WHAT IS CLAIMED IS:

1. A system, comprising:

a power plant that comprises outputs comprising a thermal energy output and an electrical power output;

an industrial process that is electrically coupled to the electrical power output of the power plant and that comprises a source of heat thermally coupled to a heating fluid to transfer heat from the source of heat to the heating fluid;

a direct air capture (DAC) system electrically coupled to the electrical power output of the power plant, the DAC system comprising:

an ambient airflow input through which ambient air enters the DAC system,

a carbon dioxide output, and

a carbon dioxide source material comprising an adsorbent to which carbon dioxide from the ambient air bonds,

wherein the carbon dioxide source material is arranged to receive heat from at least one of the heating fluid or the thermal energy output of the power plant, and

wherein, when heated, adsorbed carbon dioxide is separated from the carbon dioxide source material and provided as a carbon dioxide supply stream to the carbon dioxide output; and

a heating system that comprises at least one thermodynamic cycle comprising a refrigerant fluid thermally coupled to the heating fluid, the refrigerant fluid comprising a thermal energy from at least a portion of the heat from the source of heat from the heating fluid and a heat of compression of the at least one thermodynamic cycle, wherein the at least one thermodynamic cycle comprises at least one vapor-compression cycle, and the heating system comprises a heat-pump system,

wherein the at least one vapor-compression cycle comprises:

a first vapor-compression cycle comprising:

a first heat exchanger,

a first refrigerant fluid thermally coupled to the heating fluid in the first heat exchanger,

a first compressor fluidly coupled to the first heat exchanger,

a second heat exchanger fluidly coupled to the first compressor, and

a first expansion device fluidly coupled to the second heat exchanger; and

a second vapor-compression cycle comprising:

the second heat exchanger,

a second refrigerant fluid thermally coupled to the first refrigerant fluid in the second heat exchanger,

a second compressor fluidly coupled to the second heat exchanger,

a third heat exchanger fluidly coupled to the second compressor, and

a second expansion device fluidly coupled to the third heat exchanger.

2. The system of claim 1, wherein the industrial process comprises a data center, and the source of heat comprises a plurality of data center heat-generating electronic devices.

3. The system of claim 2, wherein the plurality of data center heat-generating electronic devices comprise a plurality of hardware processors.

4. The system of claim 1, further comprising an exhaust fluid scrubbing system electrically coupled to the electrical power output of the power plant and configured to separate components of an exhaust fluid from the power plant, and

wherein the power plant comprises a natural gas power plant that comprises an input comprising natural gas, and the exhaust fluid comprises carbon dioxide.

5. The system of claim 4, wherein the exhaust fluid scrubbing system is configured to separate the exhaust fluid into a carbon dioxide fluid stream and an effluent fluid stream that is substantially free of carbon dioxide.

6. The system of claim 4, wherein at least two of the industrial process, the exhaust fluid scrubbing system, or the DAC system are electrically coupled to the electrical power output of the power plant through at least one switch.

7. The system of claim 6, wherein the at least one switch comprises at least one automatic transfer switch.

8. The system of claim 6, wherein the at least two of the industrial process, the exhaust fluid scrubbing system, or the DAC system comprise the industrial process and the DAC system.

9. The system of claim 6, wherein at least a portion of the electrical power output from the power plant approximates a backup electrical power input of the industrial process.

10. The system of claim 6, wherein a maximum output of the electrical power output from the power plant approximates a backup electrical power input of the industrial process.

11. The system of claim 1, wherein the at least one vapor-compression cycle comprises a compressor, a condenser, an evaporator, and an expansion device fluidly coupled in a refrigerant circuit that comprises the refrigerant fluid.

12. The system of claim 1, wherein the carbon dioxide source material is thermally coupled to the second refrigerant fluid to receive the portion of the thermal energy to separate carbon dioxide from the carbon dioxide source material, the portion of the thermal energy comprising the portion of the heat from the source of heat from the heating fluid and a heat of compression of the first and second compressors.

13. The system of claim 1, wherein the at least one vapor-compression cycle further comprises:

a third vapor-compression cycle comprising:

the third heat exchanger,

a third refrigerant fluid thermally coupled to the second refrigerant fluid in the third heat exchanger,

a third compressor fluidly coupled to the third heat exchanger,

a fourth heat exchanger fluidly coupled to the third compressor, and

a third expansion device fluidly coupled to the fourth heat exchanger.

14. The system of claim 13, wherein the carbon dioxide source material is thermally coupled to the third refrigerant fluid to receive the portion of the thermal energy to separate carbon dioxide from the carbon dioxide source material, the portion of the thermal energy comprising the portion of the heat from the source of heat from the heating fluid and a heat of compression of the first, second, and third compressors.

15. The system of claim 13, wherein at least one of the first, second, third, or fourth heat exchangers comprises a plate-and-frame heat exchanger.

16. The system of claim 13, wherein at least one of the first, second, or third refrigerant fluids comprises 1,1,1,2-Tetrafluoroethane.

17. The system of claim 1, wherein the carbon dioxide source material comprises a liquid comprising atmospheric carbon dioxide.

18. A method for providing carbon dioxide, comprising:

generating thermal energy and electrical power from a power plant;

capturing carbon dioxide from a flow of ambient air by a carbon dioxide source material of a direct air capture (DAC) system, wherein the carbon dioxide source material comprises an adsorbent to which carbon dioxide from the ambient air bonds;

capturing heat from a source of heat of an industrial process in a heating fluid, the industrial process electrically coupled to the power plant;

transferring at least a portion of the heat of the industrial process captured in the heating fluid to the carbon dioxide source material of the DAC system;

separating, with the transferred portion of the heat of the industrial process and the thermal energy, the carbon dioxide from the carbon dioxide source material of the DAC system;

providing the carbon dioxide to an output carbon dioxide supply stream; and

transferring at least a portion of the heat from the heating fluid to a refrigerant fluid circulating through at least one thermodynamic cycle of a heating system, the refrigerant fluid comprising a thermal energy from the portion of the heat from the source of heat in the heating fluid and a heat of compression of the at least one thermodynamic cycle, wherein the at least one thermodynamic cycle comprises at least one vapor-compression cycle, and the heating system comprises a heat-pump system, and

wherein transferring the portion of the heat from the heating fluid to the refrigerant fluid circulating through the at least one vapor-compression cycle of the heat-pump system comprises:

transferring the portion of the heat from the heating fluid to a first refrigerant fluid thermally coupled to the heating fluid in a first heat exchanger of a first vapor-compression cycle;

compressing the first refrigerant fluid in a first compressor fluidly coupled to the first heat exchanger to add a first heat of compression to the first refrigerant fluid;

transferring a thermal energy from the first refrigerant fluid that comprises the portion of the heat from the heating fluid and the first heat of compression to a second refrigerant fluid of a second vapor-compression cycle in a second heat exchanger fluidly coupled to the first compressor; and

compressing the second refrigerant fluid in a second compressor fluidly coupled to the second heat exchanger to add a second heat of compression to the second refrigerant fluid.

19. The method of claim 18, wherein the industrial process comprises a data center, and the source of heat comprises a plurality of data center heat-generating electronic devices.

20. The method of claim 19, wherein the plurality of data center heat-generating electronic devices comprise a plurality of hardware processors.

21. The method of claim 18, further comprising providing at least a portion of an exhaust fluid from the power plant and at least a portion of the electrical power to an exhaust fluid scrubbing system to separate components of the portion of the exhaust fluid, and wherein generating electrical power from the power plant comprises generating electrical power from a natural gas power plant, and generating the exhaust fluid comprises generating carbon dioxide from combusting natural gas in generating electrical power from the natural gas power plant.

22. The method of claim 21, further comprising separating the exhaust fluid into a carbon dioxide fluid stream that comprises the carbon dioxide and an effluent fluid stream that is substantially free of the carbon dioxide.

23. The method of claim 21, further comprising providing at least two of the industrial process, the exhaust fluid scrubbing system, or the DAC system with electrical power of the power plant through at least one switch.

24. The method of claim 23, wherein the at least one switch comprises at least one automatic transfer switch.

25. The method of claim 23, wherein the at least two of the industrial process, the exhaust fluid scrubbing system, or the DAC system comprise the industrial process and the DAC system.

26. The method of claim 23, wherein at least a portion of the electrical power from the power plant approximates a backup electrical power input of the industrial process.

27. The method of claim 23, wherein a maximum output of the electrical power from the power plant approximates a backup electrical power input of the industrial process.

28. The method of claim 18, wherein the at least one vapor-compression cycle comprises a compressor, a condenser, an evaporator, and an expansion device fluidly coupled in a refrigerant circuit that comprises the refrigerant fluid.

29. The method of claim 18, further comprising transferring a thermal energy from the second refrigerant fluid that comprises the portion of the heat from the heating fluid and the first and second heat of compressions to the carbon dioxide source material of the DAC system.

30. The method of claim 18, further comprising:

transferring the thermal energy from the second refrigerant fluid that comprises the portion of the heat from the heating fluid and the first and second heat of compression to a third refrigerant fluid of a third vapor-compression cycle in a third heat exchanger fluidly coupled to the second compressor; and

compressing the third refrigerant fluid in a third compressor fluidly coupled to the third heat exchanger to add a third heat of compression to the third refrigerant fluid.

31. The method of claim 30, further comprising transferring a thermal energy from the third refrigerant fluid that comprises the portion of the heat from the heating fluid and the first, second, and third heat of compressions to the carbon dioxide source material of the DAC system.

32. The method of claim 30, wherein at least one of the first, second, or third heat exchangers comprises a plate-and-frame heat exchanger.

33. The method of claim 30, wherein at least one of the first, second, or third refrigerant fluids comprises 1,1,1,2-Tetrafluoroethane.

34. The method of claim 18, wherein the carbon dioxide source material comprises a liquid comprising atmospheric carbon dioxide.