April 14, 2020

CPCE key process steps in post-combustion carbon utilization

The most poignant process sections of CPCE for the upgrading of existing fossil energy plants

1. Execution of Advanced Combustion in the gas turbine and fossil fuel fired power plants to obtain a high concentrated CO_2-rich gas stream without nitrogen, at low gas flow rate, factually zero-Dollar value feedstock

2. Waste heat recovery with factually as zero-Dollar value energy via First Bairamijamal Thermodynamic Cycle that backs up the electrolysis eventually via DC Supply Line#1

3. Harnessing the useless waste heat to useful electric AC electricity and/or process power integrated in the First Bairamijamal Cycle and HR sections for syngas and oxygen downstream of an auxiliary gas turbine, which supplies AC current, then eventually via DC Supply Line#2

4. Use of process power thereof for the cooling and separation of CO_2 from that CO_2-rich CO2-Stream, obtaining liquid carbon dioxide at high mass flow rate for the electrochemical conversion with water to syngas and oxygen at high yield

5. Use of that generated AC power under (2) and (3) for the DC back-up power hence referred to DC Supply line #1 &2 for the electrochemical conversion of the obtained liquid carbon dioxide for the production of anodic oxygen and cathodic syngas in the CPCE's HPLTE-SG (High Pressure Low Temperature Electrochemical Syngas Generator)

6. Harnessing the high pressure low temperature gaseous products of the electrolysis for heat recovery and to the "closing trajectory" of the First Bairamijamal Cycle under (2) for generation of additional DC power by use of multi-stage oxygen and multi-stage syngas turbines, which provides back-up AC electric power for running the electrolysis under (5) i.e. via DC Supply Line #3 and the DC Supply Line #4

7. Utilization of the most portion of the anodic oxygen for the Advanced Combustion by way of flue gas recirculation and flue gas oxyfueling under (1) and (3)

8. Conversion of a little portion of the syngas with steam via water shift converter to hydrogen and CO_2, whereas this CO_2 is recycled for re-use back to the process in (4)

9. Harnessing that portion of hydrogen with little portion of anodic oxygen to generate the remaining need for the DC current by use of fuel cell, i.e. DC Supply Line #5 under (5)

10. Delivery of syngas to an adjacent plant for high value final products like jet fuel, transportation gasoline, ethanol, methanol, and great number of other chemicals (vide attached chart) that accomplishes the lowest ever costs for production i.e. a return of investment of less than two years

11. Dispatch of pure oxygen to the market and excess AC power to the grid from the First Bairamijamal Cycle.

9710 Traville Gateway Drive, Suite 251
Rockville, Maryland 20850
U.S.A

Phone 240-426-9474
Email FBairamijamal@EVISA-Engineering.com
Web EVISA-Engineering.com