KAUST VIRTUAL RESEARCH CONFERENCE 2021

Enabling CO_2 Geological Storage within a Low-Carbon Economy

CO_2 storage and utilization techniques: An overview

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PRESENTATION OUTLINES

INTRODUCTION

LITERATURE REVIEW:

a) CO_2 STORAGE TECHNIQUES

b) CO_2 UTILIZATION TECHNIQUES

CONCLUSIONS & OUTLOOK

INTRODUCTION

World CO_2 & CH_4 Concentration Vs Time

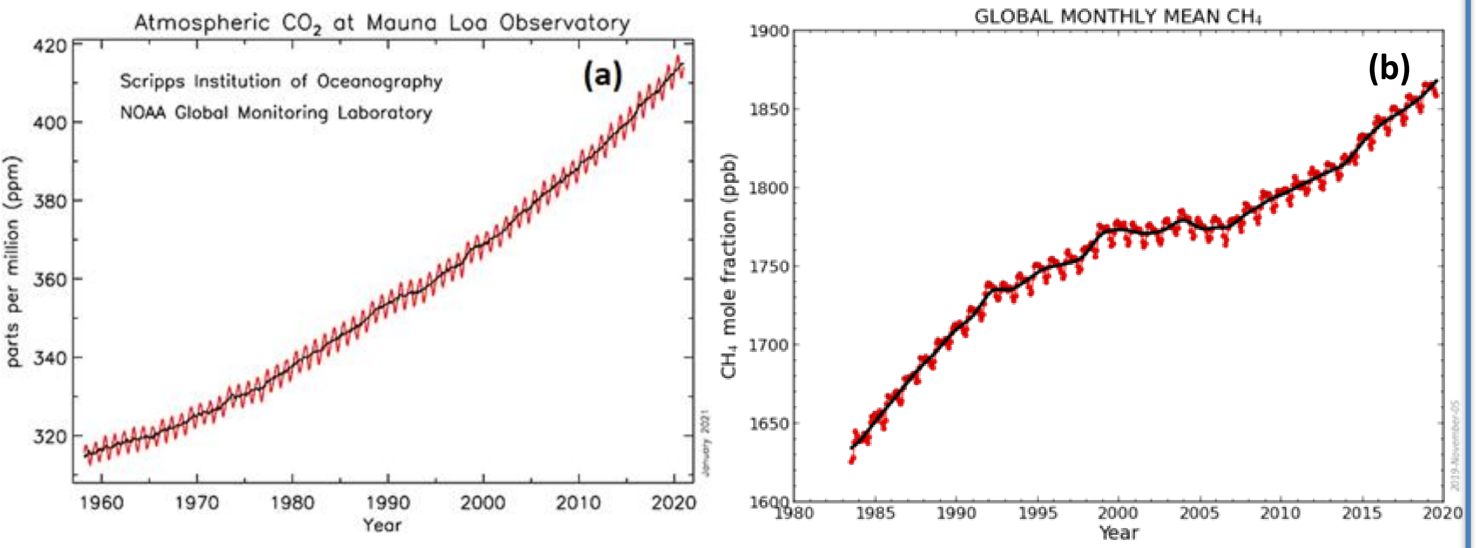

Figure 1:- (a) Surface average atmospheric CO_2 concentration (ppm) [1], (b) Globally-averaged, monthly mean atmospheric CH_4 abundance [2], ESRL Global Monitoring Division, USA.

CO_2 emission share from fossil fuels of different countries

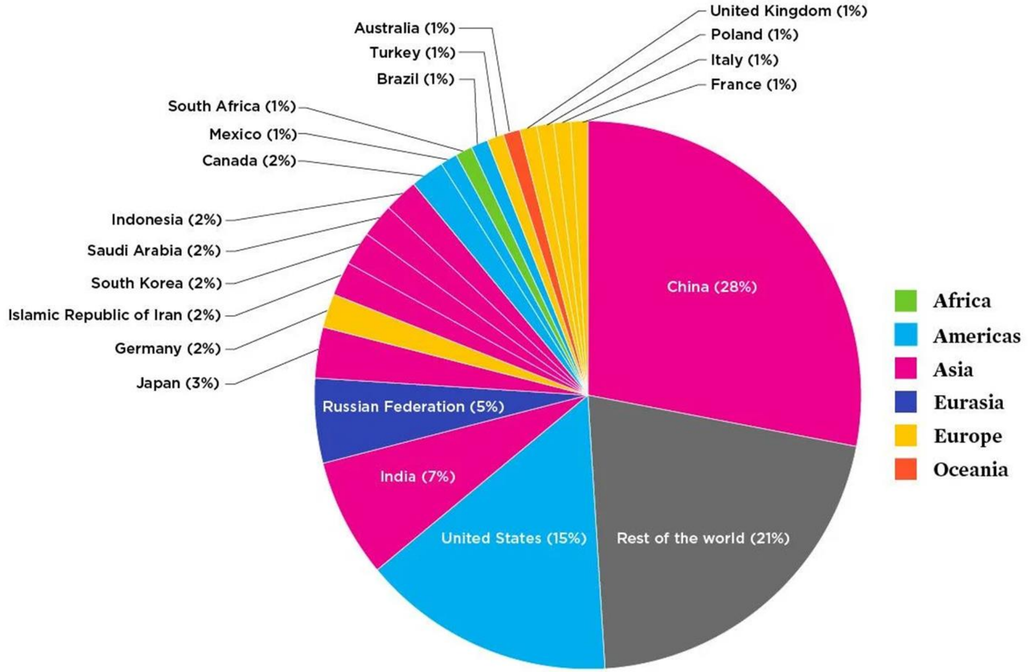

Figure 2:- Pictorial view of CO_2 emission share from fossil fuels of different countries [3].

CO_2 STORAGE TECHNIQUES

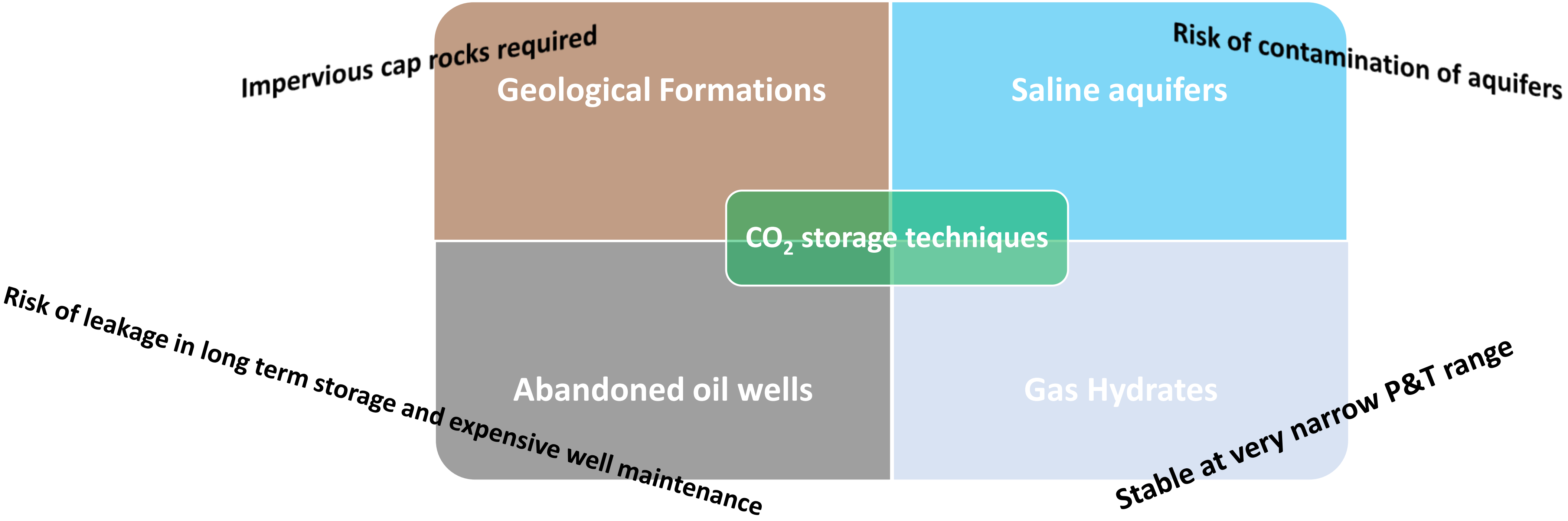

Figure 3: A pictorial view of the global greenhouse gas emissions [4,5]

CO_2 UTILIZATIONS TECHNIQUES

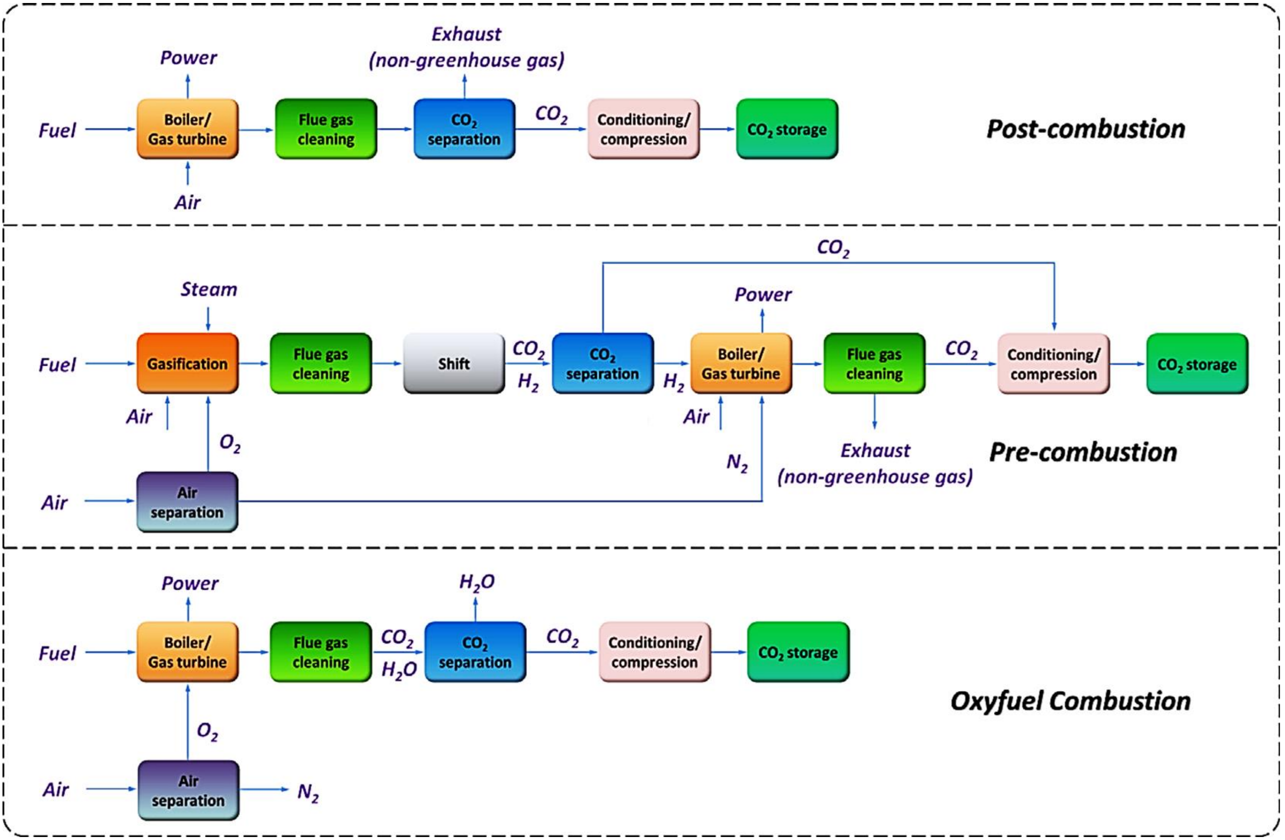

Figure 4: A process flow diagram of CO2 capture techniques [6]

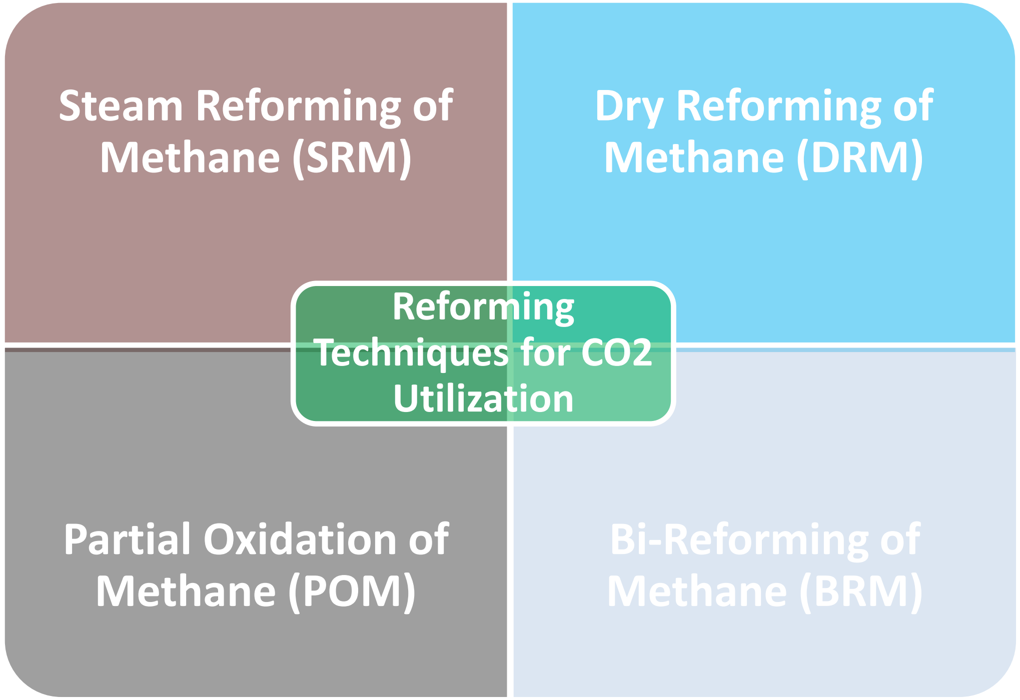

Figure 5: Reforming techniques for CO_2 utilization [7-9]

CONCLUSIONS & OUTLOOK

CONCLUSION

Global warming is escalating due to tremendous amount of GHG's released into the atmosphere.

Numerous CO_2 storage techniques are available, but either lacks long term stable storage or uneconomic.

Several CO_2 utilization are being extensively studied but have limitation either in terms of commercialization or in its infancy stage. Hence continuous research is required for economic and technical barriers.

OUTLOOK: Direct air capture (DAC) technique for CO_2 capture & utilization

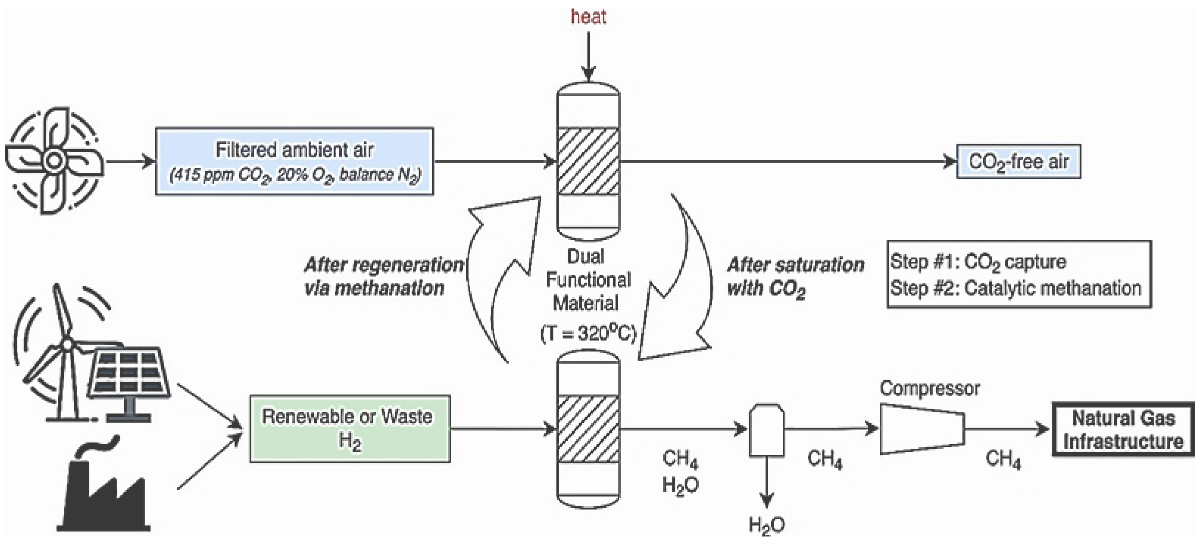

Figure 6: Block diagram of DAC technique for CO_2 capture and storage [10]

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CO_2 capture and utilization techniques: An overview

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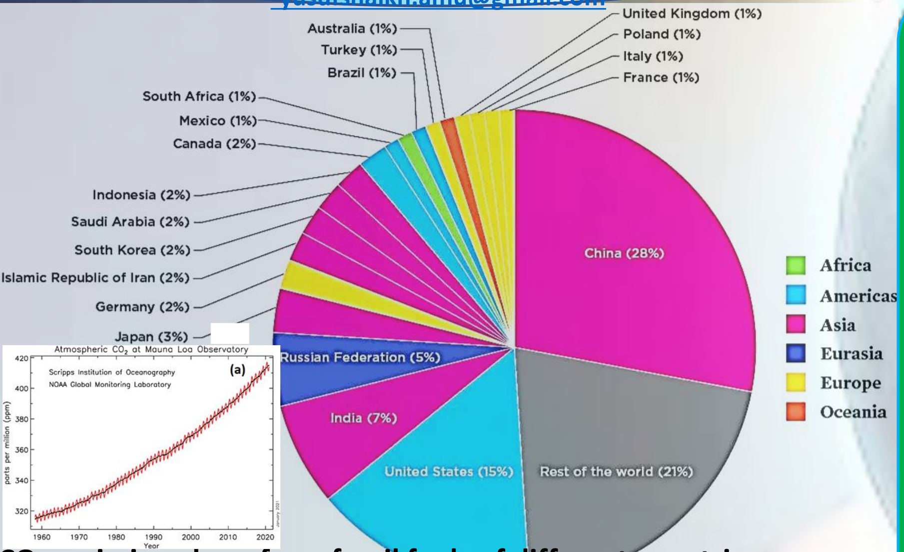
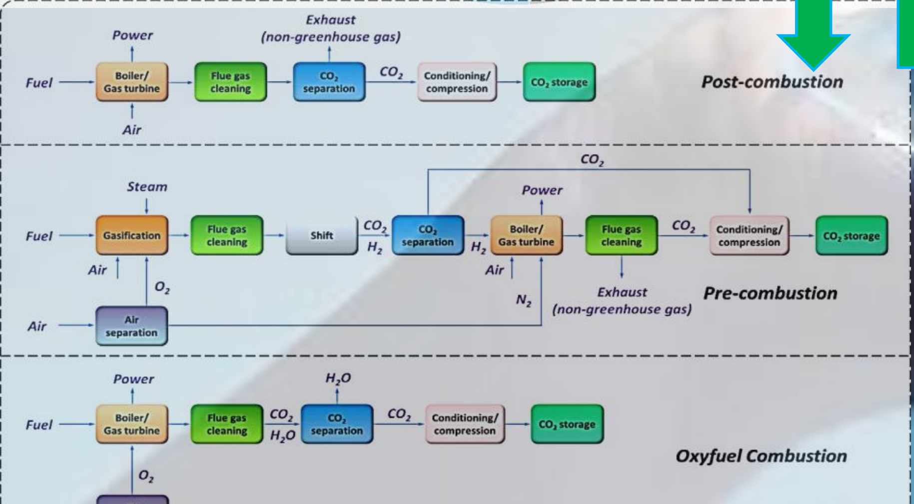
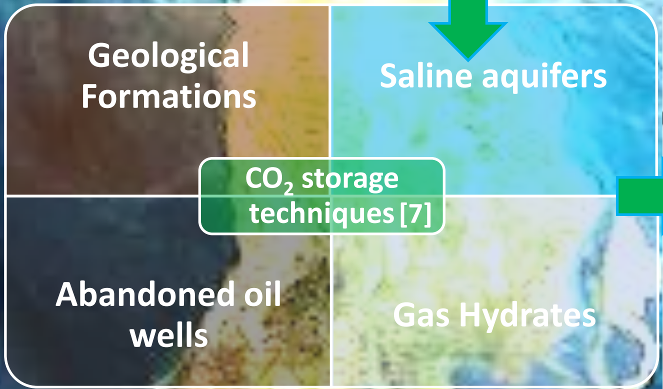
CO_2 Capture Technique	Advantages	Limitations
Pre-combustion	• High CO_2 concentration (~45 vol%) and pressure. • Commercial applied in some industrial sectors.	• Energy penalty due to sorbent regeneration. • Severe operating conditions (15–20 bar and 190–210 °C). [3,4]
Oxy-fuel combustion	• Lower capital cost. • High CO_2 concentration (80–98%). • Low investment of boiler and other equipment.	• High efficiency drop and energy penalty due to ASU. [5,6]
Post-combustion	• A straightforward approach to be retrofitted • More mature than other strategies	• Dilute CO_2 concentration (5–15 vol%) at near atmospheric pressure. • Energy penalty due to solvent/sorbent regeneration. [5]

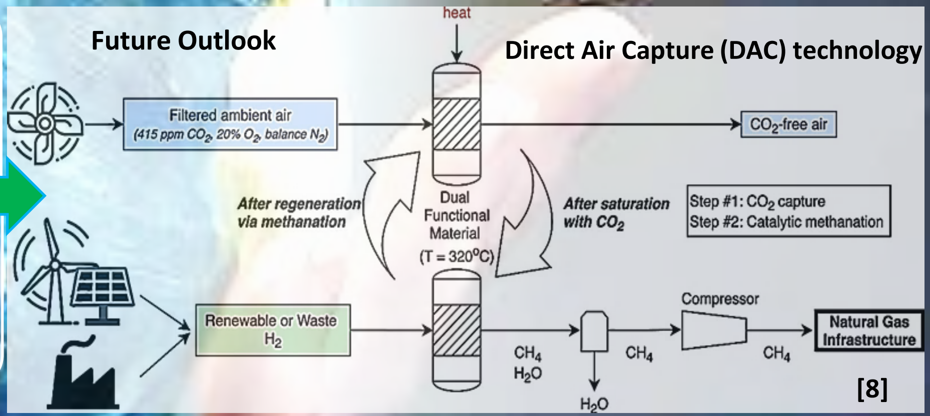


CO_2 emission share from fossil fuels of different countries [1]



CO_2 capture techniques [2]





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