CLAIMS

~~A method for recycling an effluent downstream from~~

1. An integrated process comprising:

a) passing a carbonaceous material to a gasification process to produce a syngas stream comprising CO and H_2;

~~1.~~b) passing the syngas stream to a fermentation process~~, the method comprising:~~ comprising a bioreactor containing a C1-fixing bacteria in a liquid nutrient medium to produce an effluent stream comprising at least one fermentation product and biomass;

~~a.~~c)~~recovering~~passing the effluent stream to a product recovery process to produce a stream comprising biomass, a product stream comprising at least a portion of the at least one ~~effluent downstream from the~~ fermentation ~~process;~~product, and a waste water stream; and

d) ~~directing~~passing at least a portion of ~~at least one effluent~~the stream comprising biomass to a drying zone to produce a dried biomass stream containing from greater than 20% water to about 40% water by weight;

~~b.~~e)passing the dried biomass to a gasification process~~.~~ ~~where~~ the biomass is gasified to produce syngas.

~~2. The method of claims 1, wherein the effluent is selected from the group consisting of: biogas generated from a wastewater treatment process, unused syngas generated by the gasification process, microbial biomass generated from the fermentation process, microbial biomass generated from a wastewater treatment process, crude ethanol from a product recovery process, fusel oil from the product recovery process, microbial biomass depleted water, wastewater generated from the fermentation process, and clarified water from a wastewater treatment process.~~

~~3.~~2. The method of claim ~~2, wherein~~1 further comprising passing at least a portion of ~~at least one effluent is gasified~~ the biomass to ~~produce a syngas stream~~the fermentation process.

~~4.~~3. The ~~method~~process of claim ~~3, wherein~~ 1 further comprising passing at least a portion of the ~~syngas stream is passed to the fermentation process~~waste water stream comprising biomass to a waste water treatment process to produce a biogas stream and passing the biogas stream to the gasifier.

4. ~~The method~~The process of claim 3 wherein methane contained in the biogas is reformed to produce CO and H_2.

5. The process of claim 3, wherein microbial biomass generated from the fermentation process or the wastewater treatment process is dried prior to being gasified.

6. The method of claim 2, wherein at least a portion of at least one effluent selected from wherein the group consisting of: the biogas generated from the wastewater treatment process, unused syngas generated by the gasification process, crude ethanol from the product recovery process, fusel oil from the product recovery process is utilizedbiogas is used in the gasifier as a heating source in the gasification process.

7.5. The method of claim 6, wherein the gasification process utilizes at least a portion of at least one effluent for melting at least a portion of a slag produced by the gasification process.

6. The methodprocess of claim 2,1 wherein the gasificationproduct recovery process utilizes at leastfurther produces a portion of the biogas from the wastewater treatment process for meltingstream comprising fusel oil.

7. The process of claim 6 wherein the stream comprising fusel oil is passed to the gasifier and used as a heating source.

8. The process of claim 7 wherein the stream comprising fusel oil is used to melt at least a portion of a slag produced by the gasification process.

9. The methodprocess of claim 2,1 wherein at least a portion of at least one effluent replaces at least a portion of a process the waste water requiredstream from the product recovery process is passed to the gasification process and injected into the syngas stream produced by the gasification processzone to reduce the temperature of the syngas stream.

10. The methodprocess of claim 9,3 wherein the processwaste water requiredtreatment process further produces a clarified water stream.

11. The process of claim 10 wherein the clarified water stream is passed to the gasification process and injected into the syngas stream produced by the gasification zone to reduce the temperature of the syngas stream.

12. The process of claim 10 wherein the clarified water stream is passed the gasification process to increase the H_2:CO ratio.

13. The process of claim 1 where the product stream comprises crude ethanol.

14. The process of claim 13 where at least a portion of the crude ethanol product stream is passed to the gasifier for use as a heat source.

15. The process of claim 14 where the crude ethanol product stream is used to melt at least a portion of a slag produced by the gasification process.

~~10.~~16. The process of claim 11 wherein the temperature of the syngas stream is reduced by at least ~~45 percent~~100^0C.

11. ~~The method of claim 2, wherein at least a portion of at least one effluent is injected into a syngas stream produced by the gasification process to reduce the temperature of the syngas stream.~~

~~12.~~17. ~~The method of claim 11,~~The process of claim 9 wherein the temperature of the syngas stream is reduced by at least ~~100 degrees Celsius.~~100^0C.

13. ~~The method of claim 2, wherein at least a portion of at least one effluent is injected into a syngas stream produced by the gasification process to remove at least one particulate from the syngas stream.~~

14. ~~The method of claim 2, wherein the microbial biomass comprises one or more C1-fixing microorganism.~~

15. ~~The method of claim 14,~~The process of claim 1 wherein the C1-fixing ~~microorganism~~bacteria is selected from the group consisting of: *Moorella*, *Clostridium*, *Ruminococcus*, *Acetobacterium*, *Eubacterium*, *Butyribacterium*, *Oxobacter*, *Methanosarcina*, and *Desulfotomaculum*.

16. ~~The method of claim 2, wherein the biogas generated from the wastewater treatment process comprises one or more component selected from the group consisting of: methane, carbon dioxide, carbon monoxide, ammonia, and a sulfur compound.~~

17. ~~The method of claim 16, wherein the sulfur compound is hydrogen sulfide.~~

18. ~~The method of claim 16, wherein at least a portion of the methane is reformed to produce carbon monoxide and hydrogen.~~