involves cooling the flue gas stream using at least a gas-to-air heat exchanger disposed upstream of and in fluid communication with a carbon dioxide (CO2) absorber. The method also involves moving, by a flue gas blower, the flue gas stream through the gas-to-air heat exchanger and the CO2 absorber. The method also involves moving, by a cooling air blower, air through the gas-to-air heat exchanger to cool the flue-gas stream.

[0004] In an example, a method for processing a flue gas stream involves receiving, at a solvent regenerator, a rich solvent flowing from a carbon dioxide (CO2) absorber. The rich solvent includes CO2 captured from the flue gas stream in the CO2 absorber. The method can also involve heating a heat medium using at least a fired heater, where additional heat is not available in the host facility. The method also involves transporting the heated heat medium from the fired heater to the solvent regenerator. The method also involves generating a fired heater flue gas by the fired heater. The method also involves transporting the fired heater flue gas into the flue gas stream at a position upstream of the CO2 absorber.

[0005] In an example, a system for processing a flue gas stream includes a gas-to-air heat exchanger disposed upstream of and in fluid communication with a carbon dioxide (CO2) absorber. The gas-to-air heat exchanger to receive and cool the flue gas stream. The gas-to-air heat exchanger to transport the cooled flue gas stream through and out of the gas-to-air heat exchanger toward the CO2 absorber. The system also includes a flue gas blower to move the flue gas stream through the gas-to-heat exchanger and the CO2 absorber. The system also includes a cooling air blower to move air through the gas-to-air heat exchanger to cool the flue gas stream.

[0006] In an example, a system for processing a flue gas stream includes a carbon dioxide (CO2) absorber to receive the flue gas stream. The system also includes a solvent regenerator in fluid communication with the CO2 absorber. The solvent regenerator to receive a rich solvent from the CO2 absorber and to provide a lean solvent to the CO2 absorber. The lean solvent having a lower amount of CO2 than the rich solvent. They system also can include a fired heater in fluid communication with the solvent generator, where additional waste heat is not available from the host facility. The fired heater to heat and transport a heat medium toward the solvent regenerator. The fired heater to generate a fired heater flue gas and transport the fired heater flue gas out of the fired heater for combination with the flue gas stream at a position upstream of the CO2 absorber.

[0006a] In an aspect, the present disclosure refers to a method for processing a flue gas stream, the method comprising:

receiving, at a solvent regenerator, a rich solvent flowing from a carbon dioxide absorber, wherein the flue gas stream flows through the carbon dioxide absorber, and the rich solvent comprises carbon dioxide captured from the flue gas stream in the carbon dioxide absorber;

heating a heat medium using at least a fired heater;

transporting the heated heat medium from the fired heater to the solvent regenerator; generating, by the fired heater, a fired heater flue gas; and

transporting the fired heater flue gas into the flue gas stream at a position upstream of the carbon dioxide absorber;

producing a generator flue gas by a power generator in fluid communication with a generator flue gas waste heat recovery unit, wherein the power generator generates electricity; and

transporting the generator flue gas from the power generator to the waste heat recovery unit,

wherein heating the heat medium using the generator flue gas waste heat recovery unit is based on heat recovered by the waste heat recovery unit from the generator flue gas.

[0006b] In another aspect, the present disclosure refers to a method for processing a flue gas stream, the method comprising:

receiving, at a solvent regenerator, a rich solvent flowing from a carbon dioxide absorber, wherein the flue gas stream flows through the carbon dioxide absorber, and the rich solvent comprises carbon dioxide captured from the flue gas stream in the carbon dioxide absorber;

heating a heat medium using at least a fired heater;

transporting the heated heat medium from the fired heater to the solvent regenerator; generating, by the fired heater, a fired heater flue gas; and

transporting the fired heater flue gas into the flue gas stream at a position upstream of the carbon dioxide absorber;

driving a carbon dioxide compressor using a driver, the driver producing a driver flue gas; and

transporting the driver flue gas from the driver to a waste heat recovery unit,

wherein heating the heat medium using the waste heat recovery unit is based on heat recovered by the waste heat recovery unit from the driver flue gas.

[0006c] In another aspect, the present disclosure refers to a system for processing a

flue gas stream, the system comprising: a carbon dioxide absorber configured to receive the flue gas stream;

a solvent regenerator in fluid communication with the carbon dioxide absorber, the solvent regenerator configured to receive a rich solvent from the carbon dioxide absorber; and a fired heater in fluid communication with the solvent regenerator, the fired heater configured to heat and transport a heat medium toward the solvent regenerator, and the fired heater further configured to generate a fired heater flue gas and transport the fired heater flue gas out of the fired heater for combination with the flue gas stream at a position upstream of the carbon dioxide absorber.

[0007] Additional examples, features, and advantages of the disclosed devices, systems, facilities, and methods are described in, and will be apparent from, the following