

CLAIMS

1. A process for combined renewable alkene and renewable chemical production from a glyceride containing feedstock, the process comprising:
 - a) providing the glyceride containing feedstock comprising free fatty acids, fatty acid
5 glycerides selected from monoglycerides, diglycerides and triglycerides of fatty acids, or a mixture thereof, wherein the feedstock contains a compound having at least one carbon-carbon double bond;
 - b) subjecting the feedstock to esterification reaction, preferably selected from
10 esterification of fatty acids and transesterification of mono- di- or triglycerides or a combination thereof, in the presence of a C1-C4 monoalcohol, to yield a fatty acid ester stream;
 - c) subjecting the product from step b) to fractional distillation to provide at least three fractions, namely, a gas fraction comprising water and C1-C4 alcohols; a fraction comprising fatty acid esters up to C16; and a fraction comprising unsaturated C18 fatty
15 acid esters;
 - d) subjecting the fraction comprising unsaturated C18 fatty acid esters to metathesis reaction conditions in the presence of a C2-C4 alkene to obtain metathesis products comprising renewable alkenes, such as 1-decene, and fatty acid derived esters, such as alkyl-9-decenoate;
 - 20 e) recovery of at least one renewable alkene comprising 1-decene, and at least one fatty acid derived ester comprising alkyl-9-decenoate, from products of step d.
2. A process according to claim 1, wherein fractional distillation in step c) provides
 - at least one fraction comprising water and C1-C4 monoalcohol, in a cumulative amount of at least 80 %-wt of the total fraction weight;
 - 25 • at least one fraction comprising saturated fatty acid esters having carbon chain length from C12 to C16 in a cumulative amount of at least 80 %-wt, preferably at least 90 %-wt of the total fraction weight;
 - at least one fraction comprising unsaturated C18 fatty acid esters
 - an optional bottom product from the fractional distillation comprising >C18
30 fatty acid esters and glycerol.
3. A process according to claim 1 or 2, wherein the fraction comprising unsaturated fatty acid esters comprises fatty acid esters having a carbon chain length of C18, in a

cumulative amount of at least 80 %-wt, preferably at least 90 %-wt, of the total fraction weight.

4. A process according to any one of claims 1 - 3, wherein step e) further comprises metathesis product separation steps selected from evaporation, distillation or combinations thereof.
5. A process according to claim 4, wherein step e) comprises
 - i) an evaporation, wherefrom C2-C4 alkenes are recovered as evaporation overheads product, and recycled back to metathesis reaction, and a distillation of the evaporation bottom, wherefrom the renewable C5 – C9 alkenes are recovered as distillation overheads product and the bottom product is directed to e)ii.
6. A process according to claim 5, wherein step e) further comprises
 - ii) a distillation of bottom product from distillation i), wherefrom 1-decene is recovered as product distillation overheads product.
7. A process according to claim 6, wherein step e) further comprises
 - iii) a second distillation of bottom product from distillation ii), wherefrom alkyl-9-decenoate, preferably ethyl-9-decenoate, is recovered as overheads product.
8. A process according to claim 7, wherein step e) further comprises
 - iv) hydrotreatment of the bottom product from second distillation iii), preferably hydrodeoxygenation and hydroisomerisation into at least one component selected from renewable diesel, renewable naphtha, renewable aviation fuel, and renewable gasoline.
9. A process according to any of the preceding claims, wherein the metathesis reaction conditions in step d comprise a temperature from 20 to 120 °C, a pressure from 0.1 to 3 MPa and a metathesis catalyst.
10. A process according to any of the preceding claims, wherein the C1-C4 monoalcohol used in step b is selected from methanol, ethanol, 1-propanol, 2-propanol, 1-butanol and 2-butanol, or a mixture thereof, preferably from bio based monoalcohols, more preferably from bio-based ethanol.
11. A process according to any of the preceding claims, wherein the C2-C4 alkene is ethene.
12. A process according to claim 1 or 2, further comprising subjecting the fraction comprising fatty acid esters up to C16, or the fraction comprising saturated fatty acid esters having

carbon chain length from C12 to C16, to ketonisation and hydrotreatment to produce renewable base oil meeting the API group III specifications.

13. A process according to claim 12, wherein monoalcohol used in step b is ethanol, ketonisation releases ethene and the ethene thereby produced is recycled back to metathesis reaction in step d).
14. A process according to any of the preceding claims, wherein metathesis products comprise ethyl-9-decenoate.
15. A process according to any of the preceding claims further comprising hydrotreatment of the bottom product comprising >C18 fatty acid esters from separation in step c.
- 10 16. Use of fractional distillation as pretreatment for metathesis reaction of fatty acid esters according to process of one of claims 1-15.
17. Use according to claim 16 in combined renewable base oil and renewable alkene production according to process of one of claims 12 or 13.
18. Use according to claim 16 or 17 further comprising renewable fuel production.