00	N/A	7.69	[14]
503	Fly ash (Bagasse fuel)	19.80	8.10	72.10	N/A	8.39	[14]
504	Pine needle (40% clay)	13.20	9.09	77.70	N/A	5.70	[14]
505	Cotton gin trash	15.40	75.40	9.20	7.00	15.58	[18]
506	Cotton gin waste	14.97	83.41	1.61	N/A	17.48	[14]
507	Cotton gin trash	15.10	67.30	17.60	N/A	16.42	[14]
508	Alabama oak wood waste	21.90	74.70	3.30	N/A	19.23	[14]
509	Urban Wood Waste	12.58	52.56	4.08	30.78	13.46	[18]
510	White fir	16.58	83.17	0.25	N/A	19.95	[14]
511	Tan oak	9.20	90.60	0.20	N/A	18.93	[14]
512	Industrial waste	20.10	75.10	4.80	N/A	18.93	[14]
513	Poultry pure waste	25.90	14.30	59.80	N/A	11.71	[14]
514	Municipal solid waste-Bareilly	5.00	25.00	70.00	N/A	5.63	[14]
515	Municipal solid waste-Morada	4.00	35.70	60.30	N/A	7.18	[14]
516	Other waste materials	8.96	55.93	35.11	N/A	13.91	[33]
517	Waste material	16.80	78.70	4.50	11.00	17.10	[10]
518	Millet grain waste	14.50	77.10	8.40	N/A	15.21	[21]
519	Municipal solid waste moradabad	4.00	35.70	60.30	N/A	7.18	[21]
520	Tannery waste	1.00	45.00	54.00	N/A	7.69	[21]
521	Vegetable food waste	16.35	78.77	4.88	N/A	19.23	[21]
522	Cotton residue	20.59	72.80	6.61	2.62	16.90	[31]
523	Sludge	6.09	57.22	31.27	5.42	15.59	[34]
524	Sludge C1	8.61	53.01	38.38	6.10	13.92	[40]
525	Sludge C2	6.73	51.24	42.03	5.10	13.18	[40]
526	Sludge C3	6.99	49.98	43.03	5.40	12.56	[40]
527	Sludge C4	4.05	47.58	48.37	6.40	11.02	[40]
528	Sludge C5	5.96	42.25	51.79	3.70	10.14	[40]
529	Sludge H1	5.14	55.47	39.39	6.60	13.34	[40]

530	Sludge H2	6.84	52.57	40.60	5.60	12.77	[40]
531	Sludge H3	6.47	47.68	45.86	4.60	12.39	[40]
532	Sludge H4	3.86	50.42	45.72	6.90	11.14	[40]
533	Sludge sample 1	9.80	60.70	29.50	5.20	16.60	[40]
534	Sludge sample 2	11.50	72.50	16.00	5.00	20.90	[40]
535	Sludge sample 3	12.80	60.60	26.60	11.80	17.10	[40]
536	Sludge sample 4	9.70	59.30	31.00	4.30	16.80	[40]
537	Sludge sample 5	10.70	58.50	30.80	3.90	16.60	[40]
538	Sludge sample 6	5.90	50.80	43.30	8.50	13.30	[40]
539	Sludge sample 7	2.40	60.70	36.90	78.10	16.60	[40]
540	oil palm sewage sludge	11.42	51.70	36.43	14.42	11.19	[37]
541	l pil l pil	17.70	79.90	2.40	N/A	20.22	[21]
542	Marrabu	17.20	81.30	1.50	N/A	20.72	[21]
543	RDF	17.60	72.00	10.40	N/A	19.50	[21]
544	RDF	14.31	81.22	4.48	N/A	18.19	[21]
545	Holm oak residues	17.60	80.60	2.40	N/A	20.57	[35]
546	Eucalyptus residues	23.50	74.10	2.40	N/A	20.18	[35]
547	Wood waste	19.59	79.00	1.60	10.10	17.84	[17]
548	Apple	18.40	79.00	2.60	10.10	15.10	[17]
549	Apple rind	20.90	76.90	2.20	12.30	16.17	[17]
550	Building waste chips	13.20	86.00	0.80	7.90	18.28	[17]
551	Cherry tomato plant waste	2.28	75.12	22.60	9.10	14.01	[17]
552	Chestnut tree shaving	20.60	79.00	0.40	8.35	17.62	[17]
553	Courgette waste	1.00	65.00	34.00	9.80	12.73	[17]
554	Grapevine waste	13.70	73.00	13.30	11.16	16.47	[17]
555	Lemon rind	17.10	73.20	9.70	10.40	17.18	[17]
556	Mandarin rind	21.20	75.00	3.80	15.30	15.53	[17]
557	Orange rind	28.20	68.30	3.50	21.50	16.72	[17]
558	Pea plant waste	15.89	78.00	5.80	8.70	17.35	[17]
559	Pepper plant waste	4.00	73.10	22.90	7.94	13.66	[17]
560	Pine shaving	14.20	85.00	0.80	9.20	19.79	[17]
561	Potato plant waste	14.73	69.00	15.80	9.90	15.07	[17]
562	Tomato plant waste	5.98	78.00	16.20	10.20	14.15	[17]
563	Vine orujillo	8.30	79.00	12.70	9.50	17.74	[17]
564	Vine shoot waste	31.90	64.00	4.10	31.40	13.29	[17]
565	Orange waste	23.60	74.10	2.30	1.50	19.40	[39]

L	Biomass chars						
566	Redwood char (790-1020°F)	67.70	30.00	2.30	N/A	28.84	[14]
567	Oak char (820-1185°F)	59.30	25.80	14.90	N/A	24.80	[14]
568	Coconut shell char (750°C)	87.17	9.93	2.90	N/A	31.12	[14]
569	QrC550	82.20	14.70	3.10	N/A	32.72	[15]
570	PhC300	31.30	68.10	0.60	N/A	22.84	[15]
571	EsC700	91.50	6.60	1.90	N/A	32.20	[15]

572	WsC600	63.50	11.80	24.70	N/A	24.49	[15]
573	OsC600	82.10	11.30	6.60	N/A	31.87	[15]
574	AsC600	86.50	9.80	3.70	N/A	32.60	[15]
575	PhC600	84.90	13.40	1.70	N/A	31.91	[15]
576	QrC600	83.60	13.20	3.20	N/A	32.65	[15]
577	QrC300	33.40	65.10	1.50	N/A	23.13	[15]
578	Rice husk char	41.20	5.90	52.90	N/A	14.94	[14]
579	Rose apple char	12.20	22.20	65.60	N/A	7.58	[14]
580	Lignite char	72.60	13.30	14.10	N/A	27.37	[15]
581	CC1	62.40	24.50	13.10	N/A	27.10	[15]
582	CC2	68.60	23.10	8.30	N/A	27.98	[15]
583	CC3	76.70	20.40	2.90	N/A	29.41	[15]
584	CC4	76.80	17.40	5.80	N/A	31.18	[15]
585	CC5	73.40	16.10	10.50	N/A	30.21	[15]
586	CF-200	15.04	78.26	6.70	N/A	19.93	[20]
587	CF-250	16.37	75.58	8.05	N/A	21.03	[20]
588	CF-300	25.71	64.21	10.08	N/A	23.80	[20]
589	CF-330	28.38	60.64	10.98	N/A	25.36	[20]
590	PW-200	18.62	80.43	0.95	N/A	20.74	[20]
591	PW-250	23.09	75.84	1.07	N/A	21.06	[20]
592	PW-300	40.37	58.34	1.29	N/A	22.60	[20]
593	PW-330	47.90	50.71	1.39	N/A	24.49	[20]
594	Bamboo char-300°C	65.16	30.92	3.92	N/A	25.43	[6]
595	Bamboo char-400°C	71.51	25.16	3.33	N/A	27.46	[6]
596	Bamboo char-500°C	75.39	20.53	4.08	N/A	28.15	[6]
597	Bamboo char-600°C	82.83	12.92	4.25	N/A	28.97	[6]
598	Bamboo char-700°C	86.37	9.37	4.26	N/A	29.56	[6]

Table S2. Measured HHV, Proximate Analysis (%FC, %VM, %ASH) on a dry basis, for model fit.

N°	Raw material	Proximate analysis			Measured	Reference
		% by wt. dry basis				
		FC	VM	ASH	HHV	
1	Northumber land no.8-Anth	84.59	7.09	8.32	32.86	[14]
2	German-Anna	79.60	12.00	8.40	33.00	[14]
3	Coal	56.41	18.18	22.24	27.28	[23]
4	German Braunkohole lignite	46.03	49.47	4.50	25.10	[14]
5	Coke	91.47	0.92	7.61	31.12	[14]
6	Gulf Coast Lignite	29.16	31.58	12.52	17.71	[18]
7	Black Thunder Subbituminous	34.94	30.72	5.19	20.67	[18]
8	Central Appalachian (Long Fork)	50.09	31.23	11.52	28.18	[18]
9	Illinois #6	44.98	35.32	7.43	27.29	[18]

10	High-Sulfur Coal	41.94	34.43	9.66	25.85	[18]
11	Lignite L01	27.72	38.32	33.96	15.63	[19]
12	Lignite L02	31.76	24.95	43.29	18.10	[19]
13	Lignite L03	18.24	47.96	33.80	16.47	[19]
14	Lignite L04	43.48	44.56	11.96	27.02	[19]
15	Lignite L05	45.31	41.77	12.92	25.00	[19]
16	Lignite L07	32.06	55.02	12.92	23.92	[19]
17	Lignite L10	22.93	47.57	29.50	19.05	[19]
18	Lignite L11	40.50	51.89	7.61	26.78	[19]
19	Lignite L13	8.73	54.57	36.70	16.28	[19]
20	Lignite L15	27.50	51.64	20.86	19.85	[19]
21	Lignite L14	39.37	52.05	8.58	24.08	[19]
22	Lignite	40.98	48.76	10.26	25.31	[20]
23	Charcoal	89.10	9.88	1.02	34.39	[21]
24	Ptolemais lignite	39.28	47.71	13.01	16.90	[31]
25	Vegetal coal	68.10	26.00	5.90	29.71	[17]
26	cotton shells briquettes	17.10	77.80	5.10	19.06	[14]
27	Press mud briquettes	8.60	54.70	36.70	11.97	[14]
28	Field grass pellet	17.29	75.30	7.40	18.93	[21]
29	Hemp pellet	17.71	74.89	7.40	20.17	[21]
30	Miscanthus pellet	17.40	80.21	2.37	19.00	[21]
31	Municipality waste pellet	10.68	77.38	11.90	17.32	[21]
32	Peanut shell pellet	21.77	74.41	3.82	20.15	[21]
33	Pine pellet	17.70	81.96	0.33	20.54	[21]
34	Alfalfa pellet	14.77	74.35	9.96	17.84	[21]
35	Algae pellet	17.61	76.01	6.37	18.82	[21]
36	Lantana briquettes	11.90	20.80	67.30	7.69	[14]
37	Block wood	14.59	83.32	2.09	18.26	[14]
38	Ply wood	21.80	74.20	4.00	19.72	[14]
39	CBPs	18.19	70.51	6.10	17.80	[23]
40	Cotton gin by-products pellets	48.05	47.00	5.22	18.29	[26]
41	Cotton gin by-products pellets	49.19	46.09	4.88	20.81	[26]
42	Cotton gin by-products pellets	42.80	47.59	9.75	17.97	[26]
43	Cotton gin by-products pellets	44.74	47.17	8.17	17.90	[26]
44	Cotton gin by-products pellets	45.56	46.54	7.72	20.93	[26]
45	Wood pellets	55.59	43.85	0.49	19.72	[17]
46	Beet root pellets	15.00	76.00	9.00	15.10	[17]
47	Briquette	14.20	85.00	0.80	18.49	[17]
48	Pine and pine apple leaf pellets	21.80	75.00	3.20	18.15	[17]
49	Straw pellets	11.20	79.00	9.80	16.58	[17]
50	TW pellet	21.03	74.78	4.19	17.39	[25]

51	EFB pellet	15.39	83.76	0.86	16.74	[25]
52	TW-EFB pellet (50:50)	18.21	79.32	2.46	16.99	[25]
53	75WGP25PYO pellet	23.05	70.43	6.52	19.51	[24]
54	50WGP50PYO pellet	21.31	73.48	5.22	19.48	[24]
55	100PYO pellet	12.65	83.64	3.71	19.13	[24]
56	Peach pit	19.80	79.10	1.10	19.42	[14]
57	Pine kernel shell	19.70	77.60	2.70	18.89	[17]
58	Walnut shell	18.70	79.00	2.30	18.38	[17]
59	Macadamia shell	23.68	75.92	0.40	21.01	[14]
60	Pistachio shell	16.84	82.03	1.13	19.26	[14]
61	Coconut shell powder	20.58	79.07	0.35	19.68	[14]
62	Coconut shell	15.97	83.01	1.02	20.24	[32]
63	Cotton shells	16.90	68.50	14.60	16.38	[14]
64	Spire-mint	11.80	70.10	18.10	15.53	[14]
65	Corn cob	14.60	83.00	2.40	17.69	[17]
66	Corn cob	18.54	80.10	1.36	18.77	[14]
67	Corn cob	12.50	86.50	1.00	17.00	[10]
68	Corn Stover	19.80	76.10	4.10	16.84	[18]
69	Cornstover	17.60	78.70	3.70	17.80	[10]
70	Corn stover	19.25	75.17	5.58	17.65	[21]
71	Corn stover	26.65	66.58	6.73	17.93	[21]
72	By products of fruits	21.22	74.62	3.91	19.25	[33]
73	Soft almond shell	21.10	75.80	3.10	18.01	[17]
74	Almond shells	18.40	80.50	1.10	19.92	[15]
75	Almond shell	15.80	82.00	2.20	18.28	[17]
76	Peach stone	23.90	75.60	0.50	19.59	[17]
77	Plum stone	21.20	77.00	1.80	19.14	[17]
78	Date stone	16.60	82.00	1.40	18.15	[17]
79	Nectarine stone	22.90	76.00	1.10	19.56	[17]
80	Olive stones	19.50	78.30	2.20	20.23	[35]
81	Cherry stone	14.13	85.00	0.87	19.07	[17]
82	Avocado pear stone	26.00	72.00	2.00	15.18	[17]
83	Apricot stone	17.83	81.13	1.04	18.80	[21]
84	Peach stone	12.61	86.42	0.97	20.31	[32]
85	Damson plum stone	16.67	82.03	1.00	21.23	[32]
86	Cornelian cherry stone	18.67	79.27	2.06	19.84	[32]
87	Cornelian cherry stone	23.80	73.54	2.96	19.02	[32]
88	Sour cheery stone	14.10	80.85	5.05	17.59	[21]
89	Hazelnut seedcoat	27.00	71.20	1.80	19.30	[10]
90	Hazelnut shell	20.80	77.00	2.20	18.87	[17]
91	Palm kernels	17.59	77.28	5.14	20.71	[22]
92	Palm kernel shell	12.07	70.02	6.04	16.15	[11]
93	Palm kernel shell	18.70	70.50	0.84	20.10	[11]
94	Palm kernel shell	19.70	67.20	2.10	16.41	[11]

95	Palm kernel shell	10.85	84.86	4.29	18.81	[11]
96	Empty fruit bunch	15.37	65.01	3.85	15.49	[11]
97	Oil palm fruit bunch	16.46	78.20	4.53	16.96	[21]
98	Akhrot shell	18.78	79.98	1.20	20.01	[21]
99	Almond shells	20.71	76.00	3.29	19.49	[21]
100	Coconut shell	22.10	77.19	0.71	20.50	[21]
101	Coconut shell	21.60	70.20	1.17	18.45	[21]
102	Cotton shell	16.90	68.50	14.60	16.38	[21]
103	Groundnut shell	21.60	72.70	5.70	19.85	[21]
104	Hazeinut shell	30.00	68.90	1.10	19.90	[21]
105	Peach pits	19.85	79.12	1.03	20.82	[21]
106	Peanut shell	13.40	84.90	1.70	18.60	[21]
107	Pistachio soft shell	8.69	67.85	14.21	18.57	[21]
108	Sunflower seed shell	11.70	84.70	3.60	17.60	[21]
109	Walnut shell	16.94	79.17	3.89	18.91	[21]
110	Walnuts shells	21.16	78.28	0.56	20.18	[21]
111	Dried grain-soluble	12.84	82.50	3.89	21.75	[21]
112	Wet grains	13.58	83.18	2.58	21.95	[21]
113	Olive kernel	32.80	63.90	1.70	22.40	[21]
114	Olive kernel B	24.25	73.62	2.13	19.90	[31]
115	Olive kernel shell	36.10	60.50	3.30	21.40	[21]
116	Walnut shell	16.12	82.98	0.90	20.03	[32]
117	Chestnut shell	29.10	67.00	3.90	14.31	[17]
118	Olive pits	16.28	82.00	1.72	21.59	[21]
119	Cedar cones	28.10	70.40	1.50	21.10	[21]
120	Pine cone	15.15	77.96	6.89	18.55	[21]
121	Barley	20.10	76.90	3.00	16.52	[17]
122	Maize	19.05	78.90	2.10	16.43	[17]
123	Oats bran	18.85	77.00	4.15	18.06	[17]
124	Rye	19.30	78.90	1.80	16.14	[17]
125	Soya	18.20	77.00	4.80	16.71	[17]
126	Wheat	17.20	80.00	2.80	16.33	[17]
127	Wheat bran	18.50	78.00	3.50	17.37	[17]
128	Pine cone heart	23.10	66.00	3.50	16.44	[17]
129	Paper-shelled walnut (PSW)	25.20	74.80	4.80	14.54	[30]
130	Medium-shelled walnut (MSW)	26.00	74.00	5.84	13.80	[30]
131	Hard-shelled walnut (HSW)	20.20	79.80	2.01	14.20	[30]
132	Hornbeam shell	9.37	78.83	9.52	19.60	[28]
133	Parinari fruit shell	14.51	78.17	4.67	20.47	[27]
134	Empty fruit bunches	15.43	79.16	5.48	18.18	[37]
135	Oil palm shell	26.14	72.58	1.35	18.72	[37]
136	Canyon live Oak	11.30	88.20	0.50	18.98	[14]
137	Red wood	19.92	79.72	0.36	20.72	[14]

138	Softwood	28.10	70.00	1.70	20.00	[10]
139	Spruce wood	28.30	70.20	1.50	20.10	[10]
140	Eucalyptus saligna	17.90	82.00	0.10	20.08	[14]
141	Pine wood	15.70	73.60	11.30	16.64	[14]
142	Subabul wood	18.52	81.02	1.20	19.78	[14]
143	Eucalyptus	21.30	75.35	3.35	18.64	[14]
144	Eucalyptus pellita	16.20	83.60	0.20	20.41	[15]
145	Eucalyptus citridora	13.90	85.70	0.40	19.35	[15]
146	Subabul	13.80	85.20	1.00	16.66	[14]
147	MBM	12.71	63.31	23.95	18.59	[22]
148	Wood chips/ tree species Grasses	22.23	72.69	4.91	19.56	[33]
149	Quercus rotundifolia	14.10	83.60	2.30	19.73	[15]
150	Pinus caribaea	15.70	83.90	0.40	19.95	[15]
151	Pinus tropicalis	15.80	83.90	0.30	20.81	[15]
152	Beech wood	24.60	74.00	1.40	19.20	[10]
153	Ailanthus wood	24.80	73.50	1.70	19.00	[10]
154	Hardwood	25.00	72.30	2.70	18.80	[10]
155	Bamboo wood	11.24	86.80	1.95	20.55	[10]
156	Black locust	18.26	80.94	0.80	19.71	[21]
157	B-wood	21.62	76.53	1.85	20.05	[22]
158	Casurina wood	19.58	78.58	1.83	18.77	[21]
159	Chaparral wood	18.68	75.19	6.13	18.61	[21]
160	Douglass fir	17.70	81.50	0.80	21.05	[21]
161	Douglass fir wood	12.60	87.30	0.10	20.38	[21]
162	Dry subabul wood	18.52	81.02	1.20	19.78	[21]
163	Eucalyptus globulus wood	17.30	81.60	1.10	19.23	[21]
164	Eucalyptus wood	21.30	75.35	3.35	18.64	[21]
165	Eucalyptus wood	15.91	78.48	4.11	16.42	[21]
166	Fresh subabul wood	15.20	83.60	1.12	19.70	[21]
167	Hybrid poplar	6.87	89.69	3.44	17.14	[21]
168	Poplar	16.35	82.32	1.33	19.38	[21]
169	Jujuba wood	14.14	83.63	2.32	20.26	[21]
170	Madrone	12.00	87.80	0.20	19.51	[21]
171	Mango wood	11.36	85.64	2.98	19.17	[21]
172	Neem wood	12.19	85.86	1.93	20.26	[21]
173	Oak wood (medium branch)	16.18	81.75	3.00	19.24	[21]
174	Oak wood (small branch)	18.50	77.45	4.05	19.20	[21]
175	Ponderosa pine	17.17	82.54	0.29	20.02	[21]
176	Red alder	12.50	87.10	0.40	19.30	[21]
177	Red wood	16.10	83.50	0.40	21.03	[21]
178	Western hemlock wood	15.20	84.80	2.20	20.05	[21]
179	White oak	17.20	81.28	1.52	19.42	[21]
180	Willow wood	16.07	82.22	1.71	19.59	[21]

181	Ash tree	14.12	80.13	5.75	18.06	[21]
182	Olive Wood	16.05	79.71	4.24	20.79	[35]
183	Black poplar wood	12.28	86.00	1.50	18.39	[17]
184	Forest residue	20.00	79.80	0.20	19.50	[31]
185	Gorse	50.17	45.20	5.00	18.60	[17]
186	Miscanthus	11.40	79.00	9.60	18.07	[17]
187	Oats and vetch	20.67	72.00	7.33	16.66	[17]
188	Sainfoin	17.80	73.00	9.20	16.41	[17]
189	Sorghum	21.00	62.00	17.00	11.87	[17]
190	Triticale	18.80	75.00	6.20	16.65	[17]
191	Alder	21.45	74.00	4.50	20.08	[17]
192	Almond tree	19.00	75.60	5.40	18.35	[17]
193	Apple tree	21.00	74.00	5.00	17.82	[17]
194	Bamboo	17.33	81.47	1.20	18.27	[17]
195	Camellia	17.82	78.00	4.20	17.83	[17]
196	Cherry tree	21.50	74.00	4.40	19.36	[17]
197	Chestnut tree	22.52	74.00	3.50	16.80	[17]
198	Fig. tree	19.53	73.10	7.40	17.52	[17]
199	Grapevine	20.90	71.50	7.60	16.82	[17]
200	Hazelnut tree	15.42	80.60	4.00	18.19	[17]
201	Horse chestnut tree	19.60	73.50	6.90	17.47	[17]
202	Kiwi	21.48	74.00	4.50	17.81	[17]
203	Lemon tree	18.61	76.70	4.70	17.56	[17]
204	Mimosa	21.00	75.00	4.00	17.75	[17]
205	Orange tree	16.89	79.00	4.50	16.31	[17]
206	Peach tree	22.20	74.00	3.80	17.67	[17]
207	Pear tree	19.98	74.60	6.40	17.46	[17]
208	Plum tree	21.40	72.00	6.60	17.56	[17]
209	Chinese fir	16.68	74.49	1.20	18.38	[34]
210	Grapevine pruning	30.70	64.00	5.30	17.78	[17]
211	Oak tree pruning	18.70	77.00	4.30	17.59	[17]
212	Olive tree pruning	9.00	78.00	13.00	17.34	[17]
213	Orchard Prunings	17.84	80.75	1.41	16.82	[18]
214	Vineyard Prunings	14.71	83.91	1.38	19.05	[18]
215	Vine shoot chips	24.30	66.00	9.70	14.63	[17]
216	Chestnut tree chips	20.50	78.20	1.30	17.49	[17]
217	Wood chips	29.90	68.60	1.50	15.16	[17]
218	Hazelnut and alder chips	18.00	77.00	5.00	17.56	[17]
219	Pine and eucalyptus chips	24.80	71.60	3.60	16.99	[17]
220	Pine chips	21.65	72.40	5.95	19.79	[22]
221	Holm oak branch chips	17.70	74.90	7.40	17.18	[17]
222	Wood chips	15.40	83.40	1.20	20.03	[14]
223	Douglas Fir	25.80	73.00	1.20	22.10	[14]
224	Loblolly Pine bark	33.90	54.70	0.40	21.78	[21]

225	Eucalyptus bark	15.30	65.70	19.00	15.20	[14]
226	Almond	21.54	76.83	1.63	20.01	[14]
227	Cabernet sauvignon	19.20	78.63	2.17	19.03	[14]
228	Walnut	20.80	78.50	0.70	19.97	[14]
229	Olive twigs	10.73	88.25	1.02	18.70	[35]
230	Coffee chaff	19.60	75.80	4.60	17.69	[14]
231	Tapero roor skin scale	11.40	35.10	39.20	9.23	[14]
232	Black poplar bark	20.76	71.00	8.00	17.41	[17]
233	Black walnut pruning	18.56	80.69	0.78	19.83	[21]
234	Potato peel	9.56	84.15	6.29	17.18	[21]
235	Orange peel waste	16.82	80.49	2.69	18.28	[36]
236	Avocado pear peel	14.90	82.00	3.10	18.74	[17]
237	Pomegranate peel	25.20	68.00	6.80	15.17	[17]
238	Paddy straw	11.80	72.70	15.50	14.52	[14]
239	Wet straw	17.40	74.50	8.10	18.15	[15]
240	Rice straw ground	16.20	68.30	15.50	15.61	[14]
241	Rice straw	15.86	65.47	18.67	15.09	[21]
242	Rice straw	1.33	45.68	45.76	12.26	[27]
243	Rice straw	13.51	64.59	15.34	14.64	[34]
244	Coconut stem	23.10	74.40	2.50	19.44	[14]
245	Corn straw	19.19	73.15	7.65	17.68	[22]
246	Jawar straw	15.15	75.97	8.88	17.95	[21]
247	Millet straw	16.45	78.28	5.27	18.05	[21]
248	Rape straw	17.81	76.54	4.65	18.34	[22]
249	Wheat straw	19.80	71.30	8.90	17.51	[21]
250	Wheat straw	24.00	69.60	6.40	18.91	[14]
251	Wheat straw	23.50	63.00	13.50	17.00	[10]
252	Wheat straw	11.70	80.60	7.70	17.36	[14]
253	Wheat straw	18.19	76.00	5.30	17.34	[17]
254	Sugar cane straw	14.60	76.20	9.20	17.19	[21]
255	Barley straw	16.00	77.90	6.10	17.37	[17]
256	Rye straw	16.90	79.90	3.20	17.11	[17]
257	Cornstalk	16.02	76.79	7.19	16.55	[32]
258	Sunflower stalks	15.86	74.63	9.51	16.30	[35]
259	Cotton plant stalks	20.33	75.50	4.17	17.86	[35]
260	Cotton stalk	17.30	65.40	17.30	15.83	[14]
261	Cotton stalk	22.43	70.89	6.68	18.26	[21]
262	Cotton stalks	19.90	62.90	17.20	15.83	[21]
263	Musturd stalk (A)	21.90	60.90	17.20	17.49	[14]
264	Eucalyptus stalk	12.20	87.30	0.50	19.10	[14]
265	Mulberry stick	22.80	75.10	2.10	18.36	[14]
266	Tobacco stalk	18.00	79.60	2.40	17.70	[10]
267	Sun flower stalk and stover	5.17	85.85	8.98	15.87	[21]
268	French bean stalk	4.67	89.01	6.32	15.41	[21]

269	Sunflower stalk	11.70	84.68	3.62	17.86	[21]
270	Alfalfa stems	15.81	78.92	5.27	18.67	[21]
271	Sour cherry stem	17.16	77.48	5.36	18.27	[32]
272	Oil palm trunk	16.17	79.98	3.69	16.11	[37]
273	Pea stem	12.27	74.67	13.06	16.31	[32]
274	Coconut coir	29.70	66.58	3.72	20.05	[14]
275	Sudan Grass	18.60	72.75	8.65	17.39	[14]
276	Switchgrass	12.18	65.19	7.63	15.35	[18]
277	Mechanically Harvested Switchgrass	15.49	69.03	5.95	17.06	[18]
278	Manually Harvested Switchgrass	5.39	81.79	3.93	17.26	[18]
279	Mulch Hay	17.10	77.60	5.30	18.74	[18]
280	Bagasse	7.00	70.90	22.10	14.26	[14]
281	Bagasse	14.95	73.78	11.27	17.33	[21]
282	Bagasse pith	10.60	86.60	2.80	17.19	[14]
283	Apricot bagasse	15.80	80.31	3.89	18.56	[21]
284	Peach bagasse	6.15	91.98	1.87	16.24	[21]
285	Sugarcane bagasse	8.12	79.45	3.91	16.88	[27]
286	Sugarcane bagasse	13.30	81.50	5.20	17.70	[21]
287	Sugarcane bagasse	14.70	82.60	2.70	17.32	[21]
288	Sweet sorghum bagasse	5.00	75.00	20.00	13.73	[14]
289	Moringa-oleifera (leaves)	10.70	67.80	21.50	14.23	[14]
290	Sena leaves	25.50	57.20	17.30	18.13	[14]
291	Sugar cane leaves	14.90	77.40	7.70	17.41	[14]
292	Olive marc	25.83	69.45	4.72	21.06	[35]
293	Miscalthus	12.40	87.20	0.40	19.30	[14]
294	Dal lake weed	3.60	47.70	48.70	8.89	[14]
295	Tea bush	21.80	76.50	1.70	19.84	[14]
296	Tobacco leaf	11.20	72.60	17.20	15.00	[10]
297	Oil palm frond	12.01	69.17	2.87	17.75	[11]
298	Oil palm fronds	17.87	78.90	3.12	15.81	[37]
299	Oil palm fiber	18.24	75.43	5.82	18.20	[37]
300	Palm mesocarp fiber	16.42	67.04	5.66	16.94	[11]
301	Palm mesocarp fiber	20.51	72.46	7.03	17.13	[11]
302	Carrington intermediate wheatgrass	19.10	76.10	4.80	16.44	[21]
303	Carrington tall wheatgrass	19.30	75.80	4.90	18.01	[21]
304	Casuarina equisetifolia leaf	16.46	73.50	3.93	18.48	[21]
305	Lantana camara leaf	11.83	70.46	7.26	18.50	[21]
306	Streeter switch grass	17.70	76.50	5.80	18.06	[21]
307	Switch grass	14.34	76.69	8.97	18.06	[21]
308	Pine needles	26.12	72.38	1.50	20.12	[21]
309	Shea meal	28.70	66.30	5.00	19.80	[21]
310	Soplillo	20.70	77.80	1.50	22.58	[21]
311	Pine cone leaf	18.70	80.00	1.30	18.63	[17]

312	Alder leaves	3.40	89.40	7.20	19.43	[17]
313	Almond tree leaves	3.51	87.19	9.30	17.56	[17]
314	Apple tree leaves	16.10	71.90	12.00	17.51	[17]
315	Ash tree leaves	10.16	77.70	12.10	17.17	[17]
316	Avocado leaves	22.67	70.00	6.90	17.99	[17]
317	Bamboo leaves	16.90	76.00	7.00	18.11	[17]
318	Black poplar leaves	21.04	71.20	7.80	18.17	[17]
319	Boj leaves	3.60	89.90	6.50	20.72	[17]
320	Camellia leaves	5.90	85.00	9.10	17.34	[17]
321	Chestnut tree leaves	22.69	72.41	4.90	18.76	[17]
322	Cypress leaves	17.27	74.10	8.60	19.54	[17]
323	Elder leaves	13.99	70.00	16.00	16.50	[17]
324	Feijoa leaves	22.10	71.20	6.70	17.81	[17]
325	Fig. tree leaves	15.51	67.10	17.40	14.38	[17]
326	Grapevine leaves	17.40	72.40	10.20	17.09	[17]
327	Hazelnut tree leaves	13.43	79.00	8.00	17.87	[17]
328	Horse chestnut tree leaves	22.30	67.00	10.70	16.79	[17]
329	Leilandi leaves	16.09	76.00	7.70	19.73	[17]
330	Lemon tree leaves	14.42	74.70	10.90	16.35	[17]
331	Mandarin tree leaves	15.53	69.50	15.00	15.53	[17]
332	Medlar tree leaves	18.77	73.20	8.00	18.30	[17]
333	Mimosa leaves	19.04	73.10	7.90	19.44	[17]
334	Orange tree leaves	11.45	73.20	15.40	16.17	[17]
335	Peach tree leaves	14.67	75.00	10.20	18.34	[17]
336	Pear tree leaves	15.73	77.90	6.40	18.93	[17]
337	Persimmon tree leaves	1.80	84.00	14.20	16.03	[17]
338	Plagano maple tree leaves	3.02	86.00	10.50	18.17	[17]
339	Plum tree leaves	18.80	71.00	10.20	17.93	[17]
340	Raspberry leaves	21.24	68.60	10.20	17.40	[17]
341	White magnolia leaves	13.55	75.00	11.00	17.51	[17]
342	Coconut fiber	11.10	80.85	8.05	19.23	[20]
343	Sal seed husk	28.06	62.54	9.40	20.60	[14]
344	Bamboo dust	9.30	74.20	16.50	15.89	[14]
345	Rice Hulls	15.80	63.60	20.60	14.89	[18]
346	Eucalyptus saw dust	16.20	83.60	0.20	18.50	[14]
347	Saw dust	25.00	72.40	2.60	20.93	[14]
348	Saw dust + musturd	11.90	55.40	32.70	13.73	[14]
349	Olive husk	26.10	70.30	3.60	19.00	[10]
350	Almond hulls	20.07	73.80	6.13	18.89	[21]
351	Rice husk bran	19.53	61.83	18.64	15.29	[21]
352	Rice husk patni-23	14.90	69.30	15.80	15.67	[21]
353	Rice husk	8.48	58.22	24.71	14.08	[27]
354	Rice husk	16.95	61.81	21.24	14.69	[21]
355	Rice husk	13.30	73.00	13.70	15.90	[17]

356	Broad bean husk	8.68	85.44	5.88	16.07	[21]
357	Coffe husk	19.10	78.50	2.40	19.80	[21]
358	sunflower seed husk	19.30	75.10	5.60	20.65	[35]
359	Eucalyptus sawdust	15.38	83.70	0.90	18.05	[17]
360	Sawdust from olive tree	16.10	79.70	4.20	20.79	[15]
361	Sawdust	9.35	55.03	0.69	12.63	[18]
362	Green bean stem and husk	12.52	77.88	9.60	16.86	[32]
363	Red lentil hull	20.03	74.73	5.24	18.27	[32]
364	Chickpea husk	16.32	79.70	3.98	18.26	[32]
365	Broad bean husk	17.33	74.97	7.70	16.24	[32]
366	Cacao husk	20.56	75.03	4.41	17.85	[32]
367	Peanut husk	20.53	79.32	0.15	19.16	[32]
368	Broad bean husk	19.40	74.88	5.73	16.80	[32]
369	Wood sawdust	16.40	83.00	0.60	18.21	[17]
370	Cocoa pod husks	10.96	61.73	16.24	12.48	[38]
371	Bean husk	18.22	74.00	8.00	15.11	[17]
372	Cocoa beans husk	21.04	69.00	9.96	17.31	[17]
373	Coffee husk	18.00	76.20	5.80	18.33	[17]
374	Green bean husk	9.10	81.00	9.90	15.63	[17]
375	Pea husk	12.50	83.00	4.50	15.46	[17]
376	Seed husk	18.10	80.00	1.90	18.00	[17]
377	Mentha piperita	7.50	79.00	13.50	15.15	[14]
378	Grewia optiva	14.20	85.50	0.30	18.00	[14]
379	Water hyacinth	1.90	87.30	10.80	14.81	[14]
380	Ceder cones	28.10	70.40	1.50	21.10	[14]
381	Camphor	12.53	79.02	1.78	18.40	[34]
382	Rapeseed	5.60	86.27	8.13	16.61	[21]
383	Pepper plant	20.86	64.71	14.44	15.39	[21]
384	Sugarcane	14.95	73.78	11.27	17.33	[21]
385	Vine shoots	21.49	74.79	3.72	17.94	[35]
386	Biomass Mix	18.14	69.36	12.49	18.40	[22]
387	Elaeagnus	22.67	76.43	0.90	19.80	[32]
388	Cotton cake	11.58	83.65	4.77	17.50	[21]
389	Soybean cake	16.00	76.86	7.14	18.30	[21]
390	Olive cake	34.60	62.10	2.80	21.60	[21]
391	Moringa cakes	8.26	75.08	6.28	20.47	[27]
392	Oil palm decanter cake	12.75	72.13	14.79	17.00	[37]
393	Oil palm roots	22.28	68.32	8.49	16.30	[37]
394	Pine cone	17.48	80.92	1.60	20.07	[32]
395	American oak acorn	20.80	74.00	3.20	17.37	[17]
396	Cherry-laurel fruit	14.90	80.80	4.30	19.03	[17]
397	Cypress fruit	23.50	71.80	4.70	20.17	[17]
398	Eucalyptus fruit	21.70	73.60	4.70	18.52	[17]
399	Fern	17.05	79.00	4.10	18.05	[17]

400	Horse chestnut burr	24.60	70.00	5.40	17.17	[17]
401	Walnut tree fruit	21.80	71.00	7.20	17.64	[17]
402	Apricot pulp	20.12	78.80	1.08	18.52	[32]
403	Peach pulp	23.34	71.21	5.44	18.23	[32]
404	Apple pulp	15.13	82.56	2.31	19.85	[32]
405	Locust bean	24.16	70.29	5.54	18.04	[32]
406	Thyme	16.00	75.04	8.96	18.16	[32]
407	Soybean residue	13.54	80.01	6.45	19.26	[32]
408	Tobacco waste	11.78	72.85	15.36	14.51	[32]
409	Olive Residue	25.48	67.35	7.17	21.74	[22]
410	Chicken litter	14.40	47.82	37.79	14.90	[22]
411	Chicken Manure	13.23	66.05	20.72	15.39	[18]
412	Dairy Free Stall Manure	7.40	30.10	62.50	8.48	[18]
413	Agri-wastes	19.93	71.63	8.43	18.23	[33]
414	Tea waste	13.60	85.00	1.40	17.10	[10]
415	Bamboo stick waste	47.70	12.70	39.60	17.66	[14]
416	Fly ash (Bagasse fuel)	19.80	8.10	72.10	8.39	[14]
417	Pine needle (40% clay)	13.20	9.09	77.70	5.70	[14]
418	Cotton gin trash	15.40	75.40	9.20	15.58	[18]
419	Cotton gin waste	14.97	83.41	1.61	17.48	[14]
420	Alabama oak wood waste	21.90	74.70	3.30	19.23	[14]
421	Urban Wood Waste	12.58	52.56	4.08	13.46	[18]
422	White fir	16.58	83.17	0.25	19.95	[14]
423	Tan oak	9.20	90.60	0.20	18.93	[14]
424	Industrial waste	20.10	75.10	4.80	18.93	[14]
425	Poultry pure waste	25.90	14.30	59.80	11.71	[14]
426	Municipal solid waste- Bareilly	5.00	25.00	70.00	5.63	[14]
427	Other waste materials	8.96	55.93	35.11	13.91	[33]
428	Millet grain waste	14.50	77.10	8.40	15.21	[21]
429	Municipal solid waste Moradabad	4.00	35.70	60.30	7.18	[21]
430	Tannery waste	1.00	45.00	54.00	7.69	[21]
431	Vegetable food waste	16.35	78.77	4.88	19.23	[21]
432	Cotton residue	20.59	72.80	6.61	16.90	[31]
433	Sludge	6.09	57.22	31.27	15.59	[34]
434	Sludge C1	8.61	53.01	38.38	13.92	[40]
435	Sludge C2	6.73	51.24	42.03	13.18	[40]
436	Sludge C4	4.05	47.58	48.37	11.02	[40]
437	Sludge H1	5.14	55.47	39.39	13.34	[40]
438	Sludge H2	6.84	52.57	40.60	12.77	[40]
439	Sludge H4	3.86	50.42	45.72	11.14	[40]
440	Sludge sample 2	11.50	72.50	16.00	20.90	[40]
441	Sludge sample 4	9.70	59.30	31.00	16.80	[40]
442	Sludge sample 6	5.90	50.80	43.30	13.30	[40]

443	Sludge sample 7	2.40	60.70	36.90	16.60	[40]
444	Oil palm sewage sludge	11.42	51.70	36.43	11.19	[37]
445	I pil I pil	17.70	79.90	2.40	20.22	[21]
446	Marrabu	17.20	81.30	1.50	20.72	[21]
447	RDF	17.60	72.00	10.40	19.50	[21]
448	Holm oak residues	17.60	80.60	2.40	20.57	[35]
449	Wood waste	19.59	79.00	1.60	17.84	[17]
450	Apple	18.40	79.00	2.60	15.10	[17]
451	Apple rind	20.90	76.90	2.20	16.17	[17]
452	Building waste chips	13.20	86.00	0.80	18.28	[17]
453	Cherry tomato plant waste	2.28	75.12	22.60	14.01	[17]
454	Chestnut tree shaving	20.60	79.00	0.40	17.62	[17]
455	Courgette waste	1.00	65.00	34.00	12.73	[17]
456	Grapevine waste	13.70	73.00	13.30	16.47	[17]
457	Lemon rind	17.10	73.20	9.70	17.18	[17]
458	Mandarin rind	21.20	75.00	3.80	15.53	[17]
459	Orange rind	28.20	68.30	3.50	16.72	[17]
460	Pea plant waste	15.89	78.00	5.80	17.35	[17]
461	Pepper plant waste	4.00	73.10	22.90	13.66	[17]
462	Pine shaving	14.20	85.00	0.80	19.79	[17]
463	Potato plant waste	14.73	69.00	15.80	15.07	[17]
464	Tomato plant waste	5.98	78.00	16.20	14.15	[17]
465	Vine orujillo	8.30	79.00	12.70	17.74	[17]
466	Orange waste	23.60	74.10	2.30	19.40	[39]
467	Lignite L12	26.54	37.42	36.04	17.43	[19]
468	Charcoal	61.80	29.59	3.96	23.46	[21]
469	Wood pellets	17.08	82.00	1.30	18.22	[17]
470	Oak tree	17.40	78.40	4.20	17.72	[17]
471	Waste material	16.80	78.70	4.50	17.10	[10]
472	Sludge sample 1	9.80	60.70	29.50	16.60	[40]
473	CF-250	16.37	75.58	8.05	21.03	[20]
474	Redwood char (790-1020°F)	67.70	30.00	2.30	28.84	[14]
475	Oak char (820-1185°F)	59.30	25.80	14.90	24.80	[14]
476	Coconut shell char (750°C)	87.17	9.93	2.90	31.12	[14]
477	QrC550	82.20	14.70	3.10	32.72	[15]
478	PhC300	31.30	68.10	0.60	22.84	[15]
479	EsC700	91.50	6.60	1.90	32.20	[15]
480	OsC600	82.10	11.30	6.60	31.87	[15]
481	AsC600	86.50	9.80	3.70	32.60	[15]
482	PhC600	84.90	13.40	1.70	31.91	[15]
483	QrC300	33.40	65.10	1.50	23.13	[15]
484	Rice husk char	41.20	5.90	52.90	14.94	[14]
485	Rose apple char	12.20	22.20	65.60	7.58	[14]
486	Lignite char	72.60	13.30	14.10	27.37	[15]

487	CC1	62.40	24.50	13.10	27.10	[15]
488	CC3	76.70	20.40	2.90	29.41	[15]
489	CC4	76.80	17.40	5.80	31.18	[15]
490	CC5	73.40	16.10	10.50	30.21	[15]
491	CF-200	15.04	78.26	6.70	19.93	[20]
492	CF-300	25.71	64.21	10.08	23.80	[20]
493	CF-330	28.38	60.64	10.98	25.36	[20]
494	PW-200	18.62	80.43	0.95	20.74	[20]
495	PW-250	23.09	75.84	1.07	21.06	[20]
496	PW-330	47.90	50.71	1.39	24.49	[20]
497	Bamboo char-300°C	65.16	30.92	3.92	25.43	[6]
498	Bamboo char-500°C	75.39	20.53	4.08	28.15	[6]
499	Bamboo char-600°C	82.83	12.92	4.25	28.97	[6]
500	Bamboo char-700°C	86.37	9.37	4.26	29.56	[6]

Table S3. Measured HHV, Proximate analysis (%FC, %VM, %ASH) on a dry basis, for model validation.

N°	Raw material	Proximate analysis			Measured	Reference
		% by wt. dry basis			HHV	
		FC	VM	ASH		
1	Coal sample	30.00	30.00	40.00	14.77	[14]
2	Low-Sulfur Coal	42.15	37.56	5.63	25.35	[18]
3	Lignite L06	41.40	40.98	17.62	23.74	[19]
4	Lignite L08	34.83	54.03	11.14	23.16	[19]
5	Charcoal	68.10	23.00	2.70	21.63	[21]
6	Coal	52.09	35.41	12.50	28.55	[22]
7	Ply wood	15.77	82.14	2.09	18.96	[21]
8	Cotton gin by-products pellets	47.65	46.89	5.58	18.41	[26]
9	Pine pellets	15.20	83.50	1.30	18.84	[17]
10	100WGP pellet	24.73	67.80	7.47	19.54	[24]
11	25WGP75PYO pellet	17.11	78.41	4.48	19.27	[24]
12	Pistachio shell	16.20	82.50	1.30	17.35	[24]
13	Coconut shell	19.40	79.20	1.40	18.88	[17]
14	Corn cob	16.80	82.10	1.10	18.80	[14]
15	Corn cob	7.60	80.72	2.96	16.99	[27]
16	Corn Stover	15.64	71.08	7.05	16.49	[18]
17	Almond shell	14.82	81.70	3.48	19.53	[32]
18	Peanut shell	16.50	81.00	2.50	20.09	[17]
19	Olive stone	20.35	78.30	1.40	17.88	[17]
20	Apricot stone	16.26	82.03	1.61	19.79	[32]
21	Peach stone	20.79	78.16	1.05	19.52	[21]

22	Hazeinut shell	28.30	69.30	1.40	19.30	[10]
23	Palm kernel shell	15.15	73.77	11.08	16.30	[11]
24	Palm kernel shell	23.00	74.00	3.00	17.58	[11]
25	Empty fruit bunch	16.80	77.10	6.10	16.80	[11]
26	Almond shells	18.73	77.22	4.05	17.96	[21]
27	Coconut shell	20.92	70.86	0.58	20.43	[21]
28	Peanut shell	13.60	80.41	5.99	18.46	[21]
29	Pistachio shell	16.95	81.64	1.41	18.22	[21]
30	Olive kernel A	24.78	72.64	2.58	18.90	[31]
31	Thin-shelled walnut (TSW)	26.10	73.90	4.27	18.45	[30]
32	Walnut shells	18.75	78.04	0.64	17.84	[29]
33	Eucalyptus- Grandis	16.93	82.55	0.52	19.35	[14]
34	Pinus halepensis	17.00	82.50	0.50	20.22	[15]
35	Douglass fir	25.80	73.00	1.20	22.10	[21]
36	Eucalyptus camaldulensis	17.82	81.42	0.76	19.42	[21]
37	Eucalyptus log	8.05	82.78	0.37	17.99	[21]
38	Hybrid poplar	12.49	84.81	2.70	19.02	[21]
39	Oak wood (large branch)	16.18	81.75	2.07	19.17	[21]
40	Black poplar	15.33	89.00	4.00	18.41	[17]
41	Medlar tree	17.60	74.00	8.40	17.65	[17]
42	Pine wood	13.15	85.45	1.40	19.83	[20]
43	Eucalyptus chips	19.10	79.00	1.90	16.84	[17]
44	Pine chips	17.80	81.60	0.60	19.43	[17]
45	Wood chips	23.50	76.40	0.10	19.92	[14]
46	Loblolly Pine	33.90	65.70	0.40	21.77	[14]
47	Eucalyptus bark	16.80	77.00	6.20	16.24	[17]
48	Wood bark	31.80	66.60	1.60	20.50	[10]
49	Straw	11.90	82.00	6.10	16.92	[17]
50	Rice straw	13.91	65.70	20.38	14.85	[21]
51	Corn straws	9.70	75.02	6.13	16.24	[27]
52	Wheat straw	10.98	82.12	6.90	17.99	[21]
53	Cotton stalk	18.80	76.10	5.10	17.40	[21]
54	Sunflower stem	13.81	75.09	11.10	16.18	[32]
55	Coconut coir pith	28.82	66.02	5.16	18.07	[21]
56	Bagasse	11.90	86.30	1.80	18.17	[14]
57	Sugarcane bagasse	13.15	83.66	3.20	18.73	[21]
58	Palm mesocarp fiber	19.72	9.57	9.57	16.63	[11]
59	Carrington switch grass	18.70	76.60	4.80	18.45	[21]
60	Streeter intermediate wheatgrass	17.90	74.40	7.80	18.08	[21]
61	Streeter tall wheatgrass	18.20	73.80	8.00	17.90	[21]
62	Pine cone leaf	22.20	75.90	1.90	18.45	[17]
63	Cherry tree leaves	21.60	71.00	7.40	17.73	[17]
64	Eucalyptus leaves	17.11	75.30	7.60	20.04	[17]

65	Oak tree leaves	24.19	72.00	3.80	17.52	[17]
66	Palm tree leaves	21.22	75.70	3.05	19.53	[17]
67	Walnut tree leaves	23.29	66.80	9.90	17.53	[17]
68	Willow leaves	19.10	74.00	6.50	17.94	[17]
69	Rice husk	16.30	61.20	22.50	16.47	[21]
70	Sawdust	17.40	81.00	1.60	18.02	[17]
71	Cocoa pod husks	16.80	58.46	13.21	18.10	[38]
72	Esparto plant	16.80	80.50	2.20	19.10	[21]
73	Caster seed cake	25.20	67.90	6.90	21.01	[21]
74	Jatropha cakes	10.97	72.53	6.47	21.24	[27]
75	Horse chestnut	20.60	75.40	4.00	17.89	[17]
76	Oak acorn	22.30	75.10	2.60	16.17	[17]
77	Sheep Manure	14.00	65.10	20.90	16.04	[18]
78	Tannary waste	1.00	45.00	54.00	7.69	[14]
79	Cotton gin trash	15.10	67.30	17.60	16.42	[14]
80	Municipal solid waste-Morada	4.00	35.70	60.30	7.18	[14]
81	Sludge C3	6.99	49.98	43.03	12.56	[40]
82	Sludge C5	5.96	42.25	51.79	10.14	[40]
83	Sludge H3	6.47	47.68	45.86	12.39	[40]
84	Sludge sample 3	12.80	60.60	26.60	17.10	[40]
85	Sludge sample 5	10.70	58.50	30.80	16.60	[40]
86	RDF	14.31	81.22	4.48	18.19	[21]
87	Eucalyptus residues	23.50	74.10	2.40	20.18	[35]
88	WsC600	63.50	11.80	24.70	24.49	[15]
89	QrC600	83.60	13.20	3.20	32.65	[15]
90	CC2	68.60	23.10	8.30	27.98	[15]
91	Oil palm frond	79.37	20.63	25.60	17.67	[11]
92	Pratt Seam Bituminous Coal	62.64	24.93	11.28	31.43	[18]
93	Lignite L09	47.47	38.31	14.22	29.98	[19]
94	PGW	5.64	62.56	31.79	22.20	[22]
95	White mulberry pruning	30.87	64.00	5.00	13.17	[17]
96	Vine shoot waste	31.90	64.00	4.10	13.29	[17]
97	PW-300	40.37	58.34	1.29	22.60	[20]
98	Bamboo char-400°C	71.51	25.16	3.33	27.46	[6]

Table S4. Measured HHV, proximate analysis on a dry basis for model fit that includes moisture content as an additional variable.

N°	Raw material	Proximate analysis				Measured	Reference
		% by wt. dry basis					
		FC	VM	ASH	M	HHV	
1	Coal	56.41	18.18	22.24	3.17	27.28	[22]
2	Gulf Coast Lignite	29.16	31.58	12.52	26.74	17.71	[18]

3	Black Thunder Subbituminous	34.94	30.72	5.19	29.15	20.67	[18]
4	Central Appalachian (Long Fork)	50.09	31.23	11.52	7.16	28.18	[18]
5	Illinois #6	44.98	35.32	7.43	12.27	27.29	[18]
6	High-Sulfur Coal	41.94	34.43	9.66	13.97	25.85	[18]
7	Pratt Seam Bituminous Coal	62.64	24.93	11.28	1.15	31.43	[18]
8	Lignite L01	27.72	38.32	33.96	8.97	15.63	[19]
9	Lignite L02	31.76	24.95	43.29	4.05	18.10	[19]
10	Lignite L03	18.24	47.96	33.80	24.43	16.47	[19]
11	Lignite L04	43.48	44.56	11.96	10.03	27.02	[19]
12	Lignite L05	45.31	41.77	12.92	11.31	25.00	[19]
13	Lignite L07	32.06	55.02	12.92	25.32	23.92	[19]
14	Lignite L09	47.47	38.31	14.22	1.32	29.98	[19]
15	Lignite L10	22.93	47.57	29.50	29.29	19.05	[19]
16	Lignite L11	40.50	51.89	7.61	6.58	26.78	[19]
17	Lignite L13	8.73	54.57	36.70	28.04	16.28	[19]
18	Lignite L15	27.50	51.64	20.86	29.19	19.85	[19]
19	Lignite L14	39.37	52.05	8.58	26.84	24.08	[19]
20	Ptolemais lignite	39.28	47.71	13.01	18.80	16.90	[31]
21	Vegetal coal	68.10	26.00	5.90	5.29	29.71	[17]
22	CBPs	18.19	70.51	6.10	5.20	17.80	[23]
23	Cotton gin by-products pellets	48.05	47.00	5.22	8.25	18.29	[26]
24	Cotton gin by-products pellets	49.19	46.09	4.88	7.82	20.81	[26]
25	Cotton gin by-products pellets	42.80	47.59	9.75	9.85	17.97	[26]
26	Cotton gin by-products pellets	44.74	47.17	8.17	9.73	17.90	[26]
27	Cotton gin by-products pellets	45.56	46.54	7.72	9.68	20.93	[26]
28	Wood pellets	55.59	43.85	0.49	5.22	19.72	[17]
29	Beet root pellets	15.00	76.00	9.00	12.50	15.10	[17]
30	Briquette	14.20	85.00	0.80	5.84	18.49	[17]
31	Pine and pine apple leaf pellets	21.80	75.00	3.20	8.20	18.15	[17]
32	Straw pellets	11.20	79.00	9.80	7.30	16.58	[17]
33	TW pellet	21.03	74.78	4.19	9.58	17.39	[25]
34	EFB pellet	15.39	83.76	0.86	8.69	16.74	[25]
35	TW-EFB pellet (50:50)	18.21	79.32	2.46	9.06	16.99	[25]
36	75WGP25PYO pellet	23.05	70.43	6.52	7.10	19.51	[24]
37	50WGP50PYO pellet	21.31	73.48	5.22	7.36	19.48	[24]
38	100PYO pellet	12.65	83.64	3.71	7.34	19.13	[24]
39	Pine kernel shell	19.70	77.60	2.70	8.33	18.89	[17]
40	Walnut shell	18.70	79.00	2.30	8.70	18.38	[17]
41	Corn cob	14.60	83.00	2.40	7.00	17.69	[14]
42	Corncob	12.50	86.50	1.00	12.10	17.00	[10]

43	Corn Stover	19.80	76.10	4.10	65.20	16.84	[18]
44	Cornstover	17.60	78.70	3.70	10.60	17.80	[10]
45	Soft almond shell	21.10	75.80	3.10	8.30	18.01	[17]
46	Almond shell	15.80	82.00	2.20	8.68	18.28	[17]
47	Peach stone	23.90	75.60	0.50	8.55	19.59	[17]
48	Plum stone	21.20	77.00	1.80	9.13	19.14	[17]
49	Date stone	16.60	82.00	1.40	9.40	18.15	[17]
50	Nectarine stone	22.90	76.00	1.10	8.20	19.56	[17]
51	Cherry stone	14.13	85.00	0.87	7.57	19.07	[17]
52	Avocado pear stone	26.00	72.00	2.00	16.70	15.18	[17]
53	Hazelnut seedcoat	27.00	71.20	1.80	6.80	19.30	[10]
54	Hazelnut shell	20.80	77.00	2.20	8.74	18.87	[17]
55	Palm kernels	17.59	77.28	5.14	11.01	20.71	[22]
56	Olive kernel B	24.25	73.62	2.13	7.12	19.90	[31]
57	Chestnut shell	29.10	67.00	3.90	24.40	14.31	[17]
58	Barley	20.10	76.90	3.00	9.90	16.52	[17]
59	Maize	19.05	78.90	2.10	11.10	16.43	[17]
60	Oats bran	18.85	77.00	4.15	9.90	18.06	[17]
61	Rye	19.30	78.90	1.80	10.76	16.14	[17]
62	Soya	18.20	77.00	4.80	10.90	16.71	[17]
63	Wheat	17.20	80.00	2.80	10.30	16.33	[17]
64	Wheat bran	18.50	78.00	3.50	9.00	17.37	[17]
65	Pine cone heart	23.10	66.00	3.50	23.10	16.44	[17]
66	Paper-shelled walnut (PSW)	25.20	74.80	4.80	9.26	14.54	[30]
67	Medium-shelled walnut (MSW)	26.00	74.00	5.84	8.19	13.80	[30]
68	Hard-shelled walnut (HSW)	20.20	79.80	2.01	8.26	14.20	[30]
69	Hornbeam shell	9.37	78.83	9.52	2.28	19.60	[28]
70	Parinari fruit shell	14.51	78.17	4.67	2.65	20.47	[27]
71	Empty fruit bunches	15.43	79.16	5.48	8.93	18.18	[37]
72	Oil palm shell	26.14	72.58	1.35	8.92	18.72	[37]
73	Softwood	28.10	70.00	1.70	8.80	20.00	[10]
74	Spruce wood	28.30	70.20	1.50	7.60	20.10	[10]
75	PGW	5.64	62.56	31.79	2.50	22.20	[22]
76	MBM	12.71	63.31	23.95	2.50	18.59	[22]
77	Beech wood	24.60	74.00	1.40	7.40	19.20	[10]
78	Ailanthus wood	24.80	73.50	1.70	8.10	19.00	[10]
79	Hardwood	25.00	72.30	2.70	7.80	18.80	[10]
80	B-wood	21.62	76.53	1.85	9.08	20.05	[22]
81	Black poplar wood	12.28	86.00	1.50	7.18	18.39	[17]
82	Forest residue	20.00	79.80	0.20	7.32	19.50	[31]
83	Gorse	50.17	45.20	5.00	43.00	18.60	[17]
84	Miscanthus	11.40	79.00	9.60	7.53	18.07	[17]
85	Oats and vetch	20.67	72.00	7.33	7.80	16.66	[17]

86	Sainfoin	17.80	73.00	9.20	9.60	16.41	[17]
87	Sorghum	21.00	62.00	17.00	6.10	11.87	[17]
88	Triticale	18.80	75.00	6.20	9.80	16.65	[17]
89	Alder	21.45	74.00	4.50	7.40	20.08	[17]
90	Almond tree	19.00	75.60	5.40	7.10	18.35	[17]
91	Apple tree	21.00	74.00	5.00	7.70	17.82	[17]
92	Bamboo	17.33	81.47	1.20	7.93	18.27	[17]
93	Camellia	17.82	78.00	4.20	9.00	17.83	[17]
94	Cherry tree	21.50	74.00	4.40	7.70	19.36	[17]
95	Chestnut tree	22.52	74.00	3.50	9.10	16.80	[17]
96	Fig. tree	19.53	73.10	7.40	11.10	17.52	[17]
97	Grapevine	20.90	71.50	7.60	10.40	16.82	[17]
98	Hazelnut tree	15.42	80.60	4.00	8.54	18.19	[17]
99	Horse chestnut tree	19.60	73.50	6.90	8.80	17.47	[17]
100	Kiwi	21.48	74.00	4.50	8.20	17.81	[17]
101	Lemon tree	18.61	76.70	4.70	8.40	17.56	[17]
102	Mimosa	21.00	75.00	4.00	8.28	17.75	[17]
103	Orange tree	16.89	79.00	4.50	8.00	16.31	[17]
104	Peach tree	22.20	74.00	3.80	8.10	17.67	[17]
105	Pear tree	19.98	74.60	6.40	10.30	17.46	[17]
106	Plum tree	21.40	72.00	6.60	9.42	17.56	[17]
107	Chinese fir	16.68	74.49	1.20	7.63	18.38	[17]
108	White mulberry pruning	30.87	64.00	5.00	33.00	13.17	[17]
109	Grapevine pruning	30.70	64.00	5.30	32.30	17.78	[17]
110	Oak tree pruning	18.70	77.00	4.30	9.80	17.59	[17]
111	Olive tree pruning	9.00	78.00	13.00	8.70	17.34	[17]
112	Orchard Prunings	17.84	80.75	1.41	20.00	16.82	[18]
113	Vineyard Prunings	14.71	83.91	1.38	20.00	19.05	[18]
114	Vine shoot chips	24.30	66.00	9.70	22.00	14.63	[17]
115	Chestnut tree chips	20.50	78.20	1.30	9.83	17.49	[17]
116	Wood chips	29.90	68.60	1.50	25.60	15.16	[17]
117	Hazelnut and alder chips	18.00	77.00	5.00	9.50	17.56	[17]
118	Pine and eucalyptus chips	24.80	71.60	3.60	13.40	16.99	[17]
119	Pine chips	21.65	72.40	5.95	7.60	19.79	[22]
120	Holm oak branch chips	17.70	74.90	7.40	11.10	17.18	[17]
121	Black poplar bark	20.76	71.00	8.00	9.80	17.41	[17]
122	Avocado pear peel	14.90	82.00	3.10	9.87	18.74	[17]
123	Pomegranate peel	25.20	68.00	6.80	14.00	15.17	[17]
124	Rice straw	1.33	45.68	45.76	7.23	12.26	[27]
125	Rice straw	13.51	64.59	15.34	6.56	14.64	[34]
126	Corn straw	19.19	73.15	7.65	7.44	17.68	[22]
127	Rape straw	17.81	76.54	4.65	8.68	18.34	[22]
128	Wheat straw	18.19	76.00	5.30	7.70	17.34	[21]

129	Barley straw	16.00	77.90	6.10	9.80	17.37	[17]
130	Rye straw	16.90	79.90	3.20	8.70	17.11	[17]
131	Tobacco stalk	18.00	79.60	2.40	8.90	17.70	[10]
132	Oil palm trunk	16.17	79.98	3.69	8.21	16.11	[37]
133	Switchgrass	12.18	65.19	7.63	15.00	15.35	[17]
134	Mechanically Harvested Switchgrass	15.49	69.03	5.95	9.53	17.06	[17]
135	Manually Harvested Switchgrass	5.39	81.79	3.93	8.89	17.26	[20]
136	Mulch Hay	17.10	77.60	5.30	19.50	18.74	[18]
137	Sugarcane bagasse	8.12	79.45	3.91	8.52	16.88	[27]
138	Tobacco leaf	11.20	72.60	17.20	8.40	15.00	[17]
139	Oil palm fronds	17.87	78.90	3.12	8.11	15.81	[32]
140	Oil palm fiber	18.24	75.43	5.82	9.53	18.20	[32]
141	Pine cone leaf	18.70	80.00	1.30	9.14	18.63	[17]
142	Alder leaves	3.40	89.40	7.20	6.27	19.43	[17]
143	Almond tree leaves	3.51	87.19	9.30	7.50	17.56	[34]
144	Apple tree leaves	16.10	71.90	12.00	9.30	17.51	[21]
145	Ash tree leaves	10.16	77.70	12.10	7.80	17.17	[21]
146	Avocado leaves	22.67	70.00	6.90	8.70	17.99	[21]
147	Bamboo leaves	16.90	76.00	7.00	8.10	18.11	[35]
148	Black poplar leaves	21.04	71.20	7.80	9.40	18.17	[22]
149	Boj leaves	3.60	89.90	6.50	8.06	20.72	[32]
150	Camellia leaves	5.90	85.00	9.10	8.90	17.34	[21]
151	Chestnut tree leaves	22.69	72.41	4.90	8.20	18.76	[21]
152	Cypress leaves	17.27	74.10	8.60	9.20	19.54	[21]
153	Elder leaves	13.99	70.00	16.00	10.90	16.50	[27]
154	Feijoa leaves	22.10	71.20	6.70	6.90	17.81	[17]
155	Fig. tree leaves	15.51	67.10	17.40	13.00	14.38	[17]
156	Grapevine leaves	17.40	72.40	10.20	8.90	17.09	[17]
157	Hazelnut tree leaves	13.43	79.00	8.00	9.10	17.87	[17]
158	Horse chestnut tree leaves	22.30	67.00	10.70	11.70	16.79	[17]
159	Leilandi leaves	16.09	76.00	7.70	8.40	19.73	[17]
160	Lemon tree leaves	14.42	74.70	10.90	8.09	16.35	[32]
161	Mandarin tree leaves	15.53	69.50	15.00	12.50	15.53	[32]
162	Medlar tree leaves	18.77	73.20	8.00	7.60	18.30	[32]
163	Mimosa leaves	19.04	73.10	7.90	7.80	19.44	[32]
164	Orange tree leaves	11.45	73.20	15.40	9.20	16.17	[32]
165	Peach tree leaves	14.67	75.00	10.20	7.44	18.34	[32]
166	Pear tree leaves	15.73	77.90	6.40	8.90	18.93	[32]
167	Persimmon tree leaves	1.80	84.00	14.20	9.40	16.03	[22]
168	Plagano maple tree leaves	3.02	86.00	10.50	9.00	18.17	[22]
169	Plum tree leaves	18.80	71.00	10.20	8.10	17.93	[18]
170	Raspberry leaves	21.24	68.60	10.20	10.80	17.40	[18]
171	White magnolia leaves	13.55	75.00	11.00	7.70	17.51	[33]

172	Rice Hulls	15.80	63.60	20.60	7.00	14.89	[14]
173	Olive husk	26.10	70.30	3.60	9.20	19.00	[14]
174	Rice husk	8.48	58.22	24.71	8.59	14.08	[21]
175	Rice husk	13.30	73.00	13.70	7.27	15.90	[21]
176	Eucalyptus sawdust	15.38	83.70	0.90	7.70	18.05	[40]
177	Sawdust	9.35	55.03	0.69	34.93	12.63	[40]
178	Wood sawdust	16.40	83.00	0.60	9.20	18.21	[35]
179	Cocoa pod husks	10.96	61.73	16.24	11.07	12.48	[38]
180	Bean husk	18.22	74.00	8.00	9.99	15.11	[17]
181	Cocoa beans husk	21.04	69.00	9.96	8.80	17.31	[17]
182	Coffee husk	18.00	76.20	5.80	9.60	18.33	[17]
183	Green bean husk	9.10	81.00	9.90	8.70	15.63	[17]
184	Pea husk	12.50	83.00	4.50	11.80	15.46	[17]
185	Seed husk	18.10	80.00	1.90	8.20	18.00	[17]
186	Camphor	12.53	79.02	1.78	6.67	18.40	[17]
187	Biomass Mix	18.14	69.36	12.49	8.82	18.40	[39]
188	Moringa cakes	8.26	75.08	6.28	10.38	20.47	[15]
189	Oil palm decanter cake	12.75	72.13	14.79	10.38	17.00	[15]
190	American oak acorn	20.80	74.00	3.20	8.92	17.37	[15]
191	Cherry-laurel fruit	14.90	80.80	4.30	14.90	19.03	[15]
192	Cypress fruit	23.50	71.80	4.70	10.30	20.17	[15]
193	Eucalyptus fruit	21.70	73.60	4.70	11.70	18.52	[15]
194	Fern	17.05	79.00	4.10	12.30	18.05	[15]
195	Horse chestnut burr	24.60	70.00	5.40	9.20	17.17	[15]
196	Walnut tree fruit	21.80	71.00	7.20	9.60	17.64	[15]
197	Olive Residue	25.48	67.35	7.17	10.63	21.74	[17]
198	Chicken litter	14.40	47.82	37.79	9.29	14.90	[21]
199	Chicken Manure	13.23	66.05	20.72	25.30	15.39	[21]
200	Dairy Free Stall Manure	7.40	30.10	62.50	69.80	8.48	[21]
201	Tea waste	13.60	85.00	1.40	6.50	17.10	[21]
202	Cotton gin trash	15.40	75.40	9.20	7.00	15.58	[21]
203	Urban Wood Waste	12.58	52.56	4.08	30.78	13.46	[21]
204	Cotton residue	20.59	72.80	6.61	2.62	16.90	[19]
205	Sludge	6.09	57.22	31.27	5.42	15.59	[21]
206	Sludge C1	8.61	53.01	38.38	6.10	13.92	[26]
207	Sludge C2	6.73	51.24	42.03	5.10	13.18	[17]
208	Sludge C4	4.05	47.58	48.37	6.40	11.02	[27]
209	Sludge H1	5.14	55.47	39.39	6.60	13.34	[10]
210	Sludge H2	6.84	52.57	40.60	5.60	12.77	[33]
211	Sludge H4	3.86	50.42	45.72	6.90	11.14	[11]
212	Sludge sample 2	11.50	72.50	16.00	5.00	20.90	[11]
213	Sludge sample 4	9.70	59.30	31.00	4.30	16.80	[21]
214	Sludge sample 6	5.90	50.80	43.30	8.50	13.30	[21]
215	Sludge sample 7	2.40	60.70	36.90	78.10	16.60	[21]

216	Oil palm sewage sludge	11.42	51.70	36.43	14.42	11.19	[21]
217	Wood waste	19.59	79.00	1.60	10.10	17.84	[21]
218	Apple	18.40	79.00	2.60	10.10	15.10	[17]
219	Apple rind	20.90	76.90	2.20	12.30	16.17	[17]
220	Building waste chips	13.20	86.00	0.80	7.90	18.28	[17]
221	Cherry tomato plant waste	2.28	75.12	22.60	9.10	14.01	[20]
222	Chestnut tree shaving	20.60	79.00	0.40	8.35	17.62	[14]
223	Courgette waste	1.00	65.00	34.00	9.80	12.73	[21]
224	Grapevine waste	13.70	73.00	13.30	11.16	16.47	[21]
225	Lemon rind	17.10	73.20	9.70	10.40	17.18	[21]
226	Mandarin rind	21.20	75.00	3.80	15.30	15.53	[17]
227	Orange rind	28.20	68.30	3.50	21.50	16.72	[17]
228	Pea plant waste	15.89	78.00	5.80	8.70	17.35	[17]
229	Pepper plant waste	4.00	73.10	22.90	7.94	13.66	[17]
230	Pine shaving	14.20	85.00	0.80	9.20	19.79	[21]
231	Potato plant waste	14.73	69.00	15.80	9.90	15.07	[32]
232	Tomato plant waste	5.98	78.00	16.20	10.20	14.15	[17]
233	Vine orujillo	8.30	79.00	12.70	9.50	17.74	[14]
234	Vine shoot waste	31.90	64.00	4.10	31.40	13.29	[21]
235	Orange waste	23.60	74.10	2.30	1.50	19.40	[40]
236	Wheat straw	23.50	63.00	13.50	8.50	17.00	[10]
237	Pepper plant	20.86	64.71	14.44	6.50	15.39	[21]
238	Sludge sample 3	12.80	60.60	26.60	11.80	17.10	[40]
239	Sludge sample 5	10.70	58.50	30.80	3.90	16.60	[40]
240	Oil palm roots	22.28	68.32	8.49	11.92	16.30	[37]

Table S5. Measured HHV, proximate analysis on dry basis for model validation that includes moisture content as an additional variable.

N°	Raw material	Proximate analysis				Measured HHV	Reference
		% by wt. dry basis					
		FC	VM	A	M		
1	Low-Sulfur Coal	42.15	37.56	5.63	14.66	25.35	[18]
2	Lignite L06	41.40	40.98	17.62	17.92	23.74	[19]
3	Lignite L08	34.83	54.03	11.14	28.02	23.16	[19]
4	Lignite L12	26.54	37.42	36.04	23.67	17.43	[19]
5	Coal	52.09	35.41	12.50	9.15	28.55	[22]
6	Cotton gin by-products pellets	47.65	46.89	5.58	10.67	18.41	[26]
7	Pine pellets	15.20	83.50	1.30	6.75	18.84	[17]
8	Wood pellets	17.08	82.00	1.30	7.70	18.22	[17]
9	100WGP pellet	24.73	67.80	7.47	7.49	19.54	[24]
10	25WGP75PYO pellet	17.11	78.41	4.48	7.08	19.27	[24]
11	Pistachio shell	16.20	82.50	1.30	8.75	17.35	[17]
12	Coconut shell	19.40	79.20	1.40	8.60	18.88	[17]

13	Corn cob	7.60	80.72	2.96	8.72	16.99	[27]
14	Corn Stover	15.64	71.08	7.05	6.23	16.49	[18]
15	Peanut shell	16.50	81.00	2.50	5.10	20.09	[17]
16	Olive stone	20.35	78.30	1.40	11.00	17.88	[17]
17	Hazeinut shell	28.30	69.30	1.40	9.00	19.30	[10]
18	Olive kernel A	24.78	72.64	2.58	7.53	18.90	[31]
19	Thin-shelled walnut (TSW)	26.10	73.90	4.27	8.08	18.45	[30]
20	Walnut shells	18.75	78.04	0.64	2.57	17.84	[29]
21	Black poplar	15.33	89.00	4.00	8.40	18.41	[17]
22	Medlar tree	17.60	74.00	8.40	9.90	17.65	[17]
23	Oak tree	17.40	78.40	4.20	8.20	17.72	[17]
24	Eucalyptus chips	19.10	79.00	1.90	11.00	16.84	[17]
25	Pine chips	17.80	81.60	0.60	10.25	19.43	[17]
26	Eucalyptus bark	16.80	77.00	6.20	8.60	16.24	[17]
27	Wood bark	31.80	66.60	1.60	8.80	20.50	[10]
28	Straw	11.90	82.00	6.10	6.80	16.92	[17]
29	Corn straws	9.70	75.02	6.13	9.15	16.24	[27]
30	Pine cone leaf	22.20	75.90	1.90	9.30	18.45	[17]
31	Cherry tree leaves	21.60	71.00	7.40	10.40	17.73	[17]
32	Eucalyptus leaves	17.11	75.30	7.60	9.20	20.04	[17]
33	Oak tree leaves	24.19	72.00	3.80	9.10	17.52	[17]
34	Palm tree leaves	21.22	75.70	3.05	8.20	19.53	[17]
35	Walnut tree leaves	23.29	66.80	9.90	10.20	17.53	[17]
36	Willow leaves	19.10	74.00	6.50	7.70	17.94	[17]
37	Sawdust	17.40	81.00	1.60	11.30	18.02	[17]
38	Cocoa pod husks	16.80	58.46	13.21	11.53	18.10	[38]
39	Jatropha cakes	10.97	72.53	6.47	10.03	21.24	[27]
40	Horse chestnut	20.60	75.40	4.00	8.80	17.89	[17]
41	Oak acorn	22.30	75.10	2.60	11.90	16.17	[17]
42	Sheep Manure	14.00	65.10	20.90	47.80	16.04	[18]
43	Waste material	16.80	78.70	4.50	11.00	17.10	[10]
44	Sludge C3	6.99	49.98	43.03	5.40	12.56	[40]
45	Sludge C5	5.96	42.25	51.79	3.70	10.14	[40]
46	Sludge H3	6.47	47.68	45.86	4.60	12.39	[40]
47	Sludge sample 1	9.80	60.70	29.50	5.20	16.60	[40]