CLAIMS

1. A hydrocarbon processing system for liquefied natural gas (LNG) production, comprising:

a fluorocarbon refrigeration system configured to cool a natural gas to produce LNG using a mixed fluorocarbon refrigerant; and

a nitrogen rejection unit (NRU) configured to remove nitrogen from the LNG; and

a nitrogen refrigeration system configured to further cool the natural gas to produce the LNG using a nitrogen refrigerant.

2. The hydrocarbon processing system of claim 1, comprising an autorefrigeration system configured to further cool the natural gas to produce the LNG.

3. The hydrocarbon processing system of claim 2, wherein the autorefrigeration system comprises a plurality of flash drums and a plurality of expansion devices.

4. The hydrocarbon processing system of claim 1, wherein at least a portion of the natural gas is cooled using a nitrogen stream separated from the natural gas via the NRU.

5. The hydrocarbon processing system of claim 1, wherein the fluorocarbon refrigeration system comprises a single mixed refrigerant cycle.

6. The hydrocarbon processing system of claim 1, wherein the fluorocarbon refrigeration system comprises a pre-cooled mixed refrigerant cycle.

7. The hydrocarbon processing system of claim 1, wherein the fluorocarbon refrigeration system comprises a dual mixed refrigerant cycle.

8. The hydrocarbon processing system of claim 7, wherein the dual mixed refrigerant cycle comprises:

a first mixed refrigerant cycle that uses a warm mixed fluorocarbon refrigerant; and

a second mixed refrigerant cycle that uses a cold mixed fluorocarbon refrigerant,

wherein the first mixed refrigerant cycle and the second mixed refrigerant cycle are connected in series.

9. The hydrocarbon processing system of claim 1, wherein the fluorocarbon refrigeration system comprises a triple mixed refrigerant cycle.

10. The hydrocarbon processing system of claim 1, wherein the fluorocarbon refrigeration system comprises a heat exchanger configured to allow for cooling of the natural gas via an indirect exchange of heat between the natural gas and the mixed fluorocarbon refrigerant.

11. The hydrocarbon processing system of claim 1, wherein the fluorocarbon refrigeration system comprises:

a compressor configured to compress the mixed fluorocarbon refrigerant to provide a compressed mixed fluorocarbon refrigerant;

a chiller configured to cool the compressed mixed fluorocarbon refrigerant to provide a cooled mixed fluorocarbon refrigerant; and

a heat exchanger configured to cool the natural gas via indirect heat exchange with the cooled mixed fluorocarbon refrigerant.

12. The hydrocarbon processing system of claim 1, wherein the hydrocarbon processing system is configured to chill the natural gas for hydrocarbon dew point control.

13. The hydrocarbon processing system of claim 1, wherein the hydrocarbon processing system is configured to chill the natural gas for natural gas liquid extraction.

14. The hydrocarbon processing system of claim 1, wherein the hydrocarbon processing system is configured to separate methane and lighter gases from carbon dioxide and heavier gases.

15. The hydrocarbon processing system of claim 1, wherein the hydrocarbon processing system is configured to prepare hydrocarbons for liquefied petroleum gas production storage.

16. The hydrocarbon processing system of claim 1, wherein the hydrocarbon processing system is configured to condense a reflux stream.

17. A method for liquefied natural gas (LNG) production, comprising:

cooling a natural gas to produce LNG in a fluorocarbon refrigeration system using a mixed fluorocarbon refrigerant; and

removing nitrogen from the LNG in a nitrogen rejection unit (NRU); and.

further cooling the natural gas to produce the LNG in a nitrogen refrigeration system using a nitrogen refrigerant.

18. The method of claim 17, comprising further cooling the natural gas to produce the LNG in an autorefrigeration system.

19. The method of claim 18, comprising cooling at least a portion of the natural gas using a nitrogen stream separated from the natural gas via the NRU.

20. The method of claim 17, wherein cooling the natural gas in the fluorocarbon refrigeration system comprises:

compressing the mixed fluorocarbon refrigerant to provide a compressed mixed fluorocarbon refrigerant;

cooling the compressed mixed fluorocarbon refrigerant by indirect heat exchange with a cooling fluid to provide a cooled mixed fluorocarbon refrigerant;

passing the cooled mixed fluorocarbon refrigerant to a heat exchange area; and

heat exchanging the natural gas with the cooled mixed fluorocarbon refrigerant in the heat exchange area.

21. A hydrocarbon processing system for formation of a liquefied natural gas (LNG), comprising:

a mixed refrigerant cycle configured to cool a natural gas using a mixed fluorocarbon refrigerant, wherein the mixed refrigerant cycle comprises a heat exchanger configured to allow for cooling of the natural gas via an indirect exchange of heat between the natural gas and the mixed fluorocarbon refrigerant;

a nitrogen rejection unit (NRU) configured to remove nitrogen from the natural gas; and

a methane autorefrigeration system configured to cool the natural gas to produce the LNG.

22. The hydrocarbon processing system of claim 21, wherein the mixed fluorocarbon refrigerant comprises a mixture of two or more hydrofluorocarbon refrigerants.

23. The hydrocarbon processing system of claim 21, wherein a nitrogen stream separated from the natural gas via the NRU is used to cool at least a portion of the natural gas.

24. The hydrocarbon processing system of claim 21, wherein the methane autorefrigeration system comprises a plurality of expansion devices and a plurality of flash drums.