ACADEMIC SEMINAR

CO_2 Recovery, Storage and Utilization

Hanoi, 06-2023

Outlines

1. Contexts and Objectives
2. CO_2 Backgrounds & Applications
3. CO_2 Recovery and Storage by Gas Hydrate Engineering
4. Conclusions
5. Acknowledgements

1. Contexts and Objectives

- CO_2 emission is a big issue now for greenhouse effect and climate change

- Many methods to be proposed to reduce CO_2 emission by using less CO_2 emission fuel, CO_2 recovery, storage and utilization, etc.

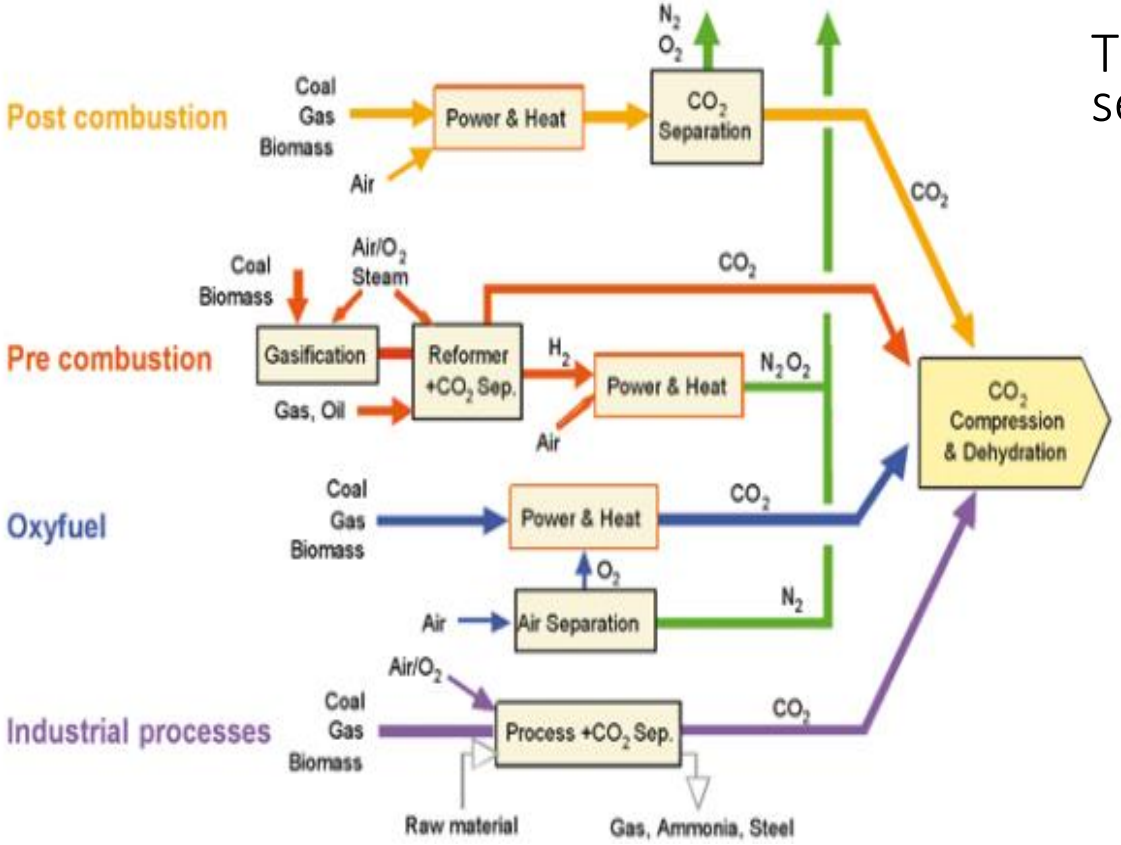
- This work is to report one of the ways to reduce CO_2 emission by CO_2 Recovery, Storage and Utilization, especially by hydrate engineering

2. CO_2 Backgrounds & Applications

- CO_2 is from natural and man-made sources
- Large amount of CO_2 is emitted in the world and Vietnam today by human that can be managed
- CO_2 may cause the green house effect and climate change
- Beside the disadvantages, CO_2 can be used for many applications such as conversion to useful products (fuel, materials, etc.)

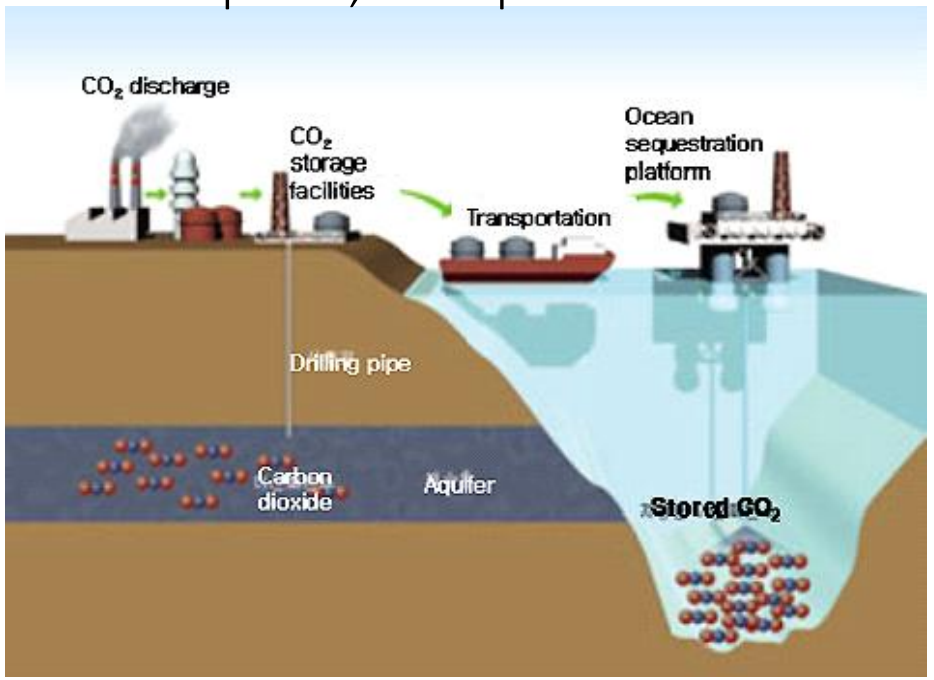
2. CO_2 Backgrounds & Applications

Overview of CO_2 capture processes and systems



B. Metz, O. Davidson, H. de Coninck, M. Loos, and L. Meyer, *IPCC Working Group III Special report on carbon dioxide capture and storage*. 2005.

The main steps in carbon dioxide capture and sequestration: capture, transportation and storage



"The future of Carbon Capture and Storage | Energy, Technology, & Policy." [Online]. Available: https://webberenergyblog.wordpress.com/2012/04/06/3272/. [Accessed: 11-Jul-2019].

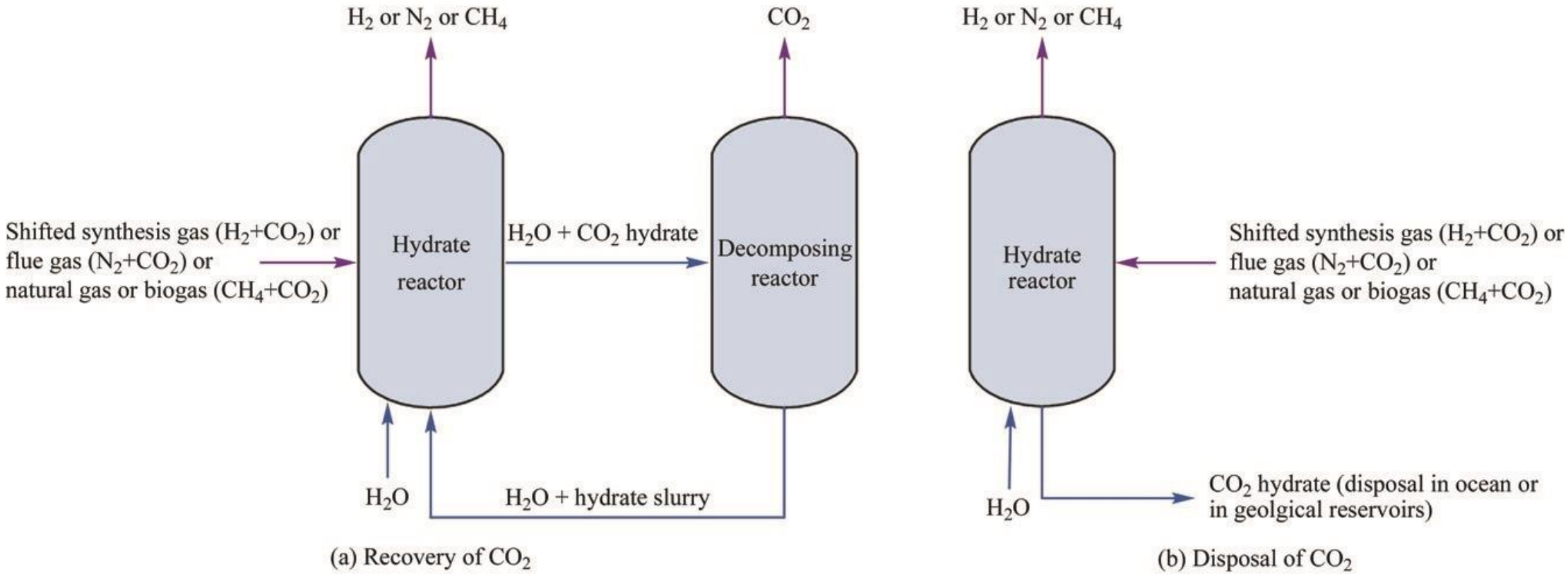
3. CO_2 Recovery and Storage by Gas Hydrate Engineering

- There are many ways to recover and store CO_2 in the industry (using absorbed solvents to capture CO_2 in the exhausted gases; store CO_2 in the ocean and/or underground geological, mineral carbonation).

- This work will show the updated **CO_2 Recovery and Storage by Gas Hydrate Engineering.**

3. CO_2 Recovery and Storage by Gas Hydrate Engineering

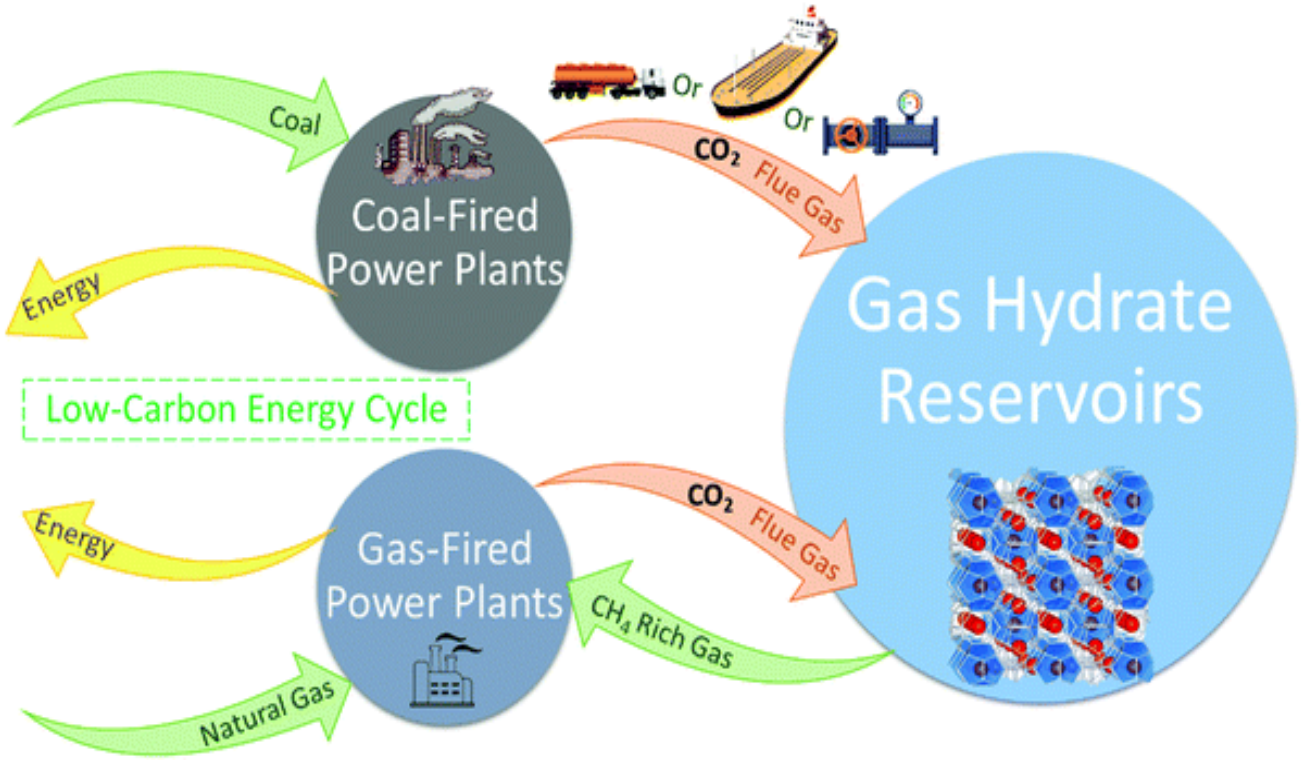
Process of CO_2 capture from shifted synthesis gas, flue gas, sour natural gas or biogas



Yanhong Wang, Xuemei Lang, Shuanshi Fan (2013), Hydrate capture CO_2 from shifted synthesis gas, flue gas and sour natural gas or biogas, China

3. CO_2 Recovery and Storage by Gas Hydrate Engineering

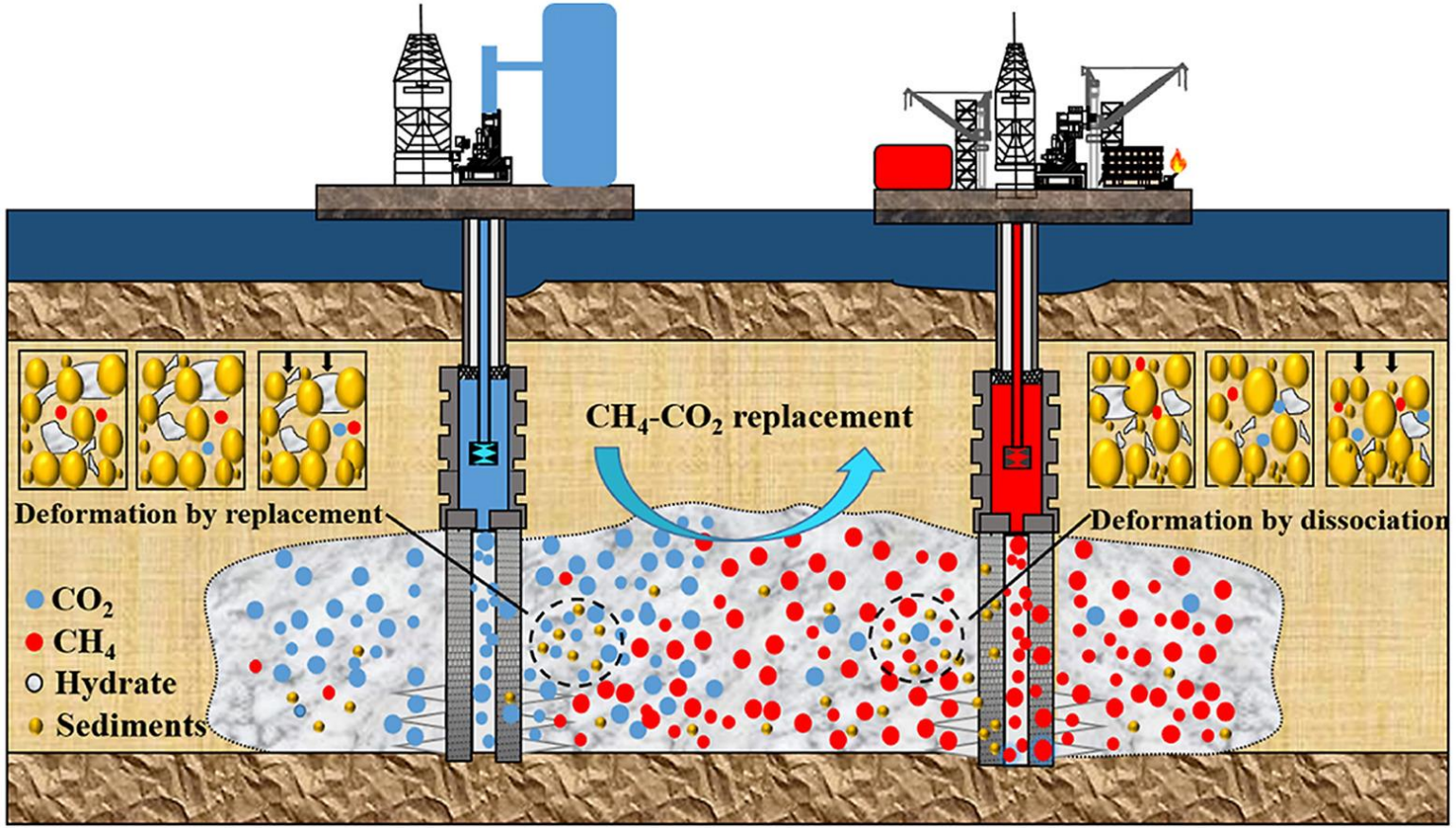
Illustration of the principal mechanism of the direct injection of flue gas for methane recovery from gas hydrate reservoirs and CO_2 capture and storage simultaneously



Aliakbar Hassanpouryouzband , Edris Joonaki, Mehrdad VasheGHsani Farahani, Satoshi Takeya , Carolyn Ruppel , Jinhai Yang , Niall J. English , Judith M. Schicks , Katriona Edlmann , Hadi Mehrabian , Zachary M. Aman and Bahman Tohidi (2020), *Gas hydrates in sustainable chemistry*

3. CO_2 Recovery and Storage by Gas Hydrate Engineering

Storage CO_2 in natural gas hydrate reservoirs and recovery CH_4



Tingting Luo et al., Deformation behaviors of hydrate-bearing silty sediments during CH_4–CO_2 replacement, Journal of Petroleum Science and Engineering, 2022

3. CO_2 Recovery and Storage by Gas Hydrate Engineering

* Future work for CO_2 Recovery and Storage by Gas Hydrate Engineering:

- Develop (Enhance) Hydrate-based gas (CO_2) separation technology (good hydrate formation promoter, improve kinetics by mechanical methods and additives)
- Natural gas hydrate recovery by CH_4-CO_2 exchange
- Conditions and techniques to store CO_2 under the seafloor by hydrate engineering

4. Conclusions

1. These days, CO_2 Recovery, Storage and Utilization are becoming more importantly
2. There are many applications of CO_2 for Utilization and Conversion to Useful Products as Fuel or Chemicals
3. CO_2 Recovery and Storage can be done by many ways and by Gas Hydrate Engineering

5. Acknowledgements

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