Claims

1. A carbon capture system comprising:

- a CO_2 containing flue gas (FG) from any CO_2 producing source (1) connected to

- a first flue gas compressor (FGC) of a gas turbine (GT) with a corresponding first turbine expander (TE1) and a generator (G) driven by said gas turbine (GT),

- said gas turbine (GT) comprising

  - a first burner (B1) with a first combustion chamber (CC1) arranged for burning a compressed flue gas (CFG) and

  - a second burner (B2) with a second combustion chamber (CC2) arranged for afterburning a hot compressed CO_2 lean flue gas (CLFG1H),

  wherein

- said second burner (B2) receiving said compressed flue gas (CFG) from said first flue gas compressor (FGC), said compressed flue gas (CFG) for cooling a second combustion chamber shell (CC2S) of said second combustion chamber (CC2),

- said second combustion chamber shell (CC2S) further connected via a coaxial pipe (P12) with a coaxial piping shell (PS12) for further transporting said compressed flue gas flow (CFG) to

- a first combustion chamber shell (CC1S) of a first burner (B1) for cooling said first combustion chamber (CC1) and being fed into said first combustion chamber (CC1) for combustion with compressed air (CA1) and fuel (G) to produce a first compressed preburned flue gas (CFG1),

- said first compressed preburned flue gas (CFG1) being fed to a first heat exchanger (HE1) for cooling, transferring heat to a cold compressed CO_2 lean flue gas (CLFG1C) produced downstream, forming a first compressed preburned cooled flue gas (CFG1C),

- said first compressed preburned cooled flue gas (CFG1C) sent to a hot potassium process CO_2 absorber plant (HPC) for returning said cold compressed CO_2 lean flue gas (CLFG1C) back to said first heat exchanger (HE1) for being heated to a first hot compressed CO_2 lean flue gas (CLFG1H) for feeding to said second burner (B2),

- said first hot compressed CO_2 lean flue gas (CLFG1H) being mixed and

afterburned by said second burner (B2) with a compressed air flow (CA2) and at least a non-carbon fuel so as for
increasing a temperature of said first hot compressed CO_2 lean flue gas (CLFG1H) to a second hotter compressed CO_2 lean flue gas (CLFG2H) for being fed into said first expander (TE1).

2. The carbon capture system of claim 1, wherein said second combustion chamber (CC2) forms part of said coaxial pipe (P12) feeding the first expander (TE1), said coaxial pipe (P12) running from said first heat exchanger (HE1) to said second combustion chamber (CC2), said coaxial pipe (P12) having said piping shell (PS12).

3. The carbon capture system of claim 2, wherein said coaxial piping shell (PS12) is connected to a heat exchanger shell (HE1S) of said first heat exchanger (HE1), said heat exchanger shell (HE1S) being further connected to a first combustion chamber shell (CC1S) of said first combustion chamber (CC1), said first combustion chamber shell (CC1S) being arranged for feeding said compressed flue gas (CFG) to said first combustion chamber (CC1).

4. The carbon capture system of claim 1, wherein said cold compressed CO_2 lean flue gas flow (CLFG1C) is split and one part is routed to said second burner (B2) as a temperature barrier (10).

5. The carbon capture system of claim 1, wherein said cold compressed CO_2 lean flue gas flow (CLFG1C) is split and one part is routed to said first gas turbine (GT) expander (TE1) as cooling agent.

6. The carbon capture system of claim 1, wherein said second hotter compressed CO_2 lean flue gas (CLFG2H) being fed into said first expander (TE1) for driving a shaft coupled to said generator (G) and for generating a first expanded relative hot CO_2 lean flue gas (ELFGH) further connected to a first heat recovery and steam generator unit (HRSG1).

7. The carbon capture system of claim 6, wherein said first heat recovery and steam generator unit (HRSG1) is for production of a first steam (ST1) further connected to heat exchange unit in a stripping unit included in said hot potassium process CO_2 absorber unit (HPC).

8. The carbon capture system of claim 6, wherein said first heat recovery and steam generator unit (HRSG1) is for production of a second steam (ST2) further connected to a steam generator (SG) for production of electrical power.

9. The carbon capture system of claim 1, wherein said first turbine expander (TE1) is constructed to expand additional mass flow from said second burner (B2).

10. The carbon capture system of claim 1, wherein said second hotter compressed CO_2 lean flue gas (CLFG2H) is being fed into said first expander (TE1) and a second turbine expander (TE2) in parallel with said first expander (TE1).

11. The carbon capture system of claim 10, wherein said cold compressed CO_2 lean flue gas (CLFG1C) flow is partly divided and routed to said first gas turbine expander (TE1) and to said second turbine expander (TE2) as cooling agent.

12. The carbon capture system of claim 1, wherein said first compressed preburned cooled flue gas (CFG1C) is led to a second heat recovery unit and steam generator (HRSG2), and further cooling the said first compressed preburned cooled flue gas (CFG1C) to a second compressed preburned cooled flue gas (CFG2C) which is further led to said Hot Potassium Carbonate CO_2 absorber unit (HPC).

13. The carbon capture system of claim 1, wherein extracted CO_2 by said Hot Potassium Carbonate CO_2 absorber unit (HPC) is led to a CO_2 compressor and then cooled down before utilized in an enhanced oil recovery sequestration (EOR/S).