CLAIMS:

What is claimed is:

1. A process comprising:

(A) supplying a hydrocarbon feed and a steam feed into a syngas producing unit comprising a reforming reactor under syngas producing conditions to produce a reformed stream exiting the reforming reactor, wherein the syngas producing conditions include the presence of a reforming catalyst, and the reformed stream comprises H_2, CO, and steam;

(B) cooling the reformed stream by using a waste heat recovery unit ("WHRU") to produce a cooled reformed stream and to generate a high-pressure steam ("HPS") stream;

(C) heating the HPS stream to obtain a super-heated high-pressure steam ("SH-HPS") stream, wherein the SH-HPS stream has a pressure higher than a pressure of the steam feed supplied to the syngas producing unit in step (A);

(D) expanding at least a portion of the SH-HPS stream in at least one steam turbine to produce shaft power and an expanded steam stream having a pressure equal to or higher than the steam feed, wherein the at least one steam turbine is located in a hydrocarbon production plant, wherein the hydrocarbon production plant is an olefins production plant and the shaft power produced in step (D) drives an equipment located in the olefins production plant; and

(E) supplying at least a portion of the expanded steam stream as the steam feed in step (A).

2. The process of claim 1, wherein:

the syngas producing unit comprises a steam methane reformer ("SMR"); and

the SMR comprises: a plurality of SMR burners where a SMR fuel combusts to supply thermal energy to the SMR; a radiant section heated by the thermal energy in which the hydrocarbon feed and steam reacts under the syngas producing conditions; a convection section heated by the thermal energy in which the hydrocarbon feed and steam are preheated before entering the radiant section.

3. The process of claim 2, wherein step (C) comprises:

heating the HPS stream generated in step (B) in the convection section of the SMR and/or an auxiliary furnace to obtain the SH-HPS stream, wherein the SH-HPS stream obtained in step (C) has at least one of the following: a temperature from 350 °C to 550 °C, and a pressure from 4000 kPa to 14,000 kPa.

4. The process of claim 1, wherein:

the syngas producing unit comprises an autothermal reformer ("ATR");

an O_2 stream is fed into the ATR;

the ATR comprises a reaction vessel into which the hydrocarbon feed, the steam feed, and the O_2 stream are fed;

the reforming conditions comprises the presence of an ATR catalyst in the reaction vessel; and

the reformed stream has at least one of the following: a temperature from 800 °C to 1100 °C; and an absolute pressure from 2,000 kPa to 5,000 kPa.

5. The process of claim 4, wherein step (C) comprises:

heating the HPS stream generated in step (B) in an auxiliary furnace to obtain the SH-HPS stream, wherein the SH-HPS stream obtained in step (C) has at least one of the following: a temperature from 350 °C to 550 °C, and a pressure from 4,000 kPa to 14,000 kPa.

6. The process of any of the preceding claims, wherein the expanded steam stream produced in step (D) has at least one of the following: a temperature from 260 °C to 405 °C; and an absolute pressure from 1,380 kPa to 4,500 kPa.

7. The process of any of the preceding claims, wherein the equipment is a gas compressor, pump or an electricity generator, or wherein the equipment is a compressor and the shaft power produced in step (D) drives the compressor located in the olefins production plant including a steam cracker therein operated under steam cracking conditions to convert a steam cracker feed into a steam cracker effluent comprising olefins.

8. The process of any of the preceding claims, wherein in step (D), one stage of the steam turbine is used.

9. The process of any of the preceding claims, wherein the steam feed in step (A) has an absolute pressure of at least 1,700 kPa, and the SH-HPS stream obtained in step (C) has a temperature of at least 371 °C and an absolute pressure of at least 4,000 kPa; or wherein the steam feed in step (A) has an absolute pressure of at least 1700 kPa, and the SH-HPS stream obtained in step (C) has a temperature of at least 482 °C and an absolute pressure of at least 10,000 kPa.

10. The process of claim 9, wherein the steam feed in step (A) has an absolute pressure of at least 2,500 kPa.

11. The process of any of the preceding claims, wherein step (D) comprises:

(D1) expanding the at least a portion of the SH-HPS stream in a first stage steam turbine to produce shaft power and an intermediate steam stream; and

(D2) expanding at least a portion of the intermediate steam stream in a second stage steam turbine to produce additional shaft power and the expanded steam stream.

12. The process of any of the preceding claims, wherein the SH-HPS stream produced in step (C) is a super-high-pressure steam ("Super-HPS") stream having an absolute pressure of ≥ 8,370 kPa, and the SH-HPS stream is supplied to a SUPER-HPS header supplying steam to the steam turbine of step (D).

13. The process of any of claims 11 to 12, wherein the intermediate steam stream is supplied to a HPS header or a medium pressure steam ("MPS") header, depending on the pressure of the intermediate steam stream, supplying steam to the second stage steam turbine.

14. The process of any of claims 11 to 13, wherein the first stage steam turbine drives a process gas compressor located in an olefins production plant having a steam cracker therein.

15. The process of any of claims 11 to 14, wherein the second stage steam turbine drives a process gas compressor, a refrigeration compressor, an air compressor, and/or a pump located in the olefins production plant.