

CLAIMS:

1. A method for hydroprocessing a biocomponent feedstock, comprising:
treating an off-gas stream from a fluid catalytic cracking reactor to remove hydrogen sulfide and carbon dioxide, the treated off-gas stream having a hydrogen content of not more than 25%; and

hydroprocessing a feedstock comprising a biocomponent portion in a reactor in the presence of the treated off-gas stream, a catalyst with hydrogenation activity, and steam under effective hydroprocessing conditions to produce a vapor effluent, an aqueous effluent, and a diesel boiling range product;

wherein the effective hydroprocessing conditions include an LHSV from about 0.5 hr⁻¹ to 1.5 hr⁻¹, a temperature from about 600°F to about 650°F (about 316°C to about 343°C), and a hydrogen partial pressure from about 15 psig to about 200 psig (about 103 kPag to about 1.4 Mpag).

2. The method of claim 1, wherein the catalyst is a water gas shift catalyst.

3. The method of claim 2, wherein the water gas shift catalyst comprises an oxide of iron, copper, zinc, chromium, or a combination thereof.

4. The method of claim 3, wherein the water gas shift catalyst comprises Fe₃O₄.

5. The method of ~~any one of the previous claims~~ claim 2, wherein the feedstock is substantially free of sulfur.

6. The method of ~~any one of the previous claims~~ claim 2, wherein the treated off-gas stream is substantially free of sulfur.

7. The method of ~~any one of the previous claims~~ claim 1, wherein the catalyst comprises a spent hydrotreating catalyst.

~~8. The method of any one of the previous claims, wherein the effective hydroprocessing conditions include an LHSV from about 0.5 hr⁻¹ to 1.5 hr⁻¹, a temperature from about 600°F to about 650°F (about 316°C to about 343°C), and a hydrogen partial pressure from about 10 psig to about 200 psig (about 69 kPag to about 1.4 MPag).~~

~~9. The method of claim 8, wherein the hydrogen partial pressure is at least about 15 psig (about 103 kPag).~~

~~10.8. The method of any one of the previous claims claim 1, wherein the biocomponent portion is reacted in the presence of an additional hydrogen-containing stream.~~

~~11.9. The method of any one of the previous claims claim 1, wherein hydroprocessing the feedstock comprises introducing the feedstock into the reactor in a counter-current manner relative to the treated off-gas stream.~~

~~12.10. The method of any one of the previous claims claim 1, wherein the vapor effluent is used as a refinery fuel gas.~~

~~13.11. The method of any one of the previous claims claim 1, further comprising hydroisomerizing the diesel boiling range product.~~

~~14.12. The method of any one of the previous claims claim 1, further comprising mixing the diesel boiling range product with a mineral feed and hydrotreating the mixed feed under effective hydrotreating conditions.~~

~~15. A system for hydroprocessing a biocomponent feed, comprising: a hydroprocessing reactor, including an input conduit for introducing a biocomponent feedstock and a liquid effluent conduit; at least one catalyst in the hydroprocessing reactor having hydrogenation activity; a fluid catalytic cracking reactor, including at least one output conduit for removing an off-gas; an intervening conduit to provide~~

~~fluid communication between the output conduit of the fluid catalytic cracking reactor and the input conduit of the hydroprocessing reactor; a scrubber for removing hydrogen sulfide and carbon dioxide from a flow in the intervening conduit; and a separator for separating an aqueous effluent from a diesel boiling range product in the liquid effluent conduit of the hydroprocessing reactor.~~