CLAIMS

What is claimed is:

~~1. A method for processing waste plastic, said method comprising:~~

~~introducing a terephthalyl column bottoms coproduct stream from a solvolysis facility into at least one of the following: (i) a partial oxidation (POX) gasification facility; (ii) a pyrolysis facility; (iii) a cracker facility; and (iv) an energy generation/energy production facility.~~

~~2. The method of claim 1, further comprising introducing another process stream into at least one of into at least one of (i) through (iv) and (v) a solidification facility.~~

~~3. The method of claim 2, wherein said terephthalyl column bottoms coproduct stream and said another process stream are introduced into different ones of (i) through (v).~~

~~4. The method of claim 2, wherein said another process stream originates from one of facilities (ii) through (v).~~

~~5. The method of claim 2, wherein said another process stream comprises a PO-enriched waste plastic stream.~~

~~6. The method of claim 1, wherein said another process stream comprises another solvolysis coproduct stream from said solvolysis facility.~~

~~7. The method of claim 1, wherein at least a portion of said terephthalyl column bottoms coproduct stream is introduced into a POX gasification facility.~~

~~8. The method of claim 7, wherein said POX gasification facility includes a liquid-fed gasifier.~~

~~9. The method of claim 7, wherein said POX gasification facility includes a solid-fed gasifier.~~

~~10. The method of claim 1, wherein said terephthalyl column bottoms coproduct stream comprises at least 70 weight percent of oligomers comprising polyester moieties, wherein said oligomers have an average chain length of 2 to 25.~~

~~11. The method of claim 1, wherein said terephthalyl column bottoms coproduct stream at least 1 ppb and not more than 25 weight percent of substituted terephthalyl components and wherein said composition has a mid-range boiling point higher than the boiling point of said terephthalyl.~~

~~12~~1. A method for processing waste plastic, said method comprising:

(a) withdrawing a terephthalyl column bottoms coproduct stream from a solvolysis facility used to process PET-containing waste plastic; and

(b) introducing at least a portion of said coproduct stream into at least one of the following: (i) a partial oxidation (POX) gasification facility; (ii) a pyrolysis facility; (iii) a cracker facility; and (iv) an energy generation/energy production facility.

~~13~~2. The method of claim ~~12~~1, wherein said withdrawing is performed in a continuous manner.

~~14~~3. The method of claim ~~12~~1, wherein said solvolysis facility produces a principal terephthalyl and wherein said terephthalyl column bottoms coproduct stream has a mid-range boiling point higher than the boiling point of said principal terephthalyl.

~~15. The method of claim 12, wherein said PET-containing waste plastic is at least partially derived from a feedstock comprising at least 10 weight percent textiles.~~

~~16~~4. The method of claim ~~12~~1, further comprising introducing another coproduct stream from said solvolysis facility into at least one of the following: (i) a partial oxidation (POX) facility; (ii) a pyrolysis facility; (iii) a solidification facility; (iv) a cracker facility; and (v) an energy generation/energy production facility.

~~17~~5. The method of claim ~~16~~4, wherein said terephthalyl column bottoms coproduct stream and said another coproduct stream are introduced into different ones of (i) through (v).

~~18~~6. The method of claim ~~16~~4, wherein said terephthalyl column bottoms coproduct stream and said another coproduct stream are introduced into the same ones of (i) through (v).

~~19. The method of claim 18, wherein said terephthalyl column bottoms coproduct stream and said another coproduct stream are combined to form a combined stream, and wherein said combined stream is introduced into at least one of (i) through (v).~~

7. The method of claim 1, wherein at least a portion of said terephthalyl column bottoms coproduct stream is introduced into a POX gasification facility.

8. The method of claim 7, wherein said POX gasification facility includes a liquid-fed gasifier.

9. The method of claim 7, wherein said POX gasification facility includes a solid-fed gasifier.

~~20~~10. A method for processing waste plastic, said method comprising:

(a) separating a stream of mixed plastic waste (MPW) into a polyethylene terephthalate-enriched (PET-enriched) stream and a polyolefin-enriched stream (PO-enriched) stream;

(b) subjecting at least a portion of said PET-enriched stream to solvolysis in a solvolysis facility to form a principal glycol product, a principal terephthalyl product, and at least one coproduct stream, wherein said coproduct stream comprises a terephthalyl column bottoms coproduct stream; and

(c) introducing at least a portion of said terephthalyl column bottoms coproduct stream from said solvolysis facility into at least one of the following: (i) a partial oxidation (POX) gasification facility; (ii) a pyrolysis facility; (iii) a solidification facility; (iv) a cracker facility; and (v) an energy generation/energy production facility.

~~21~~11. The method of claim ~~20~~10, wherein said PET-enriched stream comprises at least 60 weight percent PET and not more than 40 weight percent of polyolefins, based on the total weight of the PET-enriched stream, wherein said PO-enriched stream comprises at least 60 weight percent polyolefins and not more than 40 weight percent of PET, based on the total weight of the PO-enriched stream, and wherein said PET-enriched stream comprises not more than 10 weight percent of halogens, based on the total weight of the PET-enriched stream.

~~22~~12. The method of claim ~~20~~10, wherein said terephthalyl column bottoms coproduct stream has a temperature in the range of from 130 to 290°C when withdrawn from said solvolysis facility.

~~23. The method of claim 20, wherein said introducing is performed in a continuous manner.~~

~~24~~13. The method of claim ~~20~~10, wherein said introducing is performed in a batch manner.

~~25. The method of claim 20, wherein said stream of mixed plastic waste comprises at least 10 weight percent of textiles, based on the total weight of the stream.~~

~~26~~14. The method of claim ~~20~~10, further comprising introducing at least a portion of said PO-enriched stream into at least one of the following: (i) a partial oxidation (POX) gasification facility; (ii) a pyrolysis facility; (iii) a solidification facility; and (iv) an energy generation/energy production facility.

~~27~~15. The method of claim ~~20~~10, wherein said solvolysis facility comprises a methanolysis facility.

~~28~~16. The method of claim ~~20~~10, further comprising introducing said terephthalyl column bottoms coproduct stream into at least two of facilities (i) through (v).

~~29. The method of any of claims 1-27, wherein said method is carried out in a commercial-scale facility.~~

~~30. The method of any of claims 1-27, wherein said solvolysis facility is co-located with the at least one of the other facilities (i) through (v), and wherein at least one of the following statements (A) through (F) are true –~~

~~(A) the solvolysis facility and the other facility share at least one utility;~~

~~(B) the solvolysis facility and the other facility share at least one service group;~~

~~(C) the solvolysis facility and the other facility are owned and/or operated by parties that share at least one boundary;~~

~~(D) the solvolysis facility and the other facility are connected by at least one conduit;~~

~~(E) the solvolysis facility and the other facility share energy via an energy exchange zone; and~~

~~(F) the solvolysis facility and the other facility are within 50 miles from one another, measured from their geographical center.~~

~~31~~17. A solvolysis coproduct composition formed within a solvolysis facility for processing polyester terephthalate-containing waste plastic to form a principal glycol product and a principal terephthalyl product using a solvent, said composition comprising:

at least 70 weight percent of oligomers comprising polyester moieties; and

at least 1 part per billion (ppb) by weight and not more than 25 weight percent of substituted terephthalyl components, based on the total weight of the composition,

wherein said composition has a mid-range boiling point higher than the boiling point of said terephthalyl.

~~32. The composition of claim 31, wherein said solvolysis coproduct composition is a non-Newtonian fluid.~~

~~33~~18. The composition of claim ~~31~~17, wherein said oligomers comprise moieties of at least one ester other than dimethyl terephthalate, at least one carboxylic acid other than terephthalic acid, and/or at least one glycol other than ethylene glycol.

~~34~~19. The composition of claim ~~31~~17, wherein said oligomers have an average chain length of 2 to 25 and wherein said oligomers further comprise residues of 1,4-cyclohexanedimethanol (CHDM), neopentyl glycol, isophthalic acid, and combinations thereof.

~~35~~20. The composition of claim ~~31~~17, wherein said solvolysis coproduct composition has a viscosity of at least 0.01 poise (P), measured using a Brookfield R/S rheometer with V80-40 vane spindle operating at a shear rate of 10 rad/s and a temperature of 250°C, and wherein said solvolysis comprises methanolysis, said principal glycol comprises ethylene glycol, and wherein said principal terephthalyl product comprises dimethyl terephthalate (DMT).