CLAIMS:

We claim:

1. A process for treating organic waste comprising steps of,

pyrolysing the organic waste in a first stage at a temperature from 270 to 450 degrees C or less and a residence time of 5-30 minutes and producing at least a first char and gas;

pyrolysing the first char in a second stage and producing a second char;

condensing the gas producing a liquid comprising oil and non-condensable gas;

adding the liquid comprising oil to an oil fraction separator and separating an oily fraction from the liquid producing an aqueous liquid; and

burning and/or pyrolysing the oily fraction.

2. The process of claim 1 wherein the temperature in the second stage is higher than the temperature of the first stage by 50 degrees C or more.

3. The process of claim 1 further comprising treating at least a portion of the liquid comprising oil and/or the aqueous liquid in an anaerobic digester.

4. The process of claim 1 wherein the organic waste comprises digestate.

5. The process of claim 1 further comprising cooling the second char.

6. The process of claim 1 further comprising spraying water on the second char.

7. The process of claim 1 further comprising adding the non-condensable gas produced in the first stage or non-condensable gas produced in the second stage or both to sludge in an anaerobic digester or burning the gas to produce heat for pyrolysis or drying digestate.

8. A pyrolysis apparatus comprising,

a first pyrolysis reactor comprising an inlet, a first outlet, and a second outlet;

a second pyrolysis reactor comprising an inlet and a first outlet;

a condenser comprising an inlet and an outlet, the inlet in communication with the second outlet of the first pyrolysis reactor; and

an oily fraction separator having an inlet that is in communication with the outlet of the condenser,

wherein the first outlet from the first pyrolysis reactor is connected to the inlet of the second pyrolysis reactor,

wherein the oil fraction separator comprises an outlet in communication with the first pyrolysis reactor, the second pyrolysis reactor, a burner, or any combination thereof.

9. The apparatus of claim 8 further comprising a char cooler downstream of the first outlet of the second pyrolysis reactor.

10. The apparatus of claim 8 having a water sprayer downstream of the first outlet of the second pyrolysis reactor.

11. The apparatus of claim 8 further comprising an anaerobic digester.

12. The apparatus of claim 11 wherein a digestate outlet of the anaerobic digester is connected to the inlet of the first pyrolysis reactor.

13. The apparatus of claim 11 wherein the second outlet of the first pyrolysis reactor is in communication with the digester.

14. The apparatus of claim 8 wherein the first pyrolysis reactor and the second pyrolysis reactor share a common combustion chamber.

15. The apparatus of claim 13 wherein the second pyrolysis reactor is located closer to a burner in the combustion chamber.

16. The process of claim 1 wherein the second residence time is longer than the first residence time.

17. The process of claim 1 wherein the temperature of the second stage is from 400 to 900 degrees C.

18. The process of claim 1 wherein the temperature of the second stage is from 400 to 900 degrees C and the residence time of the second stage is 5-45 minutes.

19. The apparatus of claim 8 wherein the condenser comprises a gas outlet and a liquid outlet, the gas outlet in communication with an anaerobic digester and the liquid outlet in communication with the oil fraction separator.

20. The apparatus of claim 8 wherein the oil fraction separator comprises a second outlet in communication with an anaerobic digester.