CLAIMS

What is claimed is:

1. A continuous process for converting waste plastic into recycle for polyethylene 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 naphtha/diesel fraction, a heavy fraction, and char;

(d) passing the naphtha/diesel fraction to a crude unit in a refinery;

(e) recovering a straight run naphtha (C_5-C_8) fraction from the crude unit;

(f) passing the straight run naphtha fraction (C_5-C_8) to a steam cracker for ethylene production; and

(g) passing the heavy fraction to an isomerization dewaxing unit to produce a base oil.

2. The process of claim 1, wherein the naphtha/diesel fraction of (c) is passed directly to a refinery crude unit and the contaminants are removed in a crude unit desalter.

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

4. The process of claim 1, wherein the ethylene produced in (f) is subsequently polymerized.

5. The process of claim 4, wherein consumer polyethylene products are prepared from the polymerized ethylene.

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

7. The process of claim 1, wherein heavy naphtha/diesel/atmospheric gas oil is recovered from the crude unit and further processed in the refinery to clean gasoline, diesel, or jet fuel.

8. The process of claim 1, wherein the amount of naphtha/diesel fraction processed by the crude unit is reduced with recycled pyrolysis oil.

9. The process of claim 1, wherein the amount of base oil produced by the isomerization dewaxing unit is increased with recycled pyrolysis oil.

10. The process of claim 1, wherein the heavy fraction in (g) is hydrotreated and then isomerized in the dewaxing unit.

11. The process of claim 1, wherein the volume flow of the naphtha/diesel fraction to the crude unit in the refinery comprises up to 50 volume % of the total hydrocarbon flow to the crude unit.

12. The process of claim 11, wherein the naphtha/diesel flow comprises up to 20 volume %.

13. A continuous process for converting waste plastic into recycle for polyethylene 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 naphtha/diesel fraction, a heavy fraction, and char;

(d) passing the naphtha/diesel fraction to a crude unit in a refinery;

(e) recovering a propane and butane (C_3-C_4) fraction from the crude unit;

(f) passing the (C_3-C_4) fraction to a steam cracker for ethylene production; and

(g) passing the heavy fraction to an isomerization dewaxing unit to produce a base oil.

14. The process of claim 13, wherein the naphtha/diesel fraction of (c) is passed directly to a refinery crude unit and the contaminants are removed in a crude unit desalter.

15. The process of claim 13, wherein contaminants are removed at the pyrolysis reactor.

16. The process of claim 13, wherein the ethylene produced in (f) is subsequently polymerized.

17. The process of claim 16, wherein consumer polyethylene products are prepared from the polymerized ethylene.

18. The process of claim 13, wherein the waste plastics selected in (a) are from plastics classification group 2, 4, and/or 5.

19. The process of claim 13, wherein heavy naphtha/diesel/atmospheric gas oil is recovered from the crude unit and further processed in the refinery to clean gasoline, diesel, or jet fuel.

20. The process of claim 13, wherein the amount of naphtha/diesel fraction processed by the crude unit is reduced with recycled pyrolysis oil.

21. The process of claim 13, wherein the amount of base oil produced by the isomerization dewaxing unit is increased with recycled pyrolysis oil.

22. The process of claim 13, wherein the heavy fraction in (g) is hydrotreated and then isomerized in the dewaxing unit.

23. The process of claim 13, wherein the volume flow of the naphtha/diesel fraction to the crude unit in the refinery comprises up to 50 volume % of the total hydrocarbon flow to the crude unit.

24. The process of claim 23, wherein the naphtha/diesel flow comprises up to 20 volume %.

25. A process for converting waste plastic into chemicals useful in preparing polyethylene and lubricating oil comprising:

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

(b) pyrolyzing the waste plastics and recovering a naphtha/diesel fraction and a heavy fraction;

(c) passing the naphtha/diesel fraction to a crude unit in a refinery with the volume flow of the naphtha/diesel fraction to the crude unit comprising up to 50 volume % of the total hydrocarbon flow to the crude unit; and

(d) passing the heavy fraction to an isomerization dewaxing unit.