

# JGC's Initiatives for Sustainability on Technology Innovation

Oil & Gas Project Company  
Technology Innovation Center  
Mitsuo Morita



# JGC Corporation



- Established in 1928.
- Provide EPC services for various areas.
- Experiences in over 85 different countries worldwide.



# Global Approach to GHG Reduction



## History

- 1992 Adoption of United Nations Framework Convention on Climate Change (**UNFCCC**)
- 1997 Adoption of **Kyoto Protocol** in COP 3
- 2015 Adoption of **Paris Agreement** in COP 21
- 2019 COP 25 in Madrid, Spain**

Below 2°C and pursuing efforts to limit it to 1.5°C.



Source: Homepage of United Nations

# JGC's Approach to GHG Reduction

Leaders Panel 3

“Business Strategies and Technological Challenges”

## JGC's Technological Challenges !!

### ① HiPACT™



### ② DDR Membrane

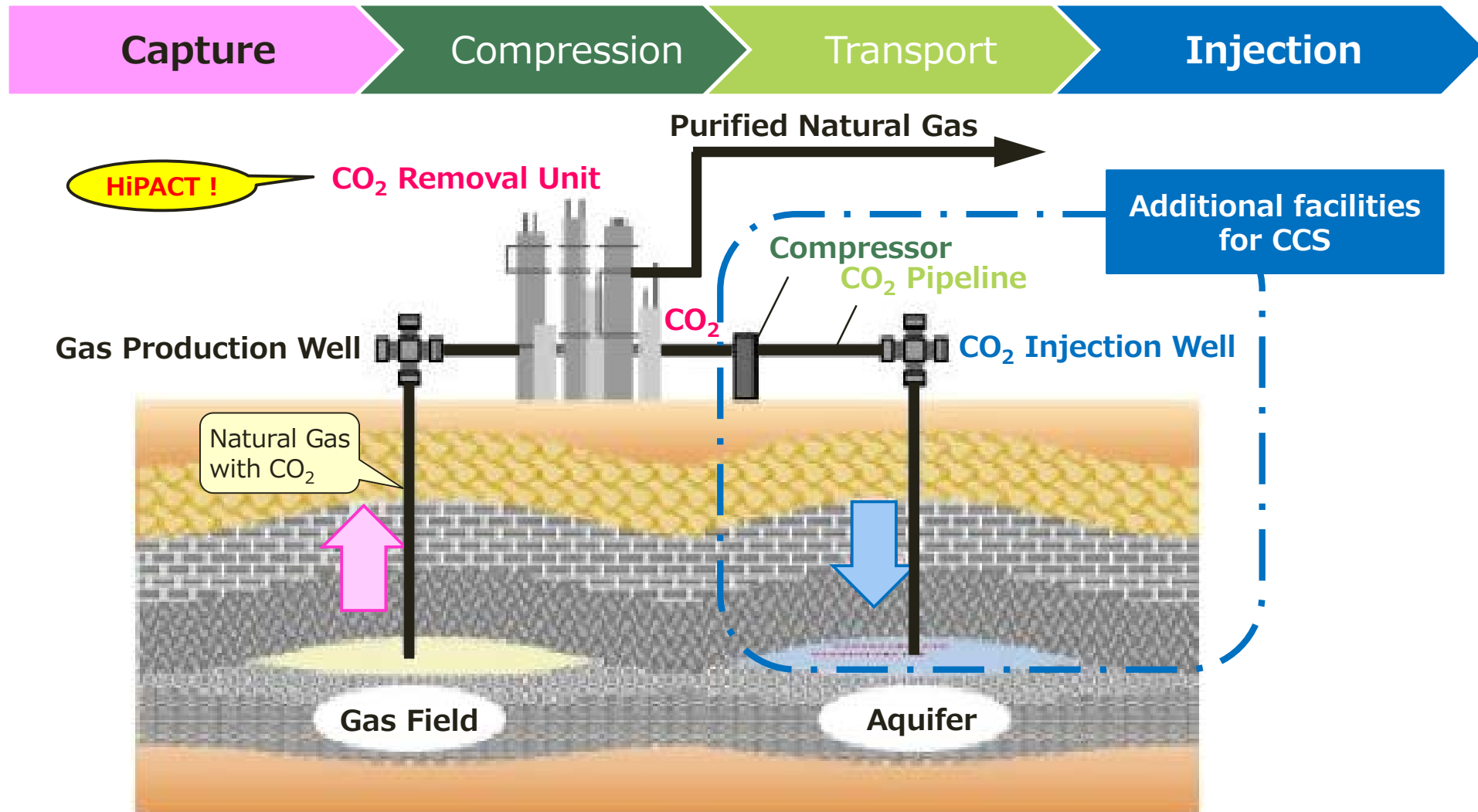


# JGC's Approach to GHG Reduction

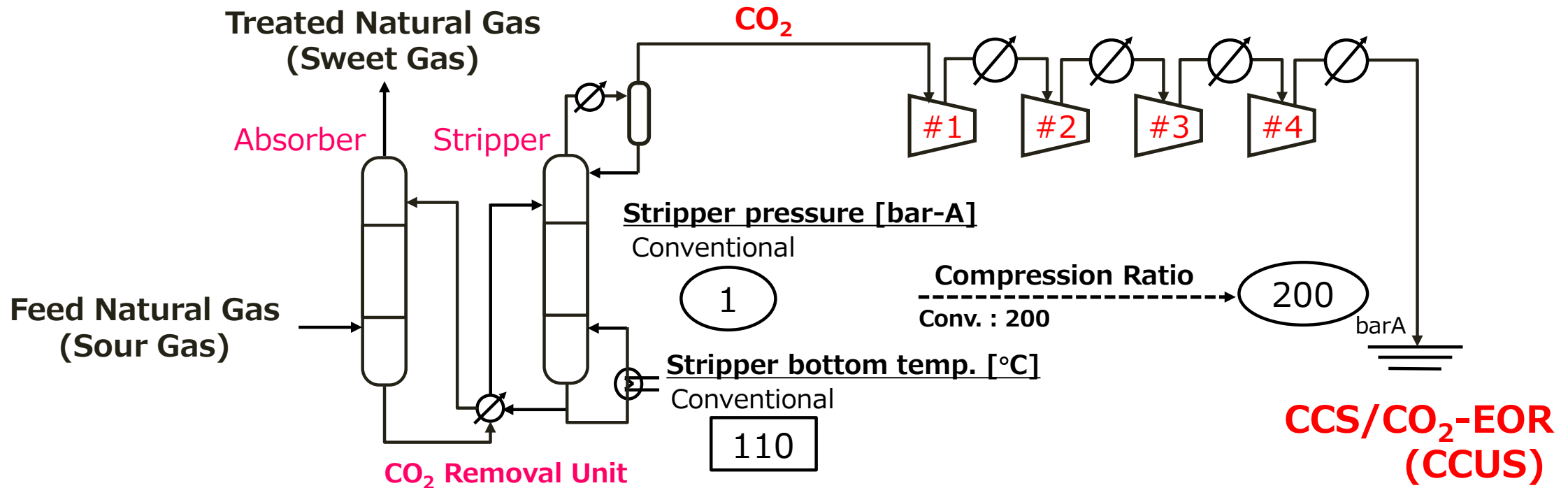
## ① HiPACT™



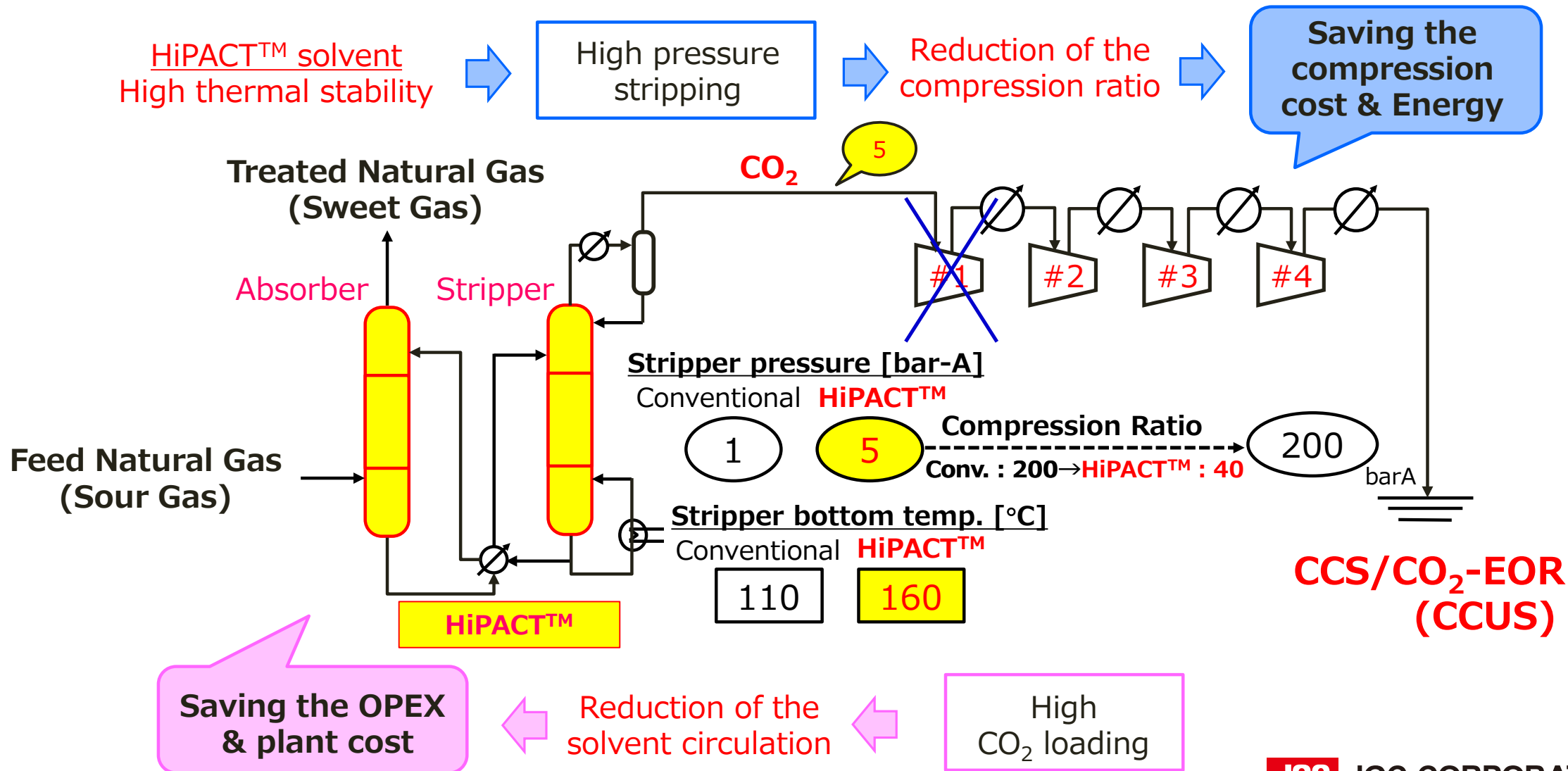
# CCS in Natural Gas Processing



# Amine Process: with CCS

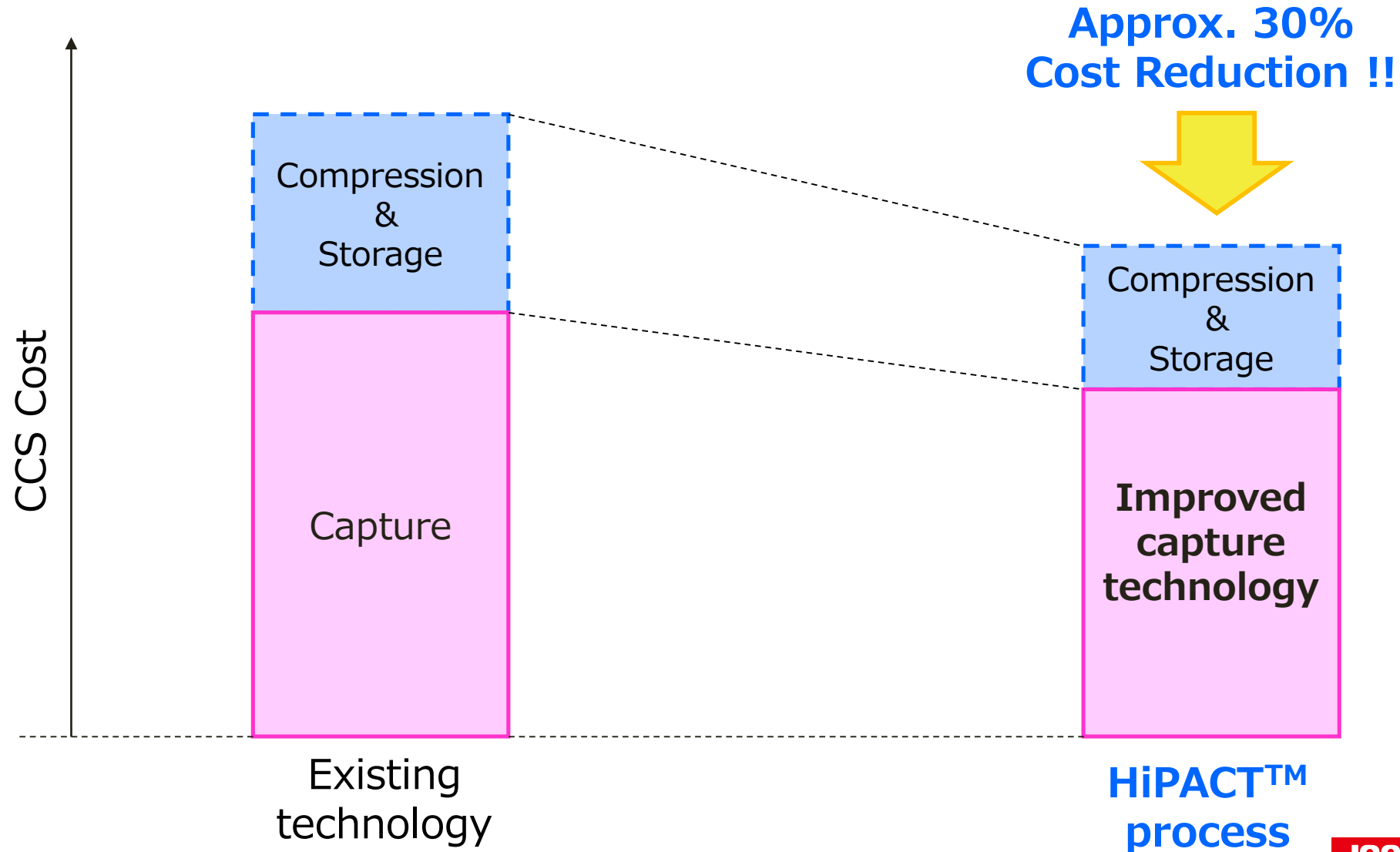


# HiPACT™ process: The excellence





# HiPACT™ Advantages



# Development Load Map of HiPACT™

\*1) <https://www.inpex.co.jp/news/assets/pdf/20110217-a.pdf>



JGC R&D Center (Oarai)

Autoclave Test  
(2004-)



JGC R&D Center (Oarai)

Bench Test(2007-)



INPEX Corporation (Nagaoka)<sup>\*1</sup>

Demonstration Test  
(2010-)



NIS a.d. Novi Sad (Serbia)

**Commercial Plant  
(2015-)**



# Our success: 1<sup>st</sup> commercial plant in Serbia

## Commercial plant

Application	Natural gas processing with CCS
Company	Naftna Industrija Srbije (NIS)
Location	Elemir-Vojvodina, Serbia
Design	500,000–800,000 Sm <sup>3</sup> /day of Natural gas at CO <sub>2</sub> 18–30 vol.%
Operation	January 2015



Commercial HiPACT™ plant (NIS, Serbia)\*<sup>1</sup>

## From the operational experience with NIS:

- ✓ HiPACT™ unit is user-friendly and not difficult to operate. So far, **no major issues have been experienced.**
- ✓ **Higher CO<sub>2</sub> stripping pressure is realized.** The solvent is stable when exposed to high temperatures in the stripping section.

\*<sup>1</sup> <https://www.nis.eu/en/presscenter/nis-invested-excess-30-million-euros-amine-plant>

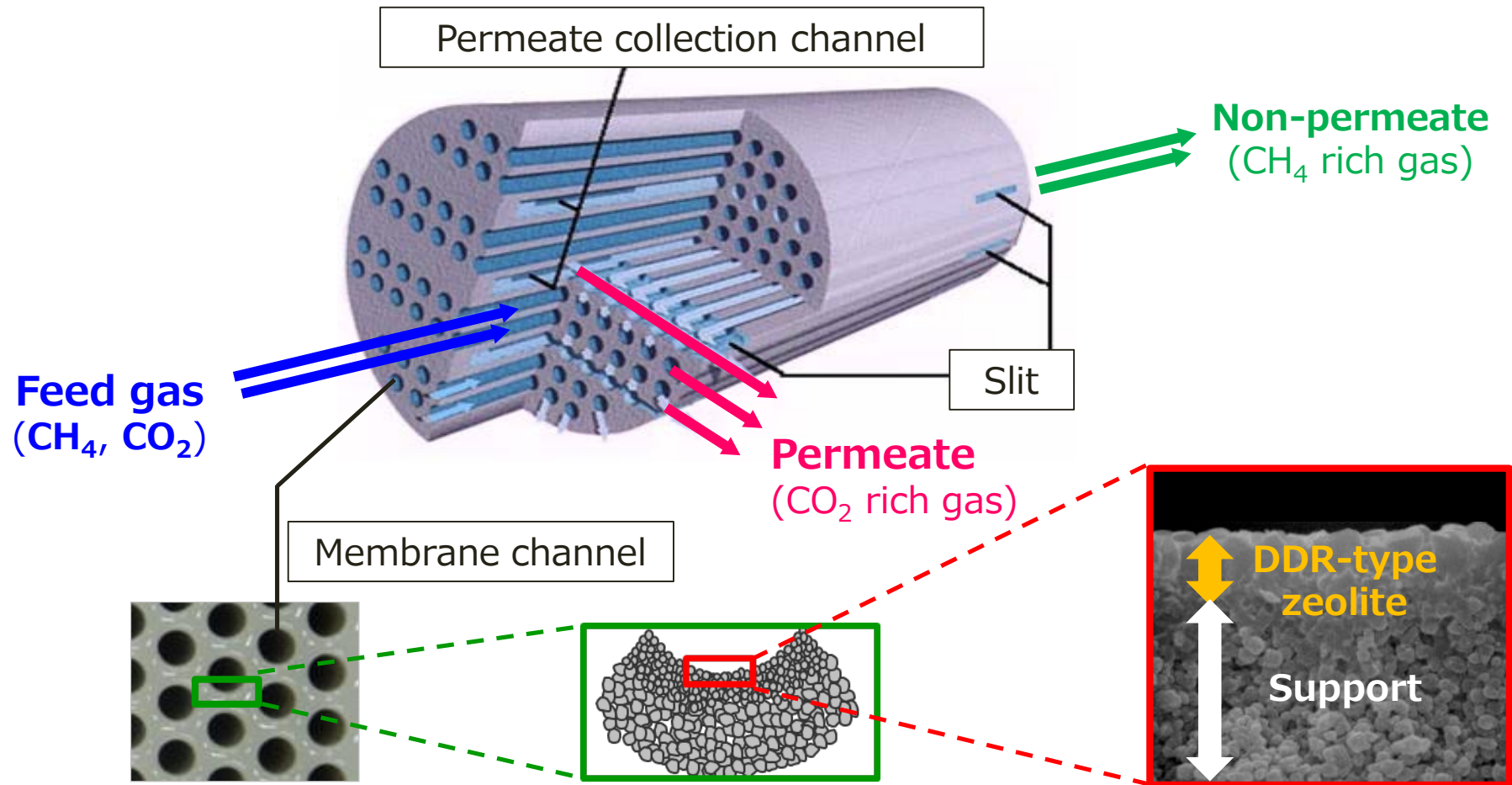
# JGC's Approach to GHG Reduction

## ② DDR Membrane



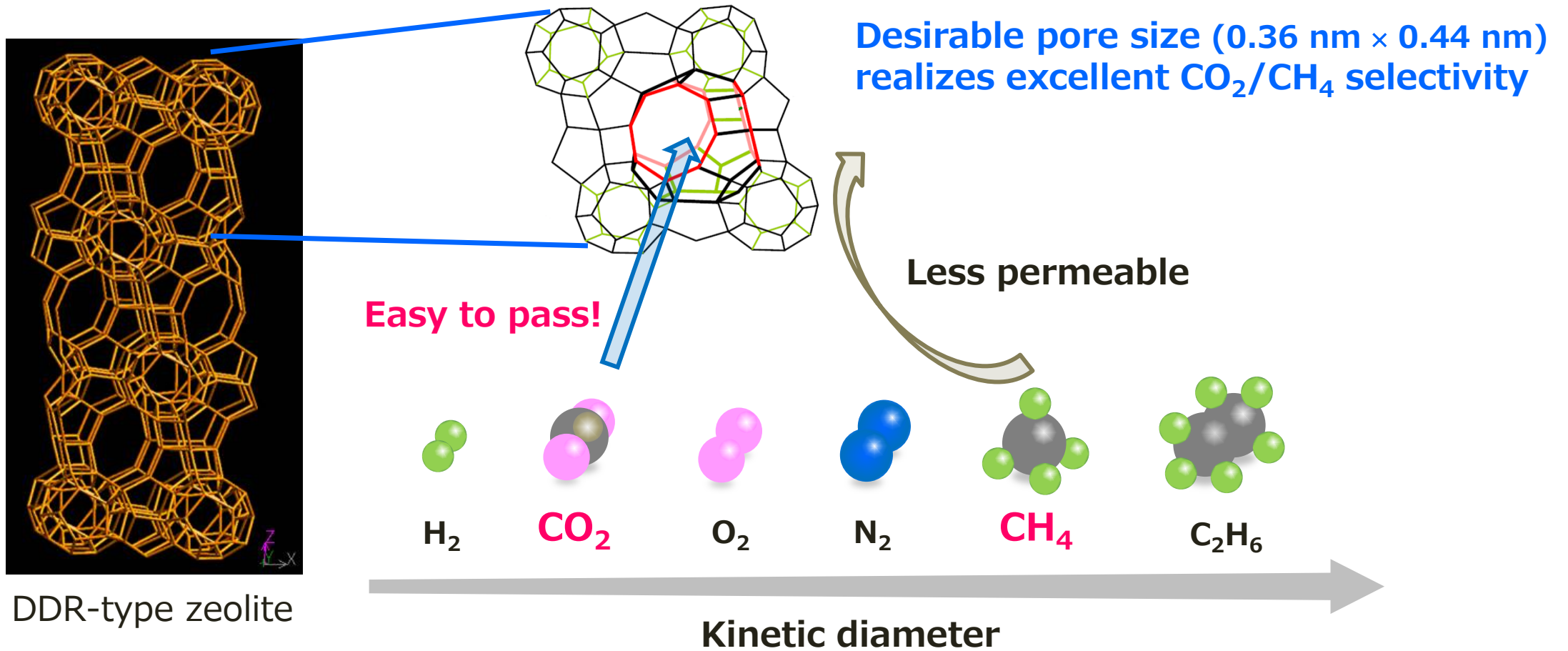
# Overview of DDR Membrane

## Uniform & defect-free membrane



# Mechanism and Feature

## Unique nano-porous material



DDR-type zeolite

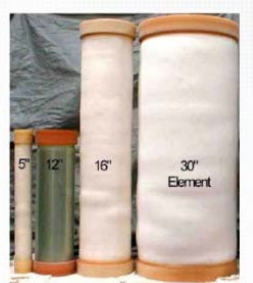
# Comparison with Polymer Membrane

## CO<sub>2</sub> Separation Membrane

### Polymer membrane



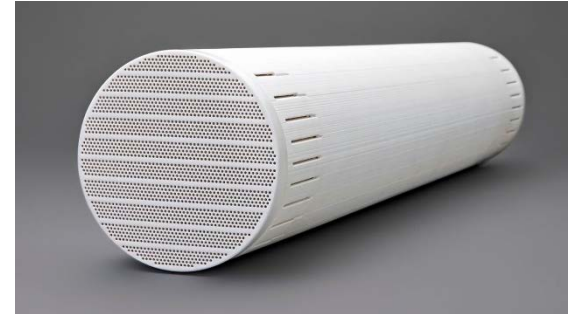
Spiral-wound  
(UOP)



Hollow fiber  
(CYNARA)

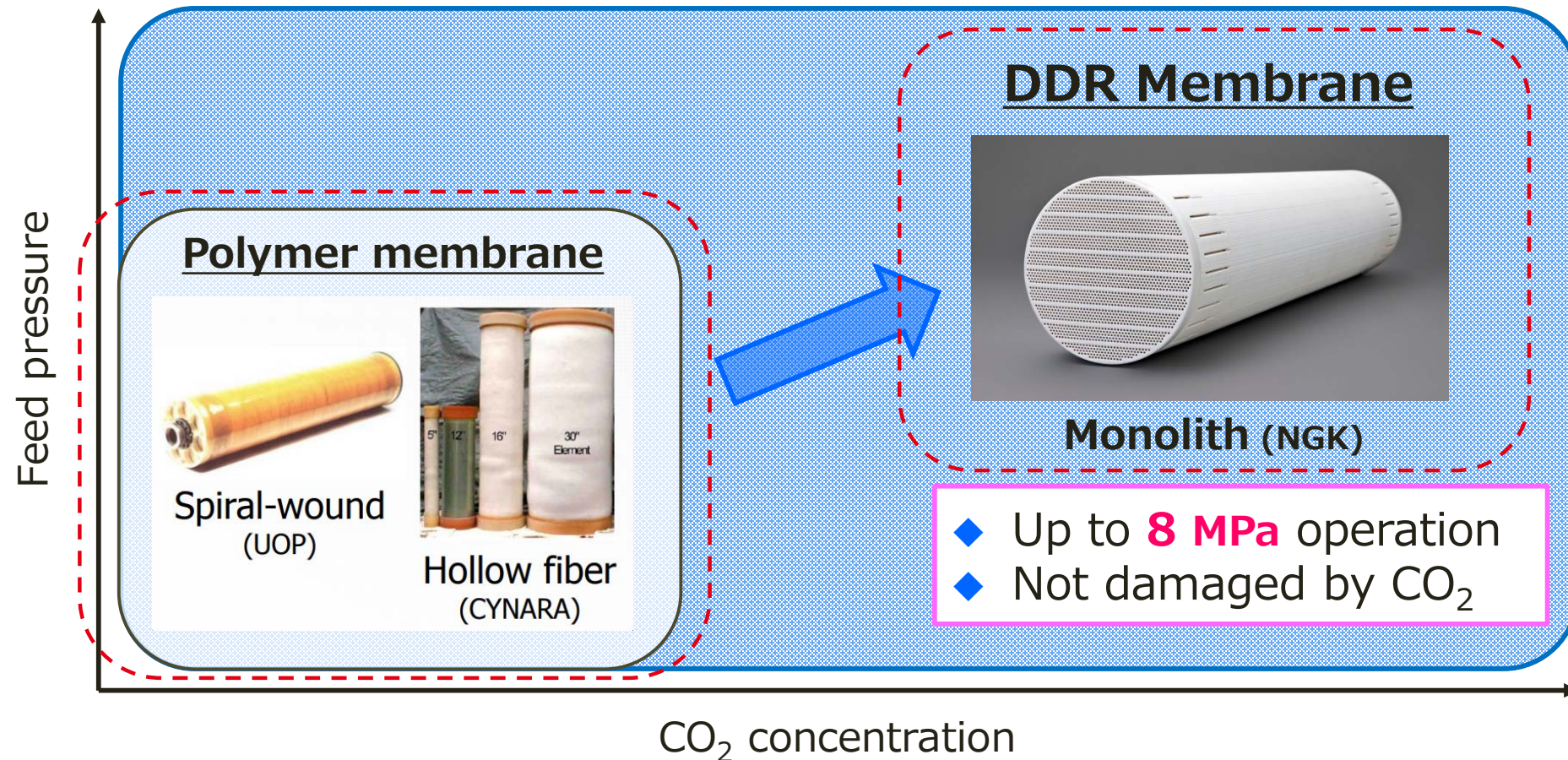
VS

### DDR Membrane



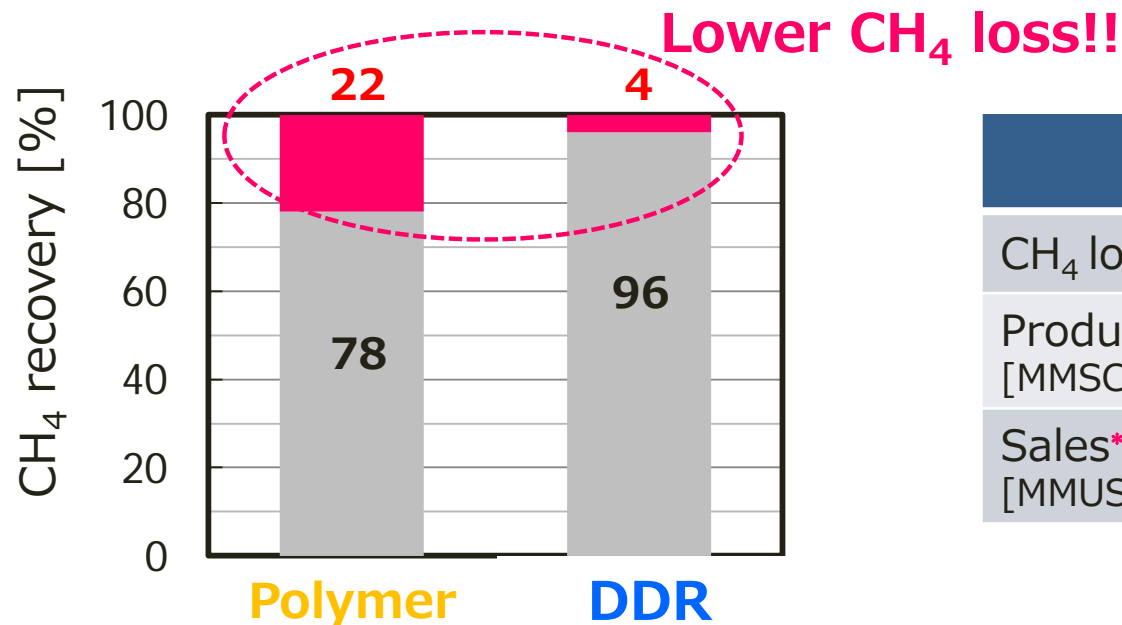
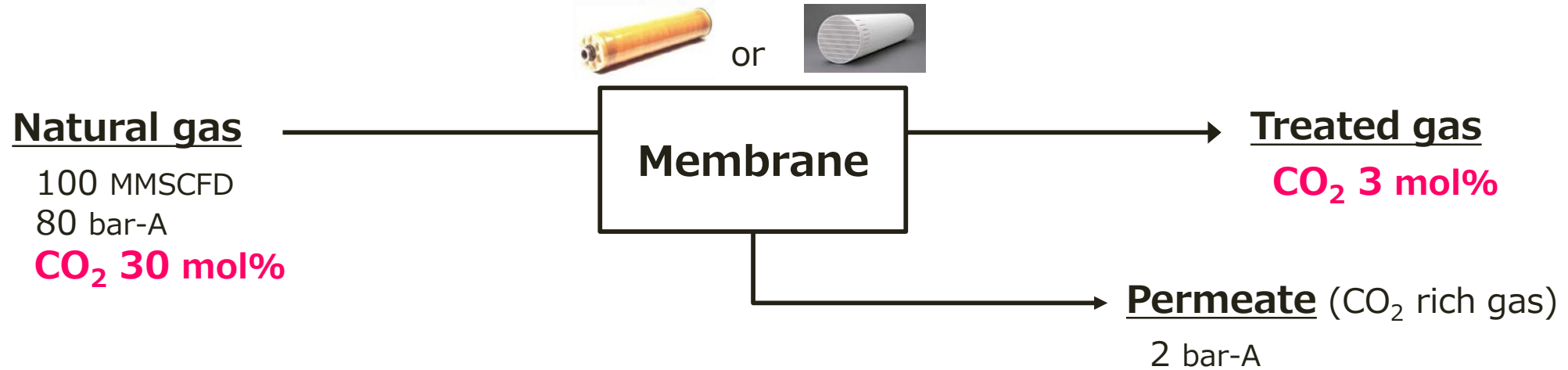
# For High Pressure and CO<sub>2</sub> Concentration

Tough under high CO<sub>2</sub> condition





# Low Methane Loss in Permeate Gas



	Polymer	DDR
CH <sub>4</sub> loss [%]	22	4
Product gas [MMSCFD]	56	70
Sales* <sup>1</sup> [MMUSD/y]	<b>54</b>	<b>67</b>

\*<sup>1</sup> Gas price: 3 USD/MMBtu

# Development Load Map of DDR Membrane

Supported by  JOGMEC



In USA



**Industrial  
Demonstration Test  
(2020-)**

Commercial Plant  
(202X-)



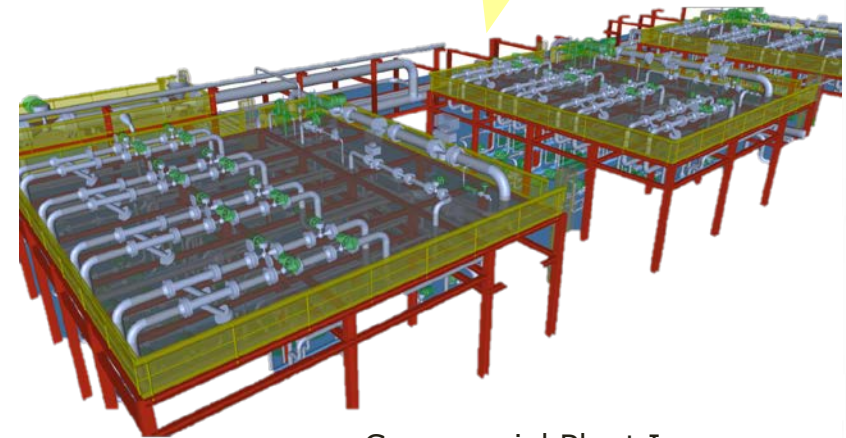
In Oarai

Field Performance Test  
(2017-)

Laboratory Test  
(2009-)



In USA

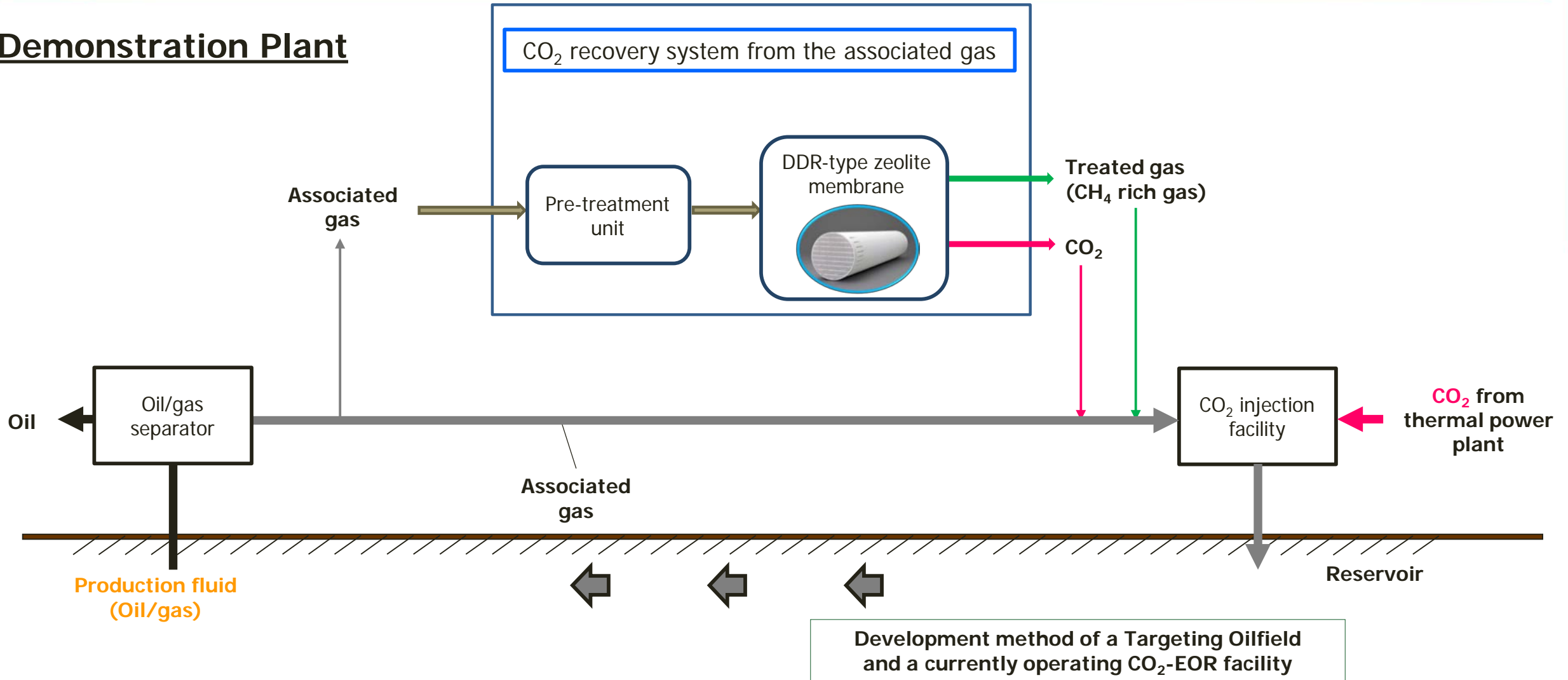


Commercial Plant Image



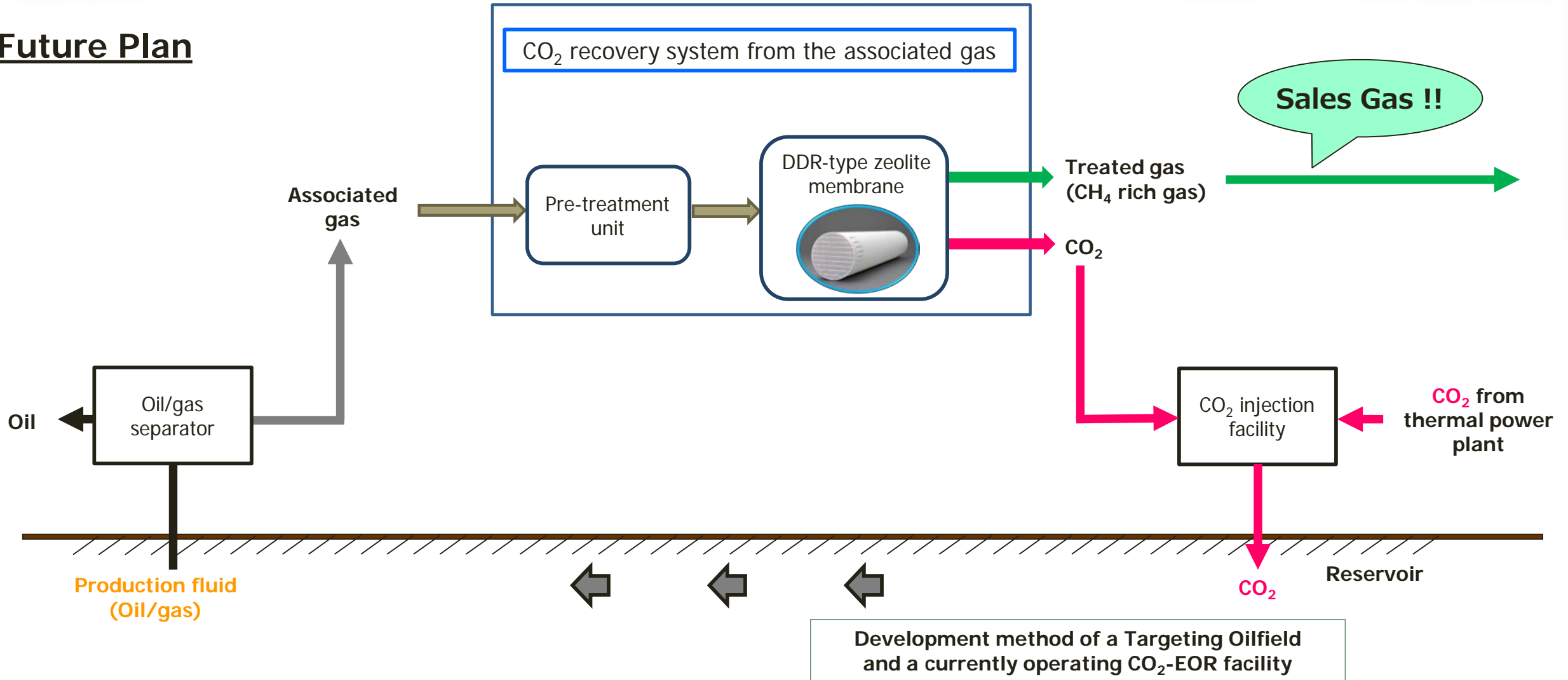
# Industrial Demonstration Test for CO<sub>2</sub>-EOR

## Demonstration Plant



# Commercial Facility for CO<sub>2</sub>-EOR

## Future Plan



# Summary

- ◆ **HiPACT™ process** is available for more economical CCS/CCUS project with higher pressure recovery of CO<sub>2</sub>.
- ◆ **DDR Membrane** is coming soon! Field performance test has been successfully completed, and industrial demonstration test will be started this year.
- ◆ **JGC Corporation** would like to contribute to the GHG reduction by CCS/CCUS project with our advanced CO<sub>2</sub> removal technologies.



**Thank you very much**

## **JGC Corporation**

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