CLAIMS

1. A hydrocarbon blend for input to a refinery ~~and~~ comprising a first blend component containing a renewable hydrocarbon component and a second blend component containing petroleum derived hydrocarbon to form at least part of a final hydrocarbon blend for processing in the~~a~~ refinery where the first blend component is characterized by comprising a hydrocarbon substance with at least 70 % by weight having a boiling point above 220 °C and by having the characteristics (δ_{d1}, δ_{p1}, δ_{h1}) = (17-20, 6-12, 6-12) and; where the second blend component is characterised by having the characteristics (δ_{d2}, δ_{p2}, δ_{h2}) = (17-20, 3-5, 4-7), where the first blend component is present in the final hydrocarbon blend in a relative amount of up to 80 wt %;~~.~~
wherein δ_d is the Hansen Solubility parameter associated with dispersion, δ_p is the Hansen Solubility parameter associated with polarity and, δ_h is the Hansen Solubility parameter associated with hydrogen bonding;
wherein the hydrocarbon substance of the first blend component is produced from biomass and/or waste; and
wherein the first blend component and/or hydrocarbon substance has an oxygen content of less than 5% by weight.

2. A hydrocarbon blend according to claim 1, where ~~the first blend component comprises a~~the hydrocarbon substance in the first blend component is characterised by having the characteristics (δ_d , δ_p , δ_h) = (17-20, 6-15, 6-12); and the first blend component further comprises a linker substance characterised by having the characteristics (δ_{d3}, δ_{p3}, δ_{h3})= (17-20, 3-6, 4-6); where the hydrocarbon substance is present in the first blend component in an ~~relative~~ amount of 90-99,5 wt.%, and, the linker substance is present in the first blend component in an ~~relative~~ amount of 0.5 to 10 wt.%.

3. A hydrocarbon blend according claim 2, where the hydrocarbon substance in the first blend component comprising renewable component is characterised by having the characteristics (δ_d , δ_p , δ_h) = (18.0-19,5, 6-12, 7-10) and where the linker substance is characterised by having the characteristics ranges (δ_{d3}, δ_{p3}, δ_{h3})= (17-20, 4-6, 4-7).

4. A hydrocarbon blend according to claims 2 or 3, where the first blend component is present in the final hydrocarbon blend in a relative amount of between 50-75 wt.%, where the second blend component is present in the final hydrocarbon blend in a relative amount of between 25-50 wt.%, and where further the linker substance optionally is present in the final hydrocarbon blend in a relative amount of between 0.5 to 5 wt.%.

5. A hydrocarbon blend according to any one of claims 2 to 4, where the linker substance comprises or further comprises one or more ketones, alcohols, alkanes, and/or aromatics.

6. A hydrocarbon blend according to claim 5, wherein the aromatics are selected from toluene, xylene and cresol.

~~2.~~7. A hydrocarbon blend according to claim 5, where the linker substance comprises or further comprises 25-90 % by weight of ketones, 0.1-40 % by weight of alkanes, 1-40 % by weight of alcohols and 0.1-20 % by weight of toluene, xylene, creosol, or any combination thereof.

~~3.~~8. A hydrocarbon blend according to ~~claims 2~~any one of claims 2 to 7, where the linker substance is an oil with a sulphur content of at least 1% by weight such as a sulphur content of at least 1.5% by weight, preferably a oil having a sulphur content of at least 2.0% by weight.

~~4.~~9. A hydrocarbon blend according to any of the claims ~~1-3~~1 to 8, where the first blend component containing renewable hydrocarbon component ~~(-s)~~ comprises a hydrocarbon substance having at least 70 % by weight having a boiling point above 300 °C ~~such as at least 70 % by weight having a boiling point above 350 °C; preferably the first blend component comprises a hydrocarbon substance comprising at least 70 % by weight having a boiling point above 370 °C such as at least 70 % by weight having a boiling point above 400 °C~~.

~~5.~~10. A hydrocarbon blend according to claim 49, where the first blend component containing the renewable hydrocarbon component~~(-s)~~ comprises a hydrocarbon substance comprising at least 50 % by weight having a boiling point above 300 °C ~~such as at least 50 % by weight of hydrocarbon substance having a boiling point above 350 °C; preferably the hydrocarbon substance of the first blend component comprises at least 50 % by weight having a boiling point above 370 °C such as hydrocarbon substance of the first blend component comprising a high at least 50 % by weight having a boiling point above 400 °C~~.

11. A hydrocarbon blend according to ~~any of the claims 4-5~~claim 9 or 10, where the first blend component containing the renewable hydrocarbon component~~(-s)~~ comprises a hydrocarbon substance comprising at least 10 % by weight having a boiling point above 400 °C. ~~such as at least 10 % by weight having a boiling point above 450 °C;~~

~~6.~~12. A hydrogen blend according to any one of claims 9 to 11, where the first blend component containing the renewable hydrocarbon component comprises a hydrocarbon substance comprising at least 10% by weight having a boiling point above 450°C.

~~7.~~13. A hydrocarbon blend according to any of ~~the preceding claims~~claims 1 to 12, where the first blend component is present in the final hydrocarbon blend in an ~~relative~~ amount of up between 10-75 wt. %, and where the second blend component is present in the final hydrocarbon blend in an ~~relative~~ amount of between 25-90 wt.%.

14. A hydrocarbon blend according to any one of ~~the preceding~~ claims 1 to 13, where the hydrocarbon substance of the first blend component containing the renewable hydrocarbon component~~(-s)~~ ~~have~~ has a water content of less than 1 % by weight ~~such as water content of less than 0.5 % by weight; preferably the hydrocarbon substance of the first blend component containing renewable hydrocarbon component(-s) have a water content of less than 0.25 % by weight such as a water content of less than 0.1 wt %~~.

~~8.~~15. A hydrocarbon blend according to any one of claims 1 to 13, wherein the hydrocarbon substance of the first blend component containing the renewable hydrocarbon component has a water content of less than 0.5% by weight.

~~9.~~16. A hydrocarbon blend according to any one of ~~the preceding~~ claims 1 to 15, where the first blend component is characterised by having the characteristics (δ_{d1}, δ_{p1}, δ_{h1}) = (17-20, 7-12, 7-12)~~.;~~

~~10.~~A hydrocarbon blend according to claim ~~9~~ 16 where the first blend component is characterised by having the characteristics (δ_{d1}, δ_{p1}, δ_{h1}) = (17-20, 7-9, 8.5-10);

~~11. A hydrocarbon blend according to any of the preceding claims, where the hydrocarbon substance in the first blend component comprising~~

~~renewable component(-s) is characterised by having the characteristics ($\delta_{\overline{d}}$, $\delta_{\overline{p}}$, $\delta_{\overline{h}}$) = (18.0-19,5, 6-12, 7-10) and where the linker substance is characterised by having the characteristics ranges ($\delta_{\overline{d3}}$, $\delta_{\overline{p3}}$, $\delta_{\overline{h3}}$)= (17-20, 4-6, 4-7).~~

17.

~~12. A hydrocarbon blend according to any of the preceding claims, where the first blend component is present in the final hydrocarbon blend in a relative amount of between 50-75 wt.%, where the second blend component is present in the final hydrocarbon blend in a relative amount of between 25-50 wt.%, and where further the linker substance optionally is present in the final hydrocarbon blend in a relative amount of between 0.5 to 5 wt.%.~~

~~13. A hydrocarbon blend according to any of the preceding claims, where the linker substance comprises or further comprises one or more components selected from each of the groups 1. Ketones, 2. Alcohols 3. Alkanes, 4. Aromatics such as toluene, xylene, cresol.~~

~~14. A hydrocarbon blend according to claim 13, where the linker substance comprises or further comprises 25-90 % by weight of ketones, 0.1-40 % by weight of alkanes, 1-40 % by weight of alcohols and 0.1-20 % by weight of toluene and/or xylene and/or creosol.~~

~~15.~~18. A hydrocarbon blend according to any one of ~~the preceding~~ claims 1 to 17, where ~~the~~ a viscosity of the hydrocarbon blend at 50 °C is in the range 160-180 cSt, ~~the~~ a flashpoint of the hydrocarbon blend above 60 °C, ~~the~~ a pour point of the hydrocarbon blend is less than 30 °C, and ~~the~~ a total acid number (TAN) is less than 2.5 mg KOH/g.

~~16.~~19. A hydrocarbon blend according to any one of ~~the preceding~~ claims 1 to 18, where the hydrocarbon substance of the first blend

component ~~and/or the hydrocarbon substance~~ is further characterized by having a Conradson Carbon Residue number of less than 25.

~~17.~~20. A hydrocarbon blend according to any one of ~~the preceding~~ claims 1 to 17, where the hydrocarbon substance of the first blend component and/or the substance is further characterized by having a total acid number (TAN) of less than 50 mg KOH/g. ~~such as less than 40 mg KOH/g, preferably the first blend component and/or the substance is further characterized by having a total acid number (TAN) of less than 30 mg KOH/g such as less than 20 mg KOH/g~~

~~18.~~ A hydrocarbon blend according to any one of claims 1 to 17~~any of the preceding claims~~, where the first blend component and/or the hydrocarbon substance is further characterized by:

- a flash point in the range 60 to 150 °C,
- a pour point below 30 °C,
- an ash content of less than 0.1% by weight,
- a Conradson Carbon Residue number of less than 20, and
- an acid number of less than 2.5 mg KOH/g.

21.

~~19. A hydrocarbon blend according to any of the preceding claims, where the hydrocarbon substance of the first blend component is further characterized by having an oxygen content of less than 15 % by weight such as an oxygen content of less than 12 % by weight; preferably the first blend component is further characterized by having an oxygen content of less than 10 % by weight such as an oxygen content of less than 8 % by weight.~~

~~20.~~22. A hydrocarbon blend according to any one of claims 1 to 21~~any of the preceding claims~~ wherein the oxygen content of the first hydrocarbon blend component and/or hydrocarbon substance ~~has an~~

~~oxygen content of~~is ~~less than 5 % by weight such as~~ less than 3 % by weight.

~~21.~~A hydrocarbon blend according to claim ~~20~~22, where the hydrocarbon substance of the first blend component is further characterized by having a viscosity at 50 °C in the range of 100~~0~~-10000 cSt ~~such as a viscosity at 50 °C in the range 100-1000 cSt~~.

23.

~~22. A hydrocarbon blend according to any of the preceding claims, where the hydrocarbon substance of the first blend component is produced from biomass and/or waste.~~

~~23.~~24. A hydrocarbon blend according to any one of claims 1 to 23 ~~22~~, where the production of the hydrocarbon substance of the first blend component is performed by a hydrothermal liquefaction process.

~~24.~~25. A hydrocarbon blend according to claim ~~23~~24, where the hydrocarbon substance of the first blend component is produced by:

a. Providing one or more biomass and/or waste materials contained in one or more feedstock;

b. Providing a feed mixture by slurrying the biomass and/or waste material(-s) in one or more fluids at least one of which comprises water;

c. Pressurizing the feed mixture to a pressure in the range 100 to 400 bar;

d. Heating the pressurized feed to a temperature in the range 300 °C to 450 °C;

e. Maintaining the pressurized and heated feed mixture in a reaction zone ~~in a reaction zone~~ for a conversion time of 3 to 30 minutes.

f. cooling the converted feed mixture to a temperature in the range 25 °C to 200 °C;

g. Expanding the converted feed mixture to a pressure of 1 to 120 bar;

h. Separating the converted feed mixture into a crude oil, a gas phase

and a water phase comprising water soluble organics and dissolved salts; and

i. Optionally further upgrading the crude oil by reacting it with hydrogen in the presence of one or more heterogeneous catalysts in one or more steps at a pressure in the range 60 to 200 bar and a temperature of 260 to 400 °C; and separating the upgraded crude oil into a fraction comprising low boiling compounds and a first hydrocarbon component comprising high boiling compounds.

~~25.~~26. An intermediate blend component for forming a hydrocarbon blend ~~according to any of the preceding claims~~, the intermediate blend component comprising a hydrocarbon substance containing hydrocarbon and a linker substance to form at least part of the intermediate blend component, where the hydrocarbon substance is characterised by having the characteristics $(\delta_{d1}, \delta_{p1}, \delta_{h1})$ = (17-20, 6-12, 7-10) and where the linker substance is characterised by having the characteristics $(\delta_{d3}, \delta_{p3}, \delta_{h3})$ = (17-20, 3-6, 3-6); where the hydrocarbon substance is present in the intermediate blend component in an ~~relative~~ amount of between 90-99,5 wt.% and where further the linker substance is present in the intermediate blend component in an ~~relative~~ amount of between 0.5 to 10 wt.%; ~~.~~

wherein δ_d is the Hansen Solubility parameter associated with dispersion, δ_p is the Hansen Solubility parameter associated with polarity and, δ_h is the Hansen Solubility parameter associated with hydrogen bonding;

wherein the hydrocarbon substance of the first blend component is produced from biomass and/or waste; and

wherein the first blend component and/or hydrocarbon substance has an oxygen content of less than 5% by weight.

~~26.~~27. An intermediate blend component according to claim ~~25~~26, where the hydrocarbon substance is present in the intermediate blend component

in an ~~relative a~~mount of ~~up~~ between 95-99.5 wt.% and where further the linker substance is present in the intermediate blend component in an ~~relative~~ amount of ~~up~~ between 0.5 to 5 wt.%.

~~27.~~28. A method of producing a hydrocarbon blend containing a renewable ~~according to any of the preceding claims~~hydrocarbon component, where the method comprises the steps of:

- Providing a first blend component comprising ~~a~~ the renewable hydrocarbon component characterized by having the characteristics (δ_{d1}, δ_{p1}, δ_{h1}) = (17-20, 6-10, 6-10) in an amount of up to 80 % by weight of the final hydrocarbon blend;
- Providing a second blend component containing a petroleum derived hydrocarbon characterised by having the characteristics (δ_{d2}, δ_{p2}, δ_{h2}) = (17-20, 3-6, 3-6); and
- Adding the first blend component to the second blend component to form the hydrocarbon blend, ~~.~~wherein δ_d is the Hansen Solubility parameter associated with dispersion, δ_p is the Hansen Solubility parameter associated with polarity and, δ_h is the Hansen Solubility parameter associated with hydrogen bonding; wherein the hydrocarbon substance of the first blend component is produced from biomass and/or waste; and wherein the first blend component and/or hydrocarbon substance has an oxygen content of less than 5% by weight.

~~28.~~29. A method of producing a hydrocarbon blend according to claim ~~27~~28, where the method further comprises the steps of:

- Providing a linker substance having the characteristics (δ_{d3}, δ_{p3}, δ_{h3}) = (17-20, 3-6, 3-6) in an ~~relative~~ amount of between 0.5 to 10 wt.% of the final hydrocarbon blend;

- Adding the linker substance to the first or to the second blend component to form an intermediate blend component; and
- Adding the second or the first blend component to the intermediate blend component to form the hydrocarbon blend.

~~29.~~30. A method according to ~~any of the preceding~~ claim ~~29~~s, where the first blend component and/or the second blend component and/or the intermediate blend component is heated to a temperature in the range 70-150°C prior to forming the hydrocarbon blend.

~~30.~~31. A method according to ~~any of the preceding~~ claims 29 to ~~30~~s, where the intermediate blend component comprising the first or the second blend component and the linker substance is manipulated to form a homogenous mixture prior to adding the second or the first blend component to form the hydrocarbon blend.

~~31.~~32. A method according to claim ~~30~~31, where the manipulation to form a homogenous mixture is carried out by stirring the mixture or by pumping the mixture.

~~32.~~33. A method for preparing the production of a hydrocarbon blend ~~according to any of the preceding claims~~, the method comprising measuring the characteristics (δ_{d1}, δ_{p1}, δ_{h1}) of a first blend component containing a renewable hydrocarbon component~~;~~, measuring the characteristics (δ_{d2}, δ_{p2}, δ_{h2}) of a second blend component; and~~,~~ determining the compatibility of the first and the second component based on the measurement of the characteristics, wherein δ_d is the Hansen Solubility parameter associated with dispersion, δ_p is the Hansen Solubility parameter associated with polarity and, δ_h is the Hansen Solubility parameter associated with hydrogen bonding; wherein the hydrocarbon

substance of the first blend component is produced from biomass and/or waste; wherein the first blend component and/or hydrocarbon substance has an oxygen content of less than 5% by weight; wherein the compatibility is determined by comparison of the Hansen Solubility parameters of the first and second components.

~~33.~~34. A method according to claim ~~32~~33, where~~in, upon determining~~ the compatibility ~~is determined to be present based on the measured characteristics and~~of the first and the second components based on the measured characteristics of the first and second components, directly mixing the first and second components~~are accepted for direct mixing~~.

~~34.~~35. A method according to claim 34~~33~~, where~~, upon determining incompatibility of~~ the first and the second component ~~are determined to be incompatible~~ based on the measured characteristics, ~~where~~ selecting a linker substance ~~is selected~~ having characteristics ~~(~~(δ_{d3}, δ_{p3}, δ_{h3}~~)~~) and ~~where~~ adding the linker substance ~~is added~~ to the first or the second component to achieve compatibility.