Influence of Molding Technology on Thermal Efficiencies and Pollutant Emissions from Household Solid Fuel Combustion during Cooking Activities in Chinese Rural Areas

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Table S1. PM EFs and TEs of tested briquette samples in this study.

Fuel form		**Mass Based Emissions**			**Delivered Energy Based Emissions**			**TE**
		TSP (mg/g)	**$PM_{2.5}$ (mg/g)**	**$PM_{1.0}$ (mg/g)**	**TSP (mg/kJ)**	**$PM_{2.5}$ (mg/kJ)**	**$PM_{1.0}$ (mg/kJ)**	**(%)**
Biomass briquette	Wheat straw	29.20±0.76	22.20±2.59	13.30±0.68	48.70±1.26	37.00±4.33	22.30±1.14	4.50±0.20
	Rice straw	33.20±0.13	27.10±2.07	22.00±5.03	71.70±0.28	58.57±4.48	47.30±10.90	3.80±0.20
	Maize straw	26.20±4.40	17.20±1.73	11.60±0.33	42.60±7.07	28.00±2.81	18.90±0.54	4.60±0.30
Anthracite	chunk	2.33±1.79	0.30±0.16	0.22±0.08	2.70±2.17	0.33±0.16	0.25±0.10	3.10±0.20
	Briquette	3.16±0.79	1.13±0.16	0.94±0.10	2.60±0.65	0.92±0.13	0.77±0.08	4.70±0.20
Blends with coal	Wheat straw	2.02±0.54	0.73±0.33	0.54±0.30	0.99±0.27	0.36±0.16	0.27±0.15	8.80±0.40
	Rice straw	1.83±0.63	0.73±0.04	0.43±0.18	0.75±0.26	0.30±0.01	0.17±0.07	10.70±0.40
	Maize straw	1.90±0.78	0.69±0.14	0.48±0.07	0.94±0.38	0.34±0.07	0.24±0.03	8.50±0.40

Table S2. EFs for CO, SO_2, NO_2 and CO_2 of anthracite chunks, anthracite briquette, bio-coal briquettes and corresponding mass-weighted average ones.

Fuel form		**Mass Based Emissions**				**Delivered Energy Based Emissions**			
		CO (g/g)	**SO_2 (mg/g)**	**NO_2 (mg/g)**	**CO_2 (g/g)**	**CO (g/kJ)**	**SO_2 (mg/kJ)**	**NO_2 (mg/kJ)**	**CO_2 (g/kJ)**
Biomass briquette	Wheat straw	0.41±0.01	0.01±0.01	0.40±0.05	0.40±0.09	0.08±0.02	0.02±0.01	0.87±0.10	0.67±0.14
	Rice straw	0.02±0.01	0.07±0.02	0.07±0.01	0.34±0.13	0.04±0.01	0.12±0.03	0.12±0.02	0.73±0.28
	Maize straw	0.02±0.01	0.01±0.01	0.18±0.11	0.36±0.13	0.17±0.2	0.02±0.01	0.29±0.19	0.58±0.22
Anthracite	chunks	0.36±0.01	5.04±0.10	4.85±0.09	2.84±0.13	0.26±0.01	3.67±0.02	3.48±0.13	2.14±0.14
	Briquette	0.31±0.03	4.44±0.03	4.23±0.20	2.48±0.14	0.25±0.02	3.64±0.03	3.47±0.16	2.03±0.12
Blends with coal	Wheat straw	0.07±0.01	1.73±0.13	2.20±0.04	2.00±0.13	0.03±0.01	0.88±0.06	1.12±0.02	0.98±0.06
	Rice straw	0.24±0.09	3.06±0.20	1.95±0.20	2.12±0.31	0.12±0.04	1.5±0.10	0.96±0.10	1.08±0.16
	Maize straw	0.03±0.01	0.33±0.05	2.14±0.06	2.00±0.14	0.02±0.01	0.18±0.03	1.16±0.03	1.08±0.07

Table S3. PM EFs and TEs of tested samples with different molding pressure in this study.

The molding pressure (MPa)		Received Mass Based Emissions			TE (%)	Delivered Energy Based Emissions		
		TSP (mg/g)	$PM_{2.5}$ (mg/g)	$PM_{1.0}$ (mg/g)		TSP (mg/kJ)	$PM_{2.5}$ (mg/kJ)	$PM_{1.0}$ (mg/kJ)
Maize straw	15	27.39±14.17	2.85±0.05	2.34±0.22	5.00±0.21	23.44±11.27	2.46±0.15	2.02±0.11
	20	16.40±9.59	2.85±0.34	2.54±0.03	7.12±0.43	10.13±6.42	1.74±0.31	1.54±0.07
	25	1.90±0.780	0.69±0.14	0.48±0.07	8.50±0.40	0.94±0.38	0.34±0.07	0.24±0.03
	30	12.47±2.48	3.43±0.01	3.25±0.57	7.79±0.62	6.99±1.93	1.91±0.14	1.82±0.46
	35	22.91±11.29	6.34±0.93	5.41±1.44	7.13±0.11	13.92±7.05	3.83±0.50	3.28±0.92
Wheat straw	15	10.60±1.72	3.45±0.34	3.31±0.47	5.65±0.16	8.09±1.09	2.64±0.19	2.53±0.29
	20	8.98±3.59	2.33±0.42	2.06±0.14	7.73±0.14	5.01±1.91	1.31±0.26	1.15±0.06
	25	2.02±0.54	0.73±0.33	0.54±0.30	8.80±0.40	0.99±0.27	0.36±0.16	0.27±0.15
	30	11.93±4.38	2.69±0.28	2.27±0.21	7.72±0.15	6.66±2.32	1.51±0.19	1.27±0.09
	35	13.02±3.91	2.87±0.51	2.66±0.58	7.30±0.24	7.67±2.06	1.70±0.36	1.57±0.29
Rice straw	15	11.21±2.23	3.08±0.52	3.02±0.06	7.17±0.21	6.83±1.17	1.87±0.26	1.84±0.02
	20	10.41±4.22	2.98±0.53	2.95±0.08	7.45±0.25	6.08±2.28	1.75±0.37	1.73±0.01
	25	1.83±0.63	0.73±0.04	0.43±0.18	10.7±0.4	0.75±0.26	0.30±0.01	0.17±0.07
	30	5.83±1.44	2.49±0.22	2.39±0.21	8.02±0.44	3.16±0.61	1.36±0.20	1.30±0.04
	35	6.66±2.39	3.02±0.33	2.50±0.04	7.69±0.45	3.84±1.58	1.72±0.08	1.42±0.06

Table S4. PM EFs and TEs of tested samples with different clay addition ratio in this study.

The clay addition ratio (%)		Received Mass Based Emissions			TE (%)	Delivered Energy Based Emissions		
		TSP (mg/g)	$PM_{2.5}$ (mg/g)	$PM_{1.0}$ (mg/g)		TSP (mg/kJ)	$PM_{2.5}$ (mg/kJ)	$PM_{1.0}$ (mg/kJ)
Maize straw	5	10.40±0.65	2.24±0.29	1.54±0.23	6.91±0.13	6.12±0.50	1.32±0.20	0.89±0.14
	7	9.81±0.72	2.97±0.47	2.11±0.18	7.31±0.07	5.58±0.35	1.69±0.28	1.19±0.10
	10	5.81±1.35	0.50±0.09	0.44±0.29	8.21±0.42	3.08±0.87	0.26±0.03	0.23±0.14
	12	6.52±1.12	2.27±0.06	1.81±0.13	7.69±0.14	3.76±0.71	1.31±0.06	1.06±0.07
	15	10.91±1.35	2.86±0.47	2.73±0.41	7.52±0.26	6.66±0.59	1.75±0.35	1.63±0.24
Wheat straw	5	7.49±2.94	3.08±0.84	2.13±0.42	7.58±0.14	4.00±1.50	1.65±0.48	1.14±0.21
	7	5.84±1.68	2.08±0.62	1.66±0.09	8.15±0.20	2.98±0.78	1.06±0.29	0.85±0.03
	10	5.14±1.77	1.81±0.27	1.22±0.34	8.79±0.17	2.52±0.82	0.89±0.15	0.60±0.16
	12	5.91±2.41	2.27±0.32	1.71±0.08	8.61±0.12	3.05±1.28	1.17±0.15	0.88±0.03
	15	4.80±3.22	1.96±0.06	1.72±0.38	6.19±0.15	3.60±2.49	1.46±0.08	1.28±0.32
Rice straw	5	11.26±2.33	4.94±1.34	4.43±0.49	6.21±0.16	7.46±1.35	3.29±0.97	2.95±0.41
	7	10.27±2.39	3.65±0.21	3.24±0.33	7.19±0.12	6.01±1.30	2.14±0.08	1.90±0.16
	10	5.64±2.08	1.67±0.07	1.12±0.66	8.40±1.53	2.89±0.56	0.89±0.20	0.63±0.46
	12	6.55±0.39	3.25±0.45	2.75±0.26	7.88±0.17	3.73±0.14	1.85±0.29	1.56±0.12
	15	6.32±1.48	2.61±0.23	3.28±2.45	7.12±0.26	4.13±0.82	1.71±0.09	1.63±0.56

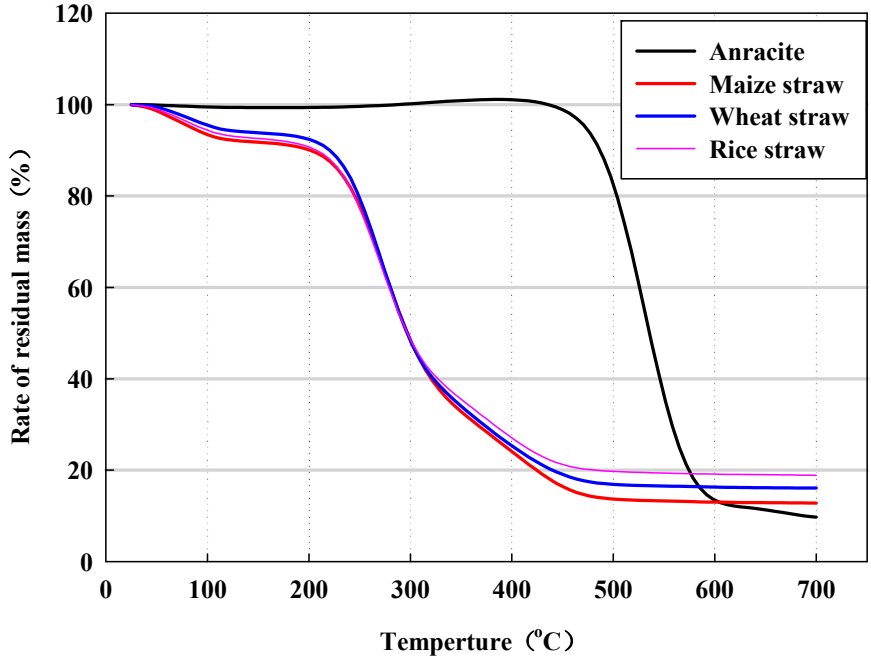

Figure S1. TGA analysis of tested raw material samples using a heating rate of 5 K/min under air atmospheres.

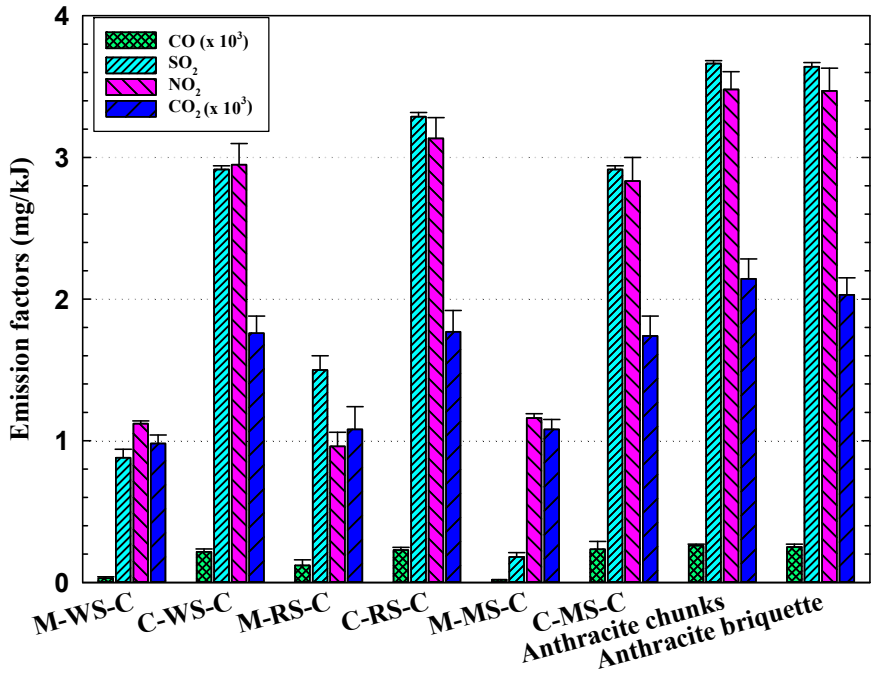

Figure S2 Energy based EFs for CO, SO_2, NO_2 and CO_2 of anthracite chunks, anthracite briquettes, bio-coal briquettes and corresponding mass-weighted average ones.