CLAIMS:

1. A method for producing liquefied natural gas (LNG), comprising:

transporting liquid nitrogen in a liquefaction vessel;

transporting a natural gas stream to the liquefaction vessel;

liquefying the natural gas stream on the liquefaction vessel using at least one heat exchanger that exchanges heat between the natural gas stream and a liquid nitrogen stream from the transported liquid nitrogen, to at least partially vaporize the liquefied nitrogen stream, thereby forming a warmed nitrogen gas stream and an at least partially condensed natural gas stream comprising LNG; and

storing and transporting the LNG on the liquefaction vessel in a tank that only stores LNG therein;

wherein the liquefaction vessel further includes at least one tank that only stores and transports liquid nitrogen therein and at least one tank that stores either LNG or liquid nitrogen therein.

2. The method of claim 1, further comprising:

obtaining the natural gas stream from a floating production unit (FPU) vessel that produces natural gas from a reservoir and treats the produced natural gas to remove at least one of water, heavy hydrocarbons, and sour gases therefrom prior to transporting the natural gas stream to the liquefaction vessel.

3. The method of claim 2, further comprising:

transporting the warmed nitrogen gas stream to the FPU vessel; and

using the warmed nitrogen gas stream within a process on the FPU vessel.

4. The method of claim 3, further comprising:

compressing the warmed nitrogen gas stream on the FPU; and

injecting the compressed warmed nitrogen gas stream into a reservoir for pressure maintenance.

5. The method of any one of claims 1-4, further comprising:

reducing the pressure of the warmed nitrogen gas stream to produce at least one additionally cooled nitrogen gas stream; and

exchanging heat between the at least one additionally cooled nitrogen gas stream and the natural gas stream to form at least one additional warmed nitrogen gas stream.

6. The method of claim 5, wherein the pressure of the warmed nitrogen gas stream is reduced using at least one expander service, and further comprising generating electrical power from at least one generator coupled to the at least one expander service.

7. The method of any one of claims 1-6, further comprising:

transporting the natural gas stream to the liquefaction vessel via a moored floating disconnectable turret configured to be connected, disconnected, and reconnected to the liquefaction vessel.

8. The method of claim 7, wherein a single liquefaction vessel is used for LNG production and storage at the export terminal, and further comprising:

storing LNG at an export terminal and transporting the LNG to an import terminal using more than one of LNG carriers, liquid nitrogen carriers and dual-purpose carriers.

9. The method of any one of claims 1-6, further comprising:

transporting the natural gas stream to the liquefaction vessel via a loading arm connected to an onshore gas pipeline, the loading arm being configured to be connected, disconnected, and reconnected to the liquefaction vessel.

10. The method of claim 9, further comprising:

transporting liquid nitrogen from a separate vessel to the liquefaction vessel via a cryogenic liquid loading arm configured to be connected, disconnected, and reconnected to the liquefaction vessel, the liquid nitrogen stream comprising the transported liquid nitrogen; or

transporting the LNG from the liquefaction vessel to a separate vessel via a cryogenic liquid loading arm configured to be connected, disconnected, and reconnected to the liquefaction vessel.

11. The method of any one of claims 1-10, further comprising:

at an LNG import terminal, liquefying nitrogen gas using available exergy from gasification of the LNG, thereby forming the liquefied nitrogen in the liquid nitrogen stream.

12. The method of any one of claims 1-11, further comprising:

during liquefaction turndown and/or shutdown periods, maintaining a temperature of liquefaction equipment on the liquefaction vessel using one of liquid nitrogen and liquid nitrogen boil-off gas.

13. The method of any one of claims 1-12, further comprising the use of warm nitrogen gas to derime the at least one heat exchanger during periods between LNG production on the liquefaction vessel.

14. A system for liquefying a natural gas stream, comprising:

a liquefaction vessel that transports liquefied natural gas from a first location to a second location and transports liquefied nitrogen (LIN) to the first location, the liquefaction vessel including;

at least one tank that only stores and transports LIN,

at least one tank that only stores and transports LNG,

at least one tank that stores either LNG or LIN therein, and

an LNG liquefaction system including at least one heat exchanger that exchanges heat between a LIN stream from LIN stored and transported on the natural gas liquefaction vessel and the natural gas stream, which is transported to the natural gas liquefaction vessel, to at least partially vaporize the LIN stream, thereby forming a warmed nitrogen gas stream and an at least partially condensed natural gas stream comprising LNG, the LNG configured to be stored on the natural gas liquefaction vessel to be transported to the second location.

15. The system of claim 14, further comprising:

a floating production unit (FPU) vessel configured to produce the natural gas stream from a reservoir and to remove at least one of water, heavy hydrocarbons, and sour gases from the natural gas stream prior to transporting the natural gas stream to the liquefaction vessel.

16. The system of claim 14 or claim 15, wherein a pressure of the warmed nitrogen gas stream is reduced to produce at least one additionally cooled nitrogen gas stream, and further comprising a second heat exchanger configured to exchange heat between the at least one additionally cooled nitrogen gas stream and the natural gas stream to thereby form additional warmed nitrogen gas streams.

17. The system of claim 16, further comprising:

at least one expander service configured to reduce a pressure of the warmed nitrogen gas stream; and

at least one generator coupled to the at least one expander service, each of the at least one generators configured to generate electrical power.

18. The system of claim 17, further comprising motor driven compressors powered by the at least one generator, the motor driven compressors configured to compress the warmed nitrogen gas stream.

19. The system of any one of claims 14-18, further comprising a moored floating disconnectable turret configured to be connected, disconnected, and reconnected to the liquefaction vessel, wherein the natural gas stream is transported to the liquefaction vessel via the moored floating disconnectable turret.

20. The system of any one of claims 14-19, further comprising a cryogenic liquid loading arm for transporting LIN from a separate vessel to the liquefaction vessel, the cryogenic liquid loading arm configured to be connected, disconnected, and reconnected to the liquefaction vessel.