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Correction

Correction: Shin et al. Analysis of Hydrothermal Solid Fuel Characteristics Using Waste Wood and Verification of Scalability through a Pilot Plant. *Processes* 2022, *10*, 2315

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1. Addition of Authors

"Seong-Yeun Yoo, In-Kook Kang, Namhyun Kim, Sanggyu Kim, Kangil Choe" were not included as authors in the original publication. The corrected Affiliations and Author Contributions statement appears below.

2. Additional Affiliations

In the published publication, there was an error regarding the affiliations for the addition of authors. In addition to affiliations 2–4, the updated affiliations should include: "2 Bioenergy Center, Kinava Co., Ltd., #701-704 7 Heolleung-ro, Seocho-gu, Seoul 06792, Republic of Korea", "3 Carbon Neutral Division, Korea East-West Power Co., Ltd., #395 Jongga-ro, Jung-gu, Ulsan 44543, Republic of Korea", "4 Construction Division, Korea East-West Power Co., Ltd., #395 Jongga-ro, Jung-gu, Ulsan 44543, Republic of Korea".

3. Author Contributions Correction

There was an error in the author contributions in the original publication because new authors were added to the original publication.

The revised publication added new authors and contributing roles such as re-source, pilot plant design verification, pilot plant experiment analysis and verification, and project manager to the author contributions. All the author contributions were determined according to the added contributing role, and all authors agreed on the re-vised publication.

New Author Contributions Statement:

Author Contributions: Conceptualization, T.-S.S., K.C. and H.-I.Y.; methodology, T.-S.S., K.C. and H.-I.Y.; validation, T.-S.S.; formal analysis, T.-S.S. and J.-C.L.; investigation, J.-C.L.; Resources, I.-K.K.; data curation, S.-Y.Y. and I.-K.K.; Pilot Plant design verification, H.-B.L.; Pilot Plant test results analysis and verification, N.K. and S.K.; writing—original draft preparation T.-S.S.; writing—review and editing, K.C., J.-C.L. and H.-I.Y.; supervision, H.-I.Y.; Project administration, K.C.; funding acquisition, N.K. and S.K. All authors have read and agreed to the published version of the manuscript.

4. Error in Figure/Table

In the original publication, there was a mistake in Tables 3-8 as published. Table 4 was deleted, titles and contents of some tables were modified, and Figure 4 was added. The corrected tables and figures are as follows and appear below:

Table 3. Comparison of calorific value and mass yield after HTC of waste wood.

Reaction Condition		Lab-Scale Results	
Time (h)	**Temperature (°C)**	**HHV (kJ/kg)**	**Mass Yield (%)**
1	200	20,373	78.0
	210	21,629	74.9
	220	23,082	67.5
1.5	200	21,265	76.0
	210	21,914	71.2
	220	23,266	66.4

Table 4. Comparison of calorific value and mass yield after catalytic HTC of waste wood at the laboratory scales.

Input Condition	Reaction Condition		Lab-Scale Results	
Catalyst	**Time (h)**	**Temperature (°C)**	**HHV (kJ/kg)**	**Mass Yield (%)**
None	1	220	23,082	67.5
Catalyst #1	1	220	26,687	61.3
	1.5	220	27,369	61.0
Catalyst #2	1	220	25,263	67.4
	1.5	220	26,038	65.3

Table 5. Laboratory-scale HTC solid fuel analysis according to heavy metal and hazardous substance standards of biosolid fuel.

Biosolid Fuel Production Condition			Lab-Scale Results			
List	**Unit**	**On-Site Standard**	**Waste Wood (Raw Material)**	**HTC (Non)**	**Catalytic HTC (Catalyst #1)**	**Catalytic HTC (Catalyst #2)**
Cl	wt%	0.5	0.02	0.06	0.75 (excess)	0.17
S	wt%	0.6	0.0161	0.04	0.06	0.03
Hg	ppm	0.6	0.00289	≤0.001	0.002	≤0.001
Cd	ppm	5	≤0.1	≤0.1	≤0.1	≤0.1
Pb	ppm	100	0.52	0.96	1.15	1.45
As	ppm	5	≤0.1	≤0.1	0.15	0.11
Cr	ppm	70	3.6	4.34	30	28.1

Table 6. Comparison of calorific value and mass yield after HTC of waste wood at the laboratory and pilot scales.

Reaction Condition		Laboratory-Scale Results		Pilot-Scale Results	
Time (h)	**Temperature (°C)**	**HHV (kJ/kg)**	**Mass Yield (%)**	**HHV (kJ/kg)**	**Mass Yield (%)**
1	220	23,082	67.5	22,960	67
1.5	220	23,266	66.4	23,236	65

Table 7. Comparison of calorific value and mass yield after catalytic HTC of waste wood according to catalytic density ratio at the pilot scale.

Reaction Condition				Pilot-Scale Results	
Catalyst	Catalytic Density Ratio	Time (h)	Temperature (°C)	HHV (kJ/kg)	Mass Yield (%)
Non	0	1.5	220	23,027	65
Catalyst #2	2	1.5	220	23,697	64
	3	1.5	220	25,787	61.2
	4	1.5	220	27,189	60

Table 8. Laboratory- and pilot-scale hydrothermal carbonization solid fuel comparison according to heavy metal and hazardous substance standards of biosolid fuel.

Biosolid Fuel Production Condition			Laboratory-Scale Results	Pilot-Scale Results
List	Unit	On-Site Standard	Catalytic HTC (Catalyst #2)	Catalytic HTC (Catalyst #2)
Cl	wt%	0.5	0.17	0.2
S	wt%	0.6	0.03	0.02
Hg	ppm	0.6	≤0.001	0.0022
Cd	ppm	5	≤0.1	≤0.1
Pb	ppm	100	1.45	1.44
As	ppm	5	0.11	≤0.1
Cr	ppm	70	28.1	29.8

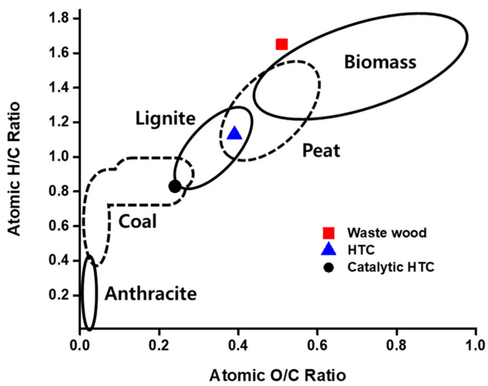

Figure 4. Van Krevelen diagram of waste wood and biosolid fuels produced by different HTC processes at the pilot scales.

5. Text Correction

There were errors in the original publication. In consultation with the authors, the inappropriate content was excluded, and the results that could be disclosed were stated.

Corrections have been made to these sections: "2.3. Laboratory-Scale Reactor HTC Experimental Conditions and Process, 2.4. Pilot Plant Reactor Configuration and Process, 3.2. Laboratory-Scale Catalytic HTC Effect Analysis, 3.3. Analysis of Heavy Metals and Hazardous Substances on Laboratory-Scale HTC Solid Fuel, 3.4. Pilot-Scale HTC Effect Analysis and Scalability Verification".

CORRECTED Paragraph:

2.3. Laboratory-Scale Reactor HTC Experimental Conditions and Process

1st paragraph, 3rd sentence: The moisture content of the pulverized raw material was then measured and placed into an aqueous solution inside the reactor to obtain the appropriate moisture content.

1st paragraph, 6–14 sentences: The added catalyst contains inorganic metals and acids. At this time, the case where a catalyst is added to HTC is called catalytic HTC. Additionally, the amount of catalyst added is determined by catalyst conditions. Catalytic conditions according to the experiment were similarly performed according to previous studies [14,15]. The catalyst is a combination of specific inorganic metals and acids. Two combinations designated by the KINAVA Company were used in the above experiment. The first case (Catalyst #1) is a combination of strong acid-based catalysts. The second case (Catalyst #2) is a combination of weak acid-based catalysts. In all cases, they were provided in the form of liquid catalysts prepared by an already specified method.

2.4. Pilot Plant Reactor Configuration and Process

4th paragraph, 5th sentence: Content is appropriate.

3.2. Laboratory-Scale Catalytic HTC Effect Analysis

1st paragraoh, 2-4 sentences: When the catalyst concentration ratio was 2-fold, the calorific value and mass yield after HTC were compared. If the calorific value increases after catalytic HTC, it is a combination of Catalyst #1 (a strong acid-based catalyst). The higher the concentration of Catalyst #1, the better the catalytic HTC reaction.

1st paragraph, 6-8 sentences: The catalyst concentration of Catalyst #1 was determined to have a calorific value of ≥25,120 kJ/kg that was a minimum of 1.5-fold more than the catalytic density ratio. When the catalyst concentration was reduced to the initial catalytic density ratio, the calorific value decreased to 25,120 kJ/kg or less, which did not reach the target calorific value. Therefore, in the pilot plant HTC experiment, we decided to add the catalyst at a concentration equal to or greater than 2-fold the catalyst density ratio.

2nd paragraph, 3-5 sentences: Although the catalyst concentration ratios were the same, the strong acid was added in a larger amount than the weak acid, considering the purity of the catalyst. When the strong acid-based catalyst (Catalyst #1) was added, the calorific value was high, but the yield was lower and the amount of catalyst added was increased. When the weak acid-based catalyst (Catalyst #2) was added, the calorific value was lower than when Catalyst #1 was used, but a stable yield was obtained.

3.3. Analysis of Heavy Metals and Hazardous Substances on Laboratory-Scale HTC Solid Fuel

1st paragraph, 2nd sentence: Table 5 is the quality standard.

1st paragraph, 9th sentence: It was confirmed that Catalyst #1 had the highest calorific value, but it was not a catalyst combination that could be used in the pilot plant because the chlorine content exceeded the standard for hazardous substances. Therefore, we decided to use Catalyst #2, which satisfied the standard of biosolid fuel as being suitable for the pilot plant-scale experiment.

3.4. Pilot-Scale HTC Effect Analysis and Scalability Verification

1st paragraph, 2nd sentence: As shown in Table 6.

2nd paragraph, 1st sentence: listed in Table 7.

2nd paragraph, 2nd sentence: at a catalyst concentration of the same condition.

2nd paragraph, 4–5 sentences: It was increased by the initial density ratio, and the calorific value was measured to be higher than 25,120 kJ/kg at a 3-fold density ratio. It was also confirmed that the mass yield was more than 60% up to a 4-fold density ratio.

3rd paragraph: The chemical positions of the waste wood used as a reactant in these experiments and the biosolid fuels produced from the pilot-scale HTC processes were compared with a Van Krevelen diagram (Figure 4). The atomic H/C and O/C ratios of waste wood were 1.65 and 0.51, which are similar to that of general biomass. After HTC of waste wood at 220 °C for 1.5 h without a catalyst, the atomic H/C ratios of the biosolid fuel decreased from 1.65 to 1.13, and the atomic O/C ratios decreased from 0.51 to 0.39. This reduced the atomic H/C and O/C ratios by 31.5% and 23.5%, respectively, compared to those of the raw material, and showed intermediate levels of peat and lignite. On the other hand, the atomic H/C and O/C ratios of the biosolid fuel produced from the catalytic HTC (Catalyst #2) under the same conditions were reduced to 0.83 and 0.24, respectively. These figures showed reduction rates of 49.7% and 52.9%, respectively, compared to those of the raw material, and showed a degree of carbonization similar to that of general coal. In addition, the atomic H/C and O/C ratios decreased by 26.5% and 38.5%, respectively, compared to the biosolid fuel produced from the HTC without a catalyst. From these results, it was confirmed that Catalyst #2 provided by KINAVA greatly increased the selectivity for dehydration even in the HTC reaction under the same conditions, enabling the production of biosolid fuel with a high calorific value due to a high degree of carbonization.

4th paragraph, 2nd sentence: As shown in Table 8.

6. Missing Funding

In the original publication [1], the funder "Korea East-West Power Company of the Republic of Korea (Pilot Plant Development for Green Pellet Production from Woodwaste Using Hydrothermal Polymerization Technology (2019))" was not included. The funding sponsors had a role in the pilot plant design of the study.

7. Missing Conflicts of Interest

In the original publication, "S.-Y.Y., I.-K.K. and K.C. are employees of the KINAVA Company. N.K. and S.K. are employees of Republic of Korea East-West Power Company." was not included.

The authors state that the scientific conclusions are unaffected. This correction was approved by the Academic Editor. The original publication has also been updated.

Reference

1. Shin, T.-S.; Yoo, S.-Y.; Kang, I.-K.; Kim, N.; Kim, S.; Lim, H.-B.; Choe, K.; Lee, J.-C.; Yang, H.-I. Analysis of Hydrothermal Solid Fuel Characteristics Using Waste Wood and Verification of Scalability through a Pilot Plant. *Processes* **2022**, *10*, 2315. [CrossRef]