Claims:

What is claimed is:

1. An integrated system, comprising:

an oxygen stream;

a main control fuel stream;

a main combustion unit configured to receive and combust the main control fuel stream and the oxygen stream to produce a gaseous combustion stream having carbon dioxide and water;

a first power generation system configured to receive the gaseous combustion stream and produce at least a compressed gaseous substantially carbon dioxide stream;

a second power generation system configured to receive thermal energy from the gaseous combustion stream and convert the thermal energy into at least one unit of power.

2. The system of claim 1 further including a heat exchange unit configured to receive the gaseous combustion stream, extract the thermal energy from the gaseous combustion stream, and transfer the thermal energy to the second power generation system.

3. The system of claim 2 wherein the heat exchange unit transfers the thermal energy to a compressed turbine air stream of the second power generation system to form a heated compressed turbine air stream.

4. The system of claim 3 wherein the second power generation system further includes a supplemental combustion unit configured to receive the heated compressed turbine air stream, receive a supplemental control fuel stream, and combust the heated compressed turbine air stream with the supplemental control fuel stream to form a combustor exhaust stream.

5. The system of claim 4 further including an expander for receiving the combustor exhaust stream, wherein the supplemental combustion unit is configured to provide the combustor exhaust stream to the expander at a temperature substantially equal to a preferred operating inlet temperature of the expander.

6. The system of claim 4 further including an expander for receiving the combustor exhaust stream, wherein the supplemental combustion unit is configured to provide the combustor exhaust stream to the expander at a temperature less than a preferred operating inlet temperature of the expander.

7. The system of claim 4 wherein the main control fuel stream and the supplemental control fuel stream are supplied by a single shared fuel source.

8. The system of claim 4 further including a reformer configured to receive steam and a reaction fuel source and further configured to generate hydrogen, wherein at least a portion of the hydrogen is used for the supplemental control fuel stream.

9. The system of claim 8 wherein another portion of the hydrogen is captured for resale.

10. The system of claim 1 further including a reformer configured to receive steam and a reaction fuel source and further configured to generate hydrogen, wherein at least a portion of reformer products, the hydrogen, or both is used for the main control fuel stream.

11. The system of claim 1 further including an Air Separation Unit for generating the oxygen stream.

12. The system of claim 11 wherein the oxygen stream is pressurized prior to combustion in the main combustion unit.

13. The system of claim 11 wherein the pressure of the oxygen stream is substantially equal to atmospheric pressure when the oxygen stream is received by the main combustion unit.

14. The system of claim 11 wherein the Air Separation Unit also generates a nitrogen stream and the nitrogen stream is injected into a pressure maintenance reservoir.

15. The system of claim 14 wherein the second power generation system includes a supplemental combustion unit configured to receive a supplemental control fuel stream and the supplemental control fuel stream is produced from the pressure maintenance reservoir.

16. The system of claim 1 wherein at least a portion of the compressed gaseous substantially carbon dioxide stream is recirculated back to the main combustion unit.

17. The system of claim 16 wherein an exhaust gas from at least one external source is mixed with the compressed gaseous substantially carbon dioxide stream.

18. The system of claim 1 wherein at least a portion of the compressed gaseous substantially carbon dioxide stream is injected into a reservoir.

19. The system of claim 18 wherein the main control fuel stream is produced from the reservoir.

20. The system of claim 18 wherein an exhaust gas from at least one external source is mixed with the compressed gaseous substantially carbon dioxide stream.

21. The system of claim 1 wherein the second power generation system includes:

a compressor configured to receive an air source and generate a compressed turbine air stream;

a heat exchange unit configured to receive the gaseous combustion stream, extract the thermal energy from the gaseous combustion stream, and transfer the thermal energy to the compressed turbine air stream to form a heated compressed turbine air stream; and

an expander configured to receive the heated compressed turbine air stream and generate a gas turbine exhaust.

22. The system of claim 21 wherein the heat exchange unit is a ceramic heat exchanger and the heated compressed turbine air stream is at a temperature substantially equal to a preferred operating inlet temperature of the expander.

23. The system of claim 21 wherein the heated compressed turbine air stream is at a temperature substantially less than a preferred operating inlet temperature of the expander.

24. The system of claim 21 further including a supplemental combustion unit configured to receive the heated compressed turbine air stream from the heat exchange unit, and increase the temperature of the heated compressed turbine air stream through combustion of a supplemental control fuel stream.

25. The system of claim 1 wherein a water stream is produced from the water of the gaseous combustion stream and the water stream is injected into a reservoir to enhance hydrocarbon recovery.

26. The system of claim 25 wherein the water stream is a low-salinity water stream.

27. The system of claim 1 wherein a water stream is produced from the water of the gaseous combustion stream and the water stream is used in connection with at least one of well work, drilling, plant cooling, and a steam system.

28. The system of claim 1 wherein the oxygen stream comprises air.

29. A method for low emission hydrocarbon recovery with power production, the method comprising the steps of:

generating a gaseous combustion stream having carbon dioxide and water;

generating a compressed air stream;

transferring heat from the gaseous combustion stream to the compressed air stream to form a cooled gaseous combustion stream and a heated compressed air stream;

producing power, a water stream, and a carbon dioxide stream from the cooled gaseous combustion stream using a first power generation system;

producing power from the heated compressed air stream using a second power generation system; and

injecting at least a portion of the carbon dioxide stream into a reservoir to increase hydrocarbon production.

30. The method of claim 29 further including the step of increasing the temperature of the heated compressed air stream prior to producing power from the second power generation system.

31. The method of claim 30 wherein the temperature of the heated compressed air stream is increased using a supplemental combustion unit.

32. The method of claim 31 wherein the supplemental combustion unit is configured to receive and combust a hydrogen fuel source produced by a reformer.

33. The method of claim 29 wherein transferring the heat from the gaseous combustion stream to the compressed air stream is performed by a heat exchange unit.

34. The method of claim 29 wherein the gaseous combustion stream having carbon dioxide and water is generated by a main combustion unit combusting a mixture of oxygen and fuel.

35. The method of claim 34 wherein the oxygen is generated by an Air Separation Unit.

36. The method of claim 34 wherein the oxygen is provided as air.

37. The method of claim 34 further including the step of re-circulating at least a portion of the carbon dioxide stream to the main combustion unit to moderate combustion temperature in the main combustion unit.

Claims:

1. A method for low emission hydrocarbon recovery with power production, the method comprising the steps of:

generating a gaseous combustion stream having carbon dioxide and water;

generating a compressed air stream;

transferring heat from the gaseous combustion stream to the compressed air stream to form a cooled gaseous combustion stream and a heated compressed air stream;

producing power, a water stream, and a carbon dioxide stream from the cooled gaseous combustion stream using a first power generation system;

producing power from the heated compressed air stream using a second power generation system; and

injecting at least a portion of the carbon dioxide stream into a reservoir to increase hydrocarbon production,

wherein transferring the heat from the gaseous combustion stream to the compressed air stream is performed by a heat exchange unit.