CLAIMS

What is claimed is:

1. A continuous process for converting waste plastic into recycle for polypropylene polymerization comprising:

(a) selecting waste plastics containing polyethylene and/or polypropylene;

(b) passing the waste plastics from (a) through a pyrolysis reactor to thermally crack at least a portion of the waste plastics and produce a pyrolyzed effluent;

(c) separating the pyrolyzed effluent into offgas, a pyrolysis oil and optionally wax comprising a naphtha/diesel/heavy fraction and char;

(d) passing the pyrolysis oil and wax to a refinery FCC unit;

(e) recovering a liquid petroleum gas C_3 olefin/paraffin mixture from the FCC unit;

(f) separating the C_3 paraffin and C_3 olefin into different fractions; and

(g) passing the C_3 olefin to a propylene polymerization reactor.

2. The process of claim 1, wherein a gasoline and heavy fraction is recovered from the refinery FCC unit.

3. The process of claim 1, wherein the pyrolysis oil and wax of (d) is passed directly a refinery FCC unit distillation section.

4. The process of claim 1, wherein contaminants are removed at the pyrolysis reactor.

5. The process of claim 1, wherein propylene products are prepared from the polymerized propylene.

6. The process of claim 1, wherein the waste plastics selected in (a) are from the plastics classification group 2, 4, and/or 5.

7. The process of claim 1, wherein gasoline is recovered from the refinery FCC unit and is sent to a gasoline blending pool.

8. The process of claim 1, wherein a C_4 stream and a heavy fraction are recovered from the FCC unit distillation column and further processed in the refinery to clean gasoline, diesel, or jet fuel.

9. The process of claim 7, wherein the amount of gasoline produced by the FCC unit is increased with recycled pyrolysis oil.

10. The process of claim 1, wherein the volume flow of pyrolysis oil to the refinery FCC unit in (d) comprises up to 50 volume % of the total hydrocarbon flow to the FCC unit.

11. The process of claim 10, wherein the pyrolysis oil flow comprises up to 20 volume % of the total flow to the FCC unit.

12. A continuous process for converting waste plastic into recycle for polypropylene polymerization comprising:

(a) selecting waste plastics containing polyethylene and/or polypropylene;

(b) passing the waste plastics from (a) through a pyrolysis reactor to thermally crack at least a portion of the waste plastics and produce a pyrolyzed effluent;

(c) separating the pyrolyzed effluent into offgas, a pyrolysis oil and optionally pyrolysis wax comprising a naphtha/diesel/heavy fraction, and char;

(d) passing the pyrolysis oil and wax to a refinery FCC unit;

(e) recovering a liquid petroleum gas C_3 olefin/paraffin mixture from the FCC unit;

(g) separating the C_3 paraffin and C_3 olefin into different fractions;

(h) passing the C_3 olefin to a propylene polymerization reactor; and

(i) passing the C_3 paraffin to a dehydrogenation unit to produce propylene.

13. The process of claim 12, wherein the propylene produced in (i) is passed on to the propylene polymerization reactor.

14. The process of claim 12, wherein a gasoline and heavy fraction is recovered from the refinery FCC unit.

15. The process of claim 12, wherein the pyrolysis oil of (d) is passed directly to a refinery FCC unit distillation section.

16. The process of claim 12, wherein contaminants are removed at the pyrolysis reactor.

17. The process of claim 13, wherein propylene products are prepared from the polymerized propylene.

18. The process of claim 12, wherein the waste plastics selected in (a) are from the plastics classification group 2, 4, and/or 5.

19. The process of claim 12, wherein gasoline is recovered from the refinery FCC unit and is sent to a gasoline blending pool.

20. The process of claim 12, wherein a C_4 and a heavy fraction are recovered from the FCC unit distillation column and further processed in the refinery to clean gasoline, diesel, or jet fuel.

21. The process of claim 19, wherein the amount of gasoline produced by the FCC unit is increased with recycled pyrolysis oil.

22. The process of claim 12, wherein the volume flow of pyrolysis oil to the refinery FCC unit in (d) comprises up to 50 volume % of the total hydrocarbon flow to the FCC unit.

23. The process of claim 22, wherein the pyrolysis oil flow comprises up to 20 volume % of the total flow to the FCC unit.

24. A process for converting waste plastic into chemicals useful in preparing polypropylene, comprising:

(a) selecting waste plastics containing polyethylene and/or polypropylene;

(b) pyrolyzing the waste plastic and recovering a pyrolysis oil comprising a naphtha/diesel fraction and a heavy fraction; and

(c) passing the pyrolysis oil to a refinery FCC unit with the volume flow of pyrolysis oil to the refinery FCC unit comprising up to 50 volume% of the total hydrocarbon feed to the FCC unit.