Current status and future plan for CCS in Korea

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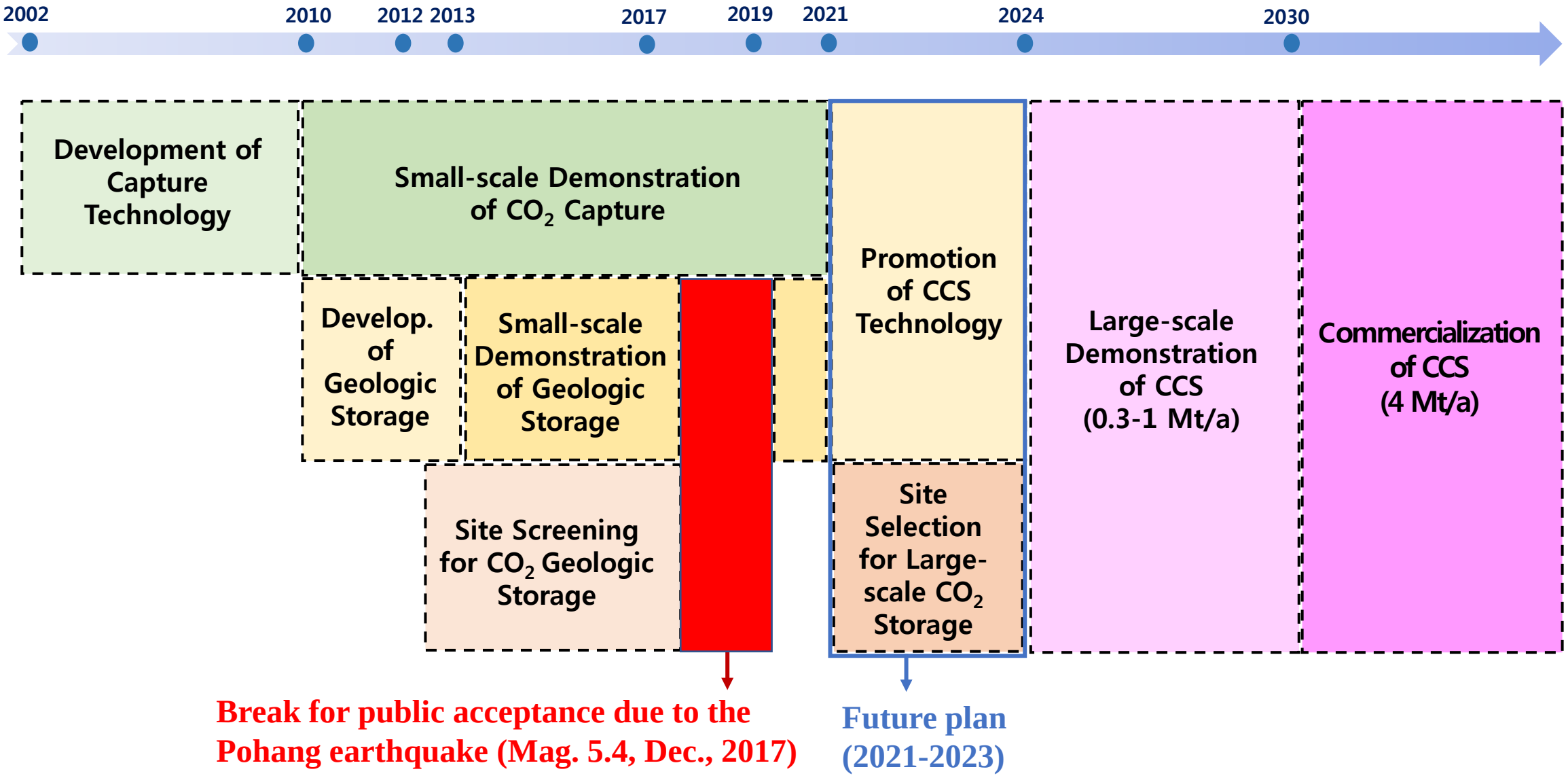
Current stage of CCS technology in Korea



Small-scale demonstration of CO_2 capture

Wet technology, PCC

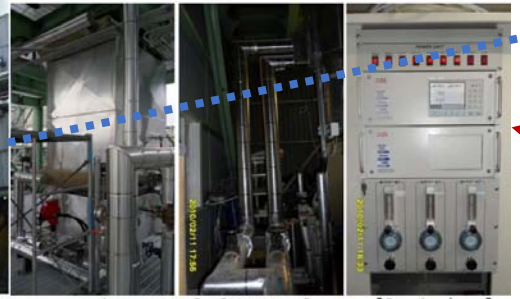
- Boryeong power plant
- Amin solvent, KoSol series
- 0.1 MW in 2010
- 10 MW in 2014
- 5,000 hrs in 2017, 180 ton/day
- 2.5-2.6 GJ/tCO_2
- 10,000 hrs by 2021

Dry technology, PCC

[2,000 Nm^3/hr Process]

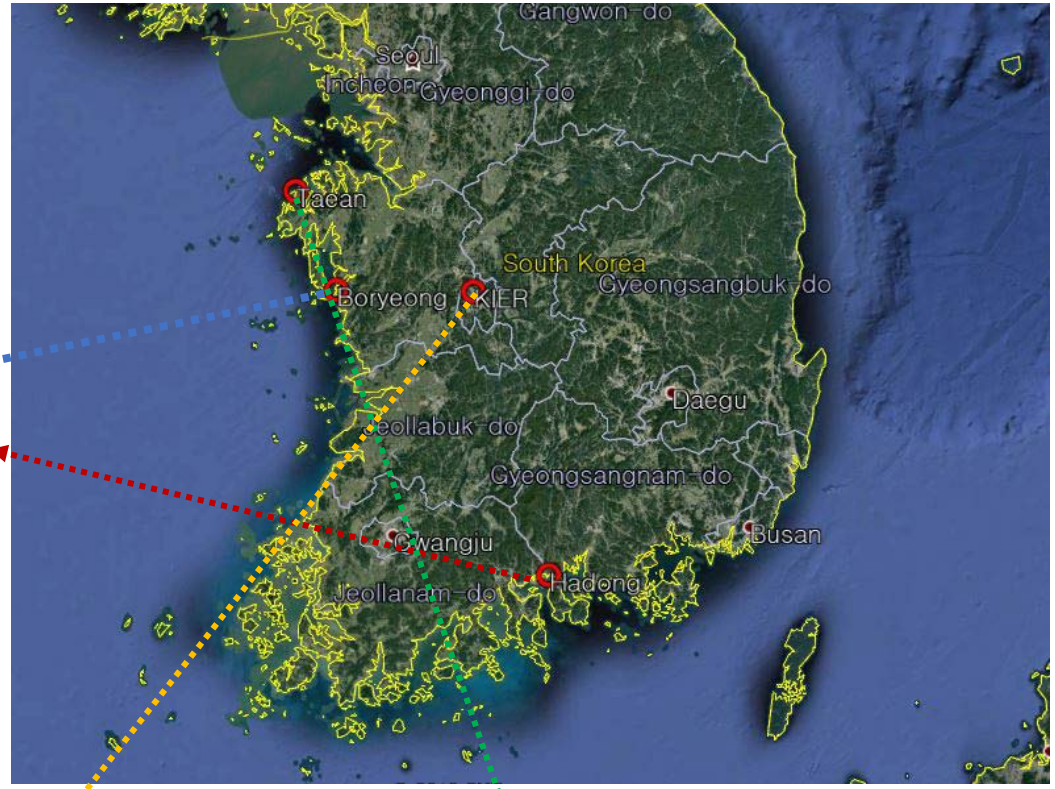
[Flue gas In/Out]

[Cyclone]



[Regenerator/Steam Line] [CCW Line] [Gas Analyzer]

- Hadong power plant
- KEP-CO2P sorbant
- 0.5 MW in Mar. 2010
- 10 MW from 2010
- 1,000 hrs by 2011



MAB

MAB-N 600 hrs

- 0.035MW, KIER
- 2.05 GJ/tCO_2

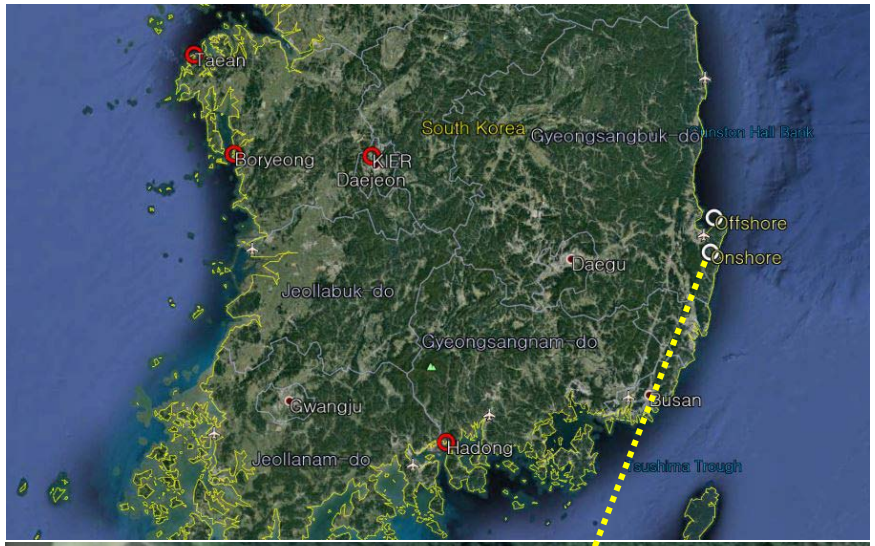
MAB-E 2,000 hrs

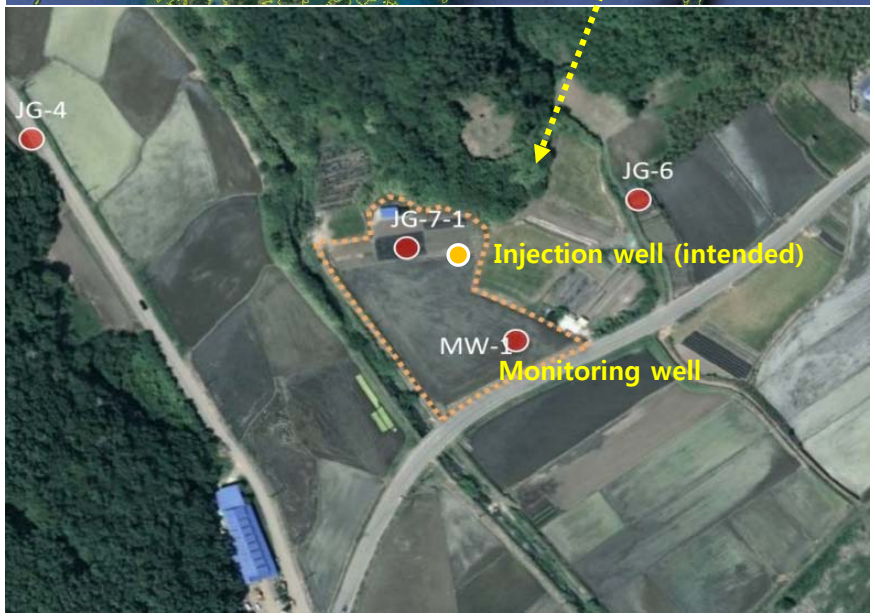
- 0.5 MW
- Taean power plant
- 2.35 GJ/tCO_2

Small-scale demonstration of CO_2 geological storage

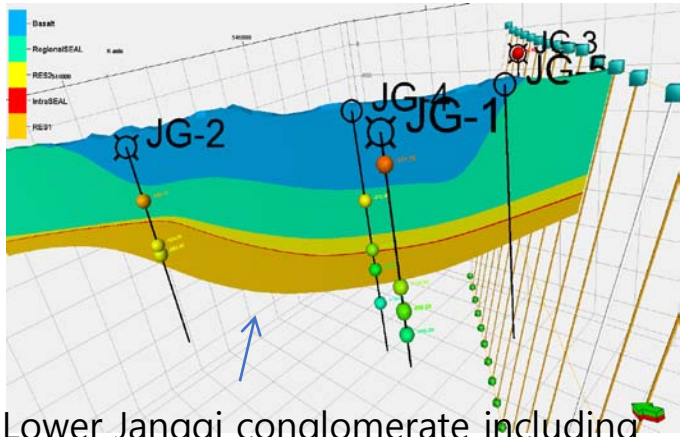
2012-2020

Onshore (Janggi Basin)





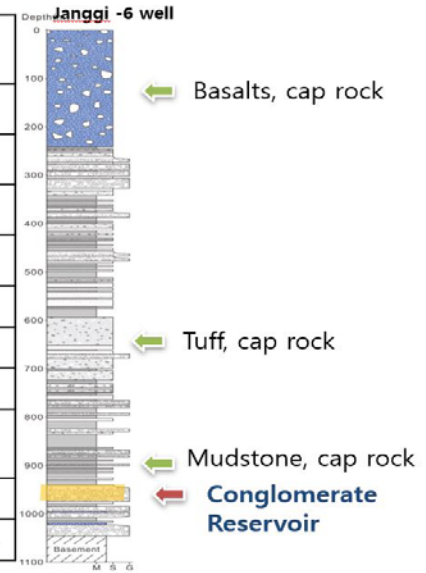
[1] Site selection



Lower Janggi conglomerate including reservoirs.

[2] Characterization

Lithology	Conglomerate Gravely SST
Depth	940 ~ 975m
Thickness	< 30m
Porosity	15.5%
Permeability	< 40mD
Dip direction	NW
Dip angle	<25°
Temp.	50°C(+/-2°C)
Reservoir pressure	92 ~ 96 bar
pH	9.60 ~ 9.72
Salinity	504 ~ 511 mg/L



[3] Completion of monitoring well drilling

[4] Installation of monitoring system

[5] Design of injection facility and prediction of injection scenarios

Small-scale demonstration of CO_2 geological storage

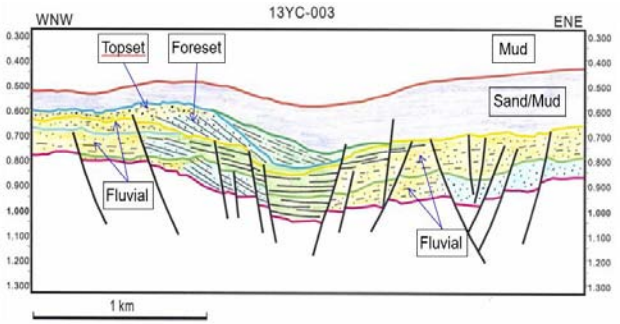
2013-2021

Offshore (Pohang Basin)

- Maximum loading : 200 ton
- W/L/H : 18.5/36.0/2.9m
- Leg length/diameter : 30/1.2m

[4] Construction of offshore platform

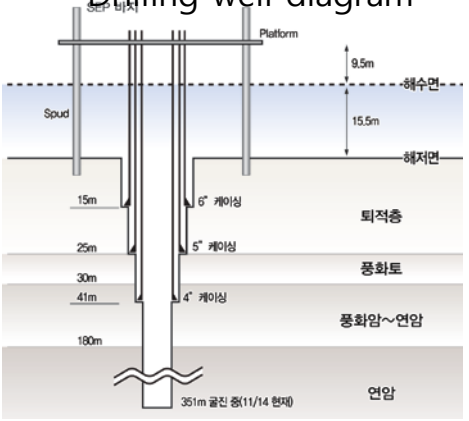
[1] Seismic survey



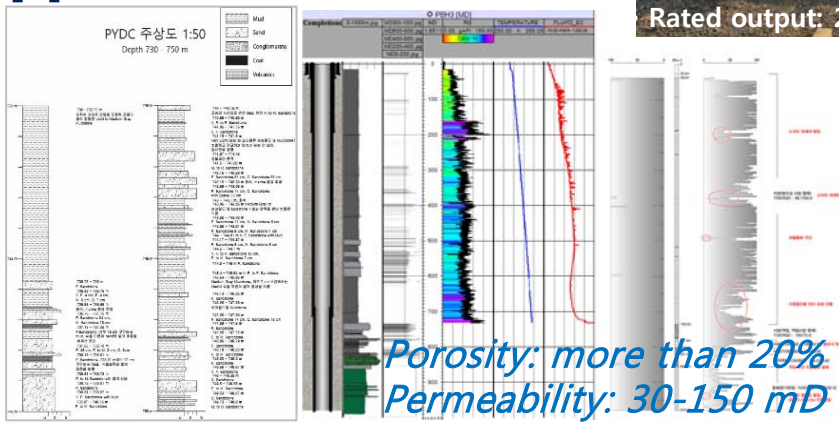
[2] Exploration drilling

Maximum pullout force: 30 ton
W/L/H : 2.3/2.8/10.5m
Rated output: 270HP/1,800rpm

Drilling well diagram

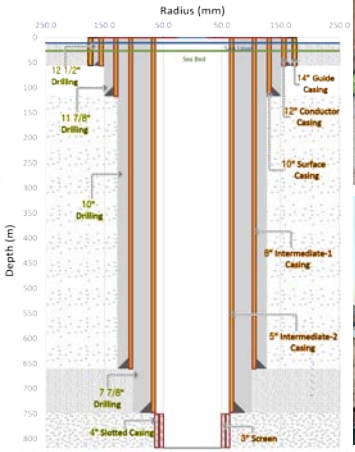


[3] Characterization



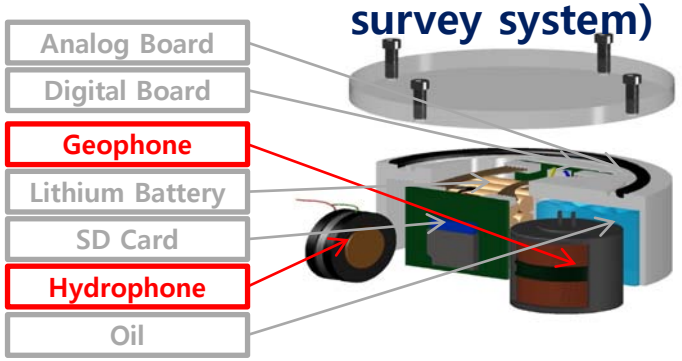
Porosity: more than 20%
Permeability: 30-150 mD

[5] Drilling of injection well and well completion



[6] Construction of injection facility

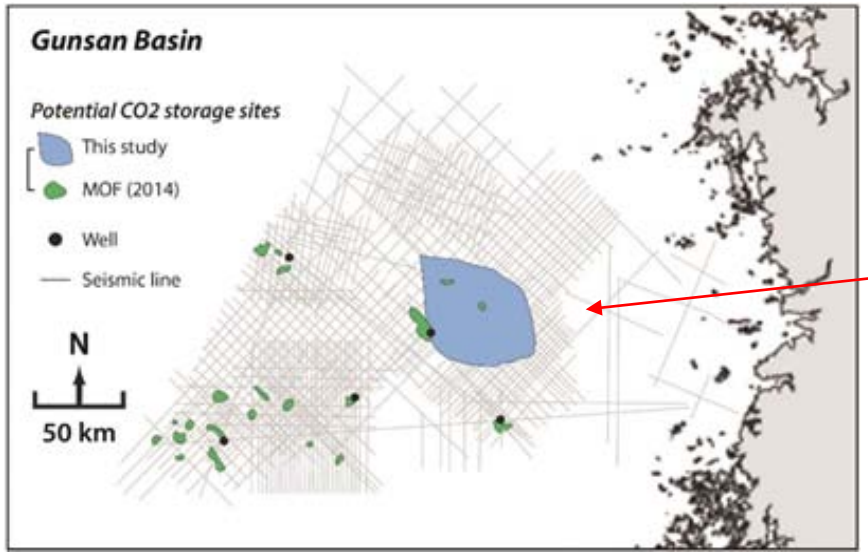
[7] Monitoring (Coastal OBS seismic survey system)

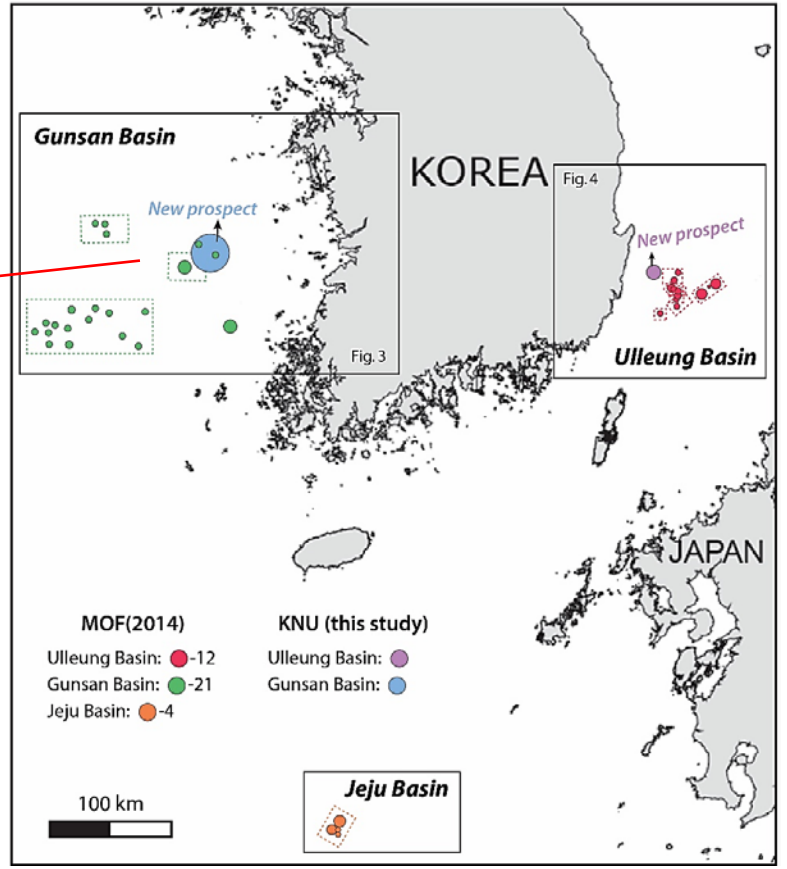


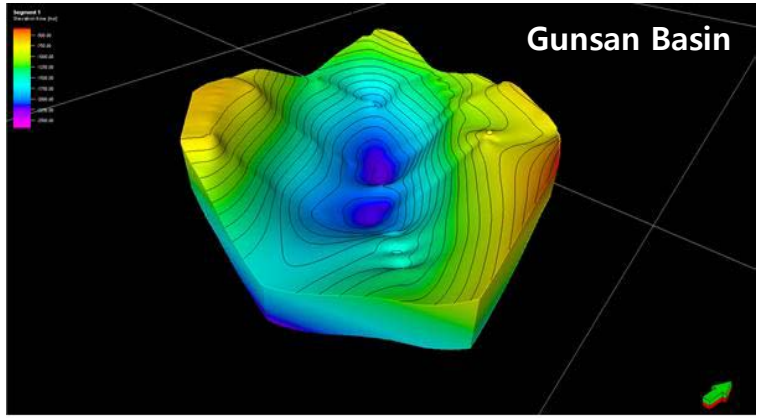
[8] Injection test of 100 tons of CO_2 (Early 2017)

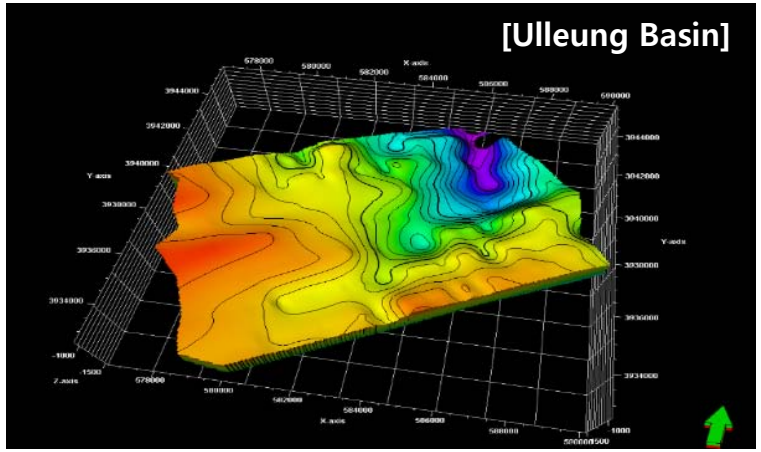
Future plan (2021 - 2023)

[1] Site selection & characterization for large-scale offshore geologic storage by exploration & drilling









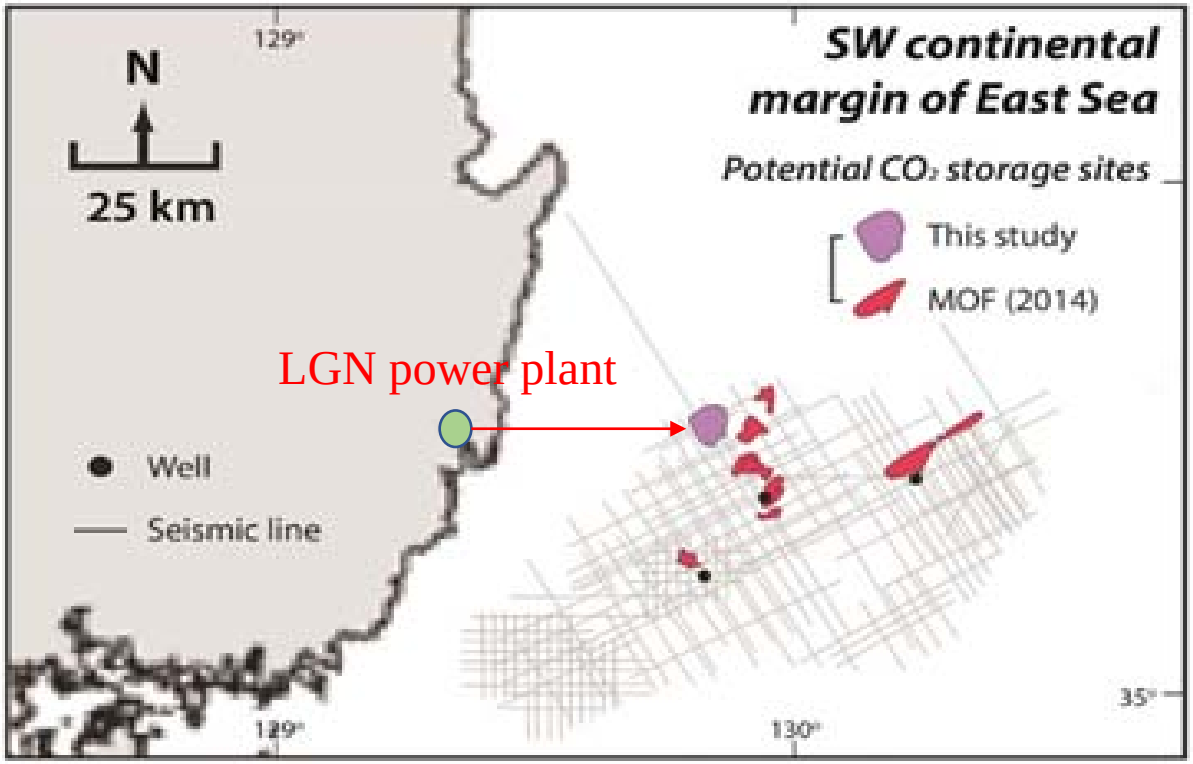
- Deduction of the promising geological structure and selection of the drilling site by geophysical exploration in Gunsan Basin
- Selection and characterization of the large-scale offshore geologic storage through the analysis of the samples and the data from the deep drilling

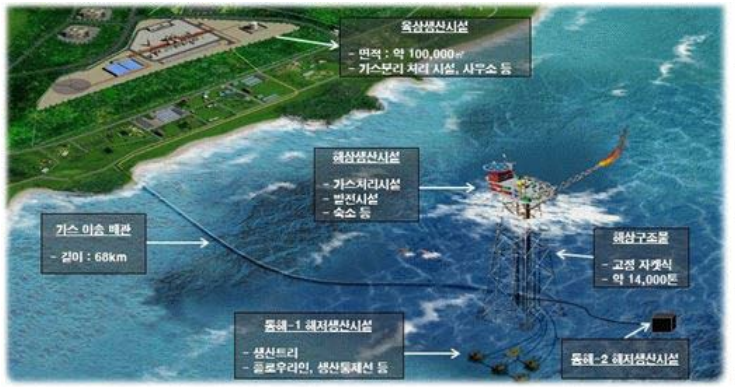
- Acquisition and determination of the large-scale offshore CO_2 geologic storage in Gunsan Basin

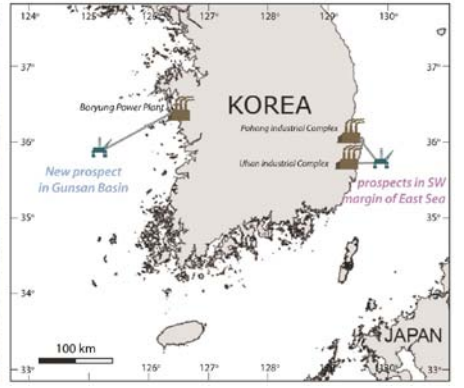
Future plan (2021 - 2023)

[2] Development of medium-scale CCS demonstration model using the gas reservoir in the East Sea

- Development of the medium-scale CCS demonstration model using the exhausted gas reservoir in the East Sea
- Suggestion of the FEED (front end engineering design) for the integrated CCS model to connect the exhausted gas reservoir in the East Sea and the capture plant of the LGN power plant and/or the industrial sources located along the southeast coast of the Korean Peninsula
- Development of the optimized medium-scale integrated CCS demonstration model for the independent technology, the cost reduction, and the improvement of the public acceptance



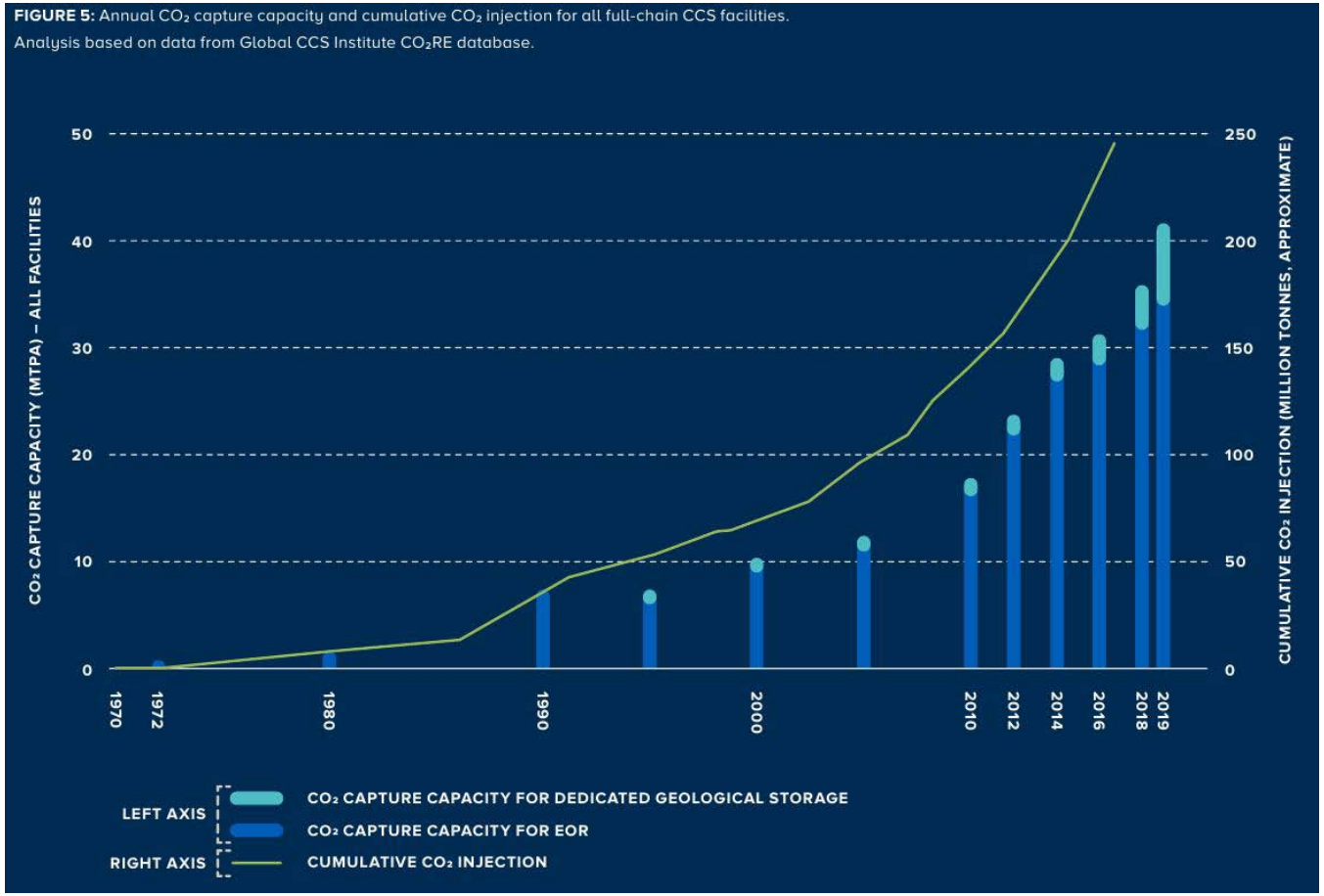




Future plan (2021 - 2023)

[3] Evaluation of the technology and the source for large-scale capture and Development of FEED for 150MW capture plant

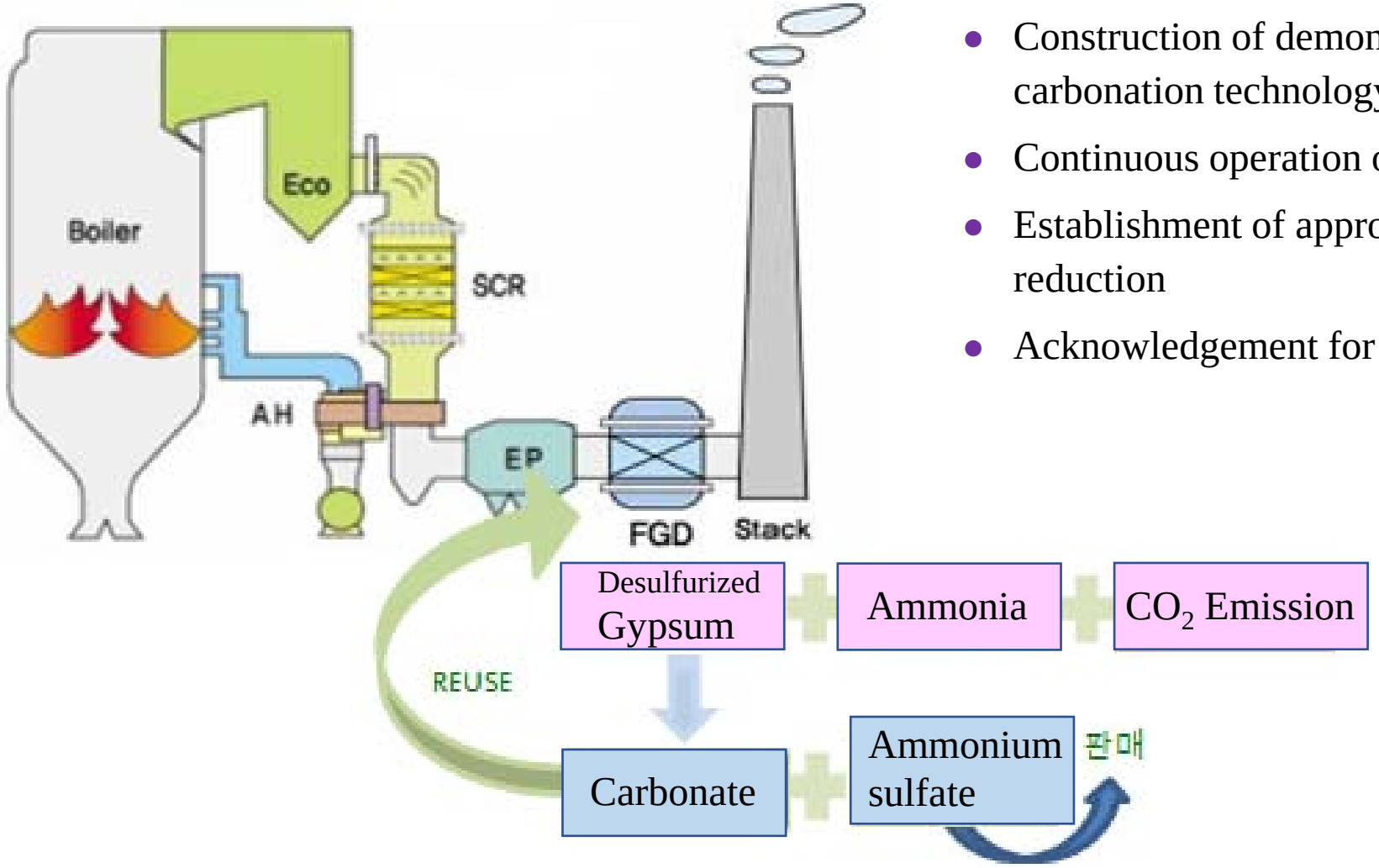
- Selection of the technology and the source for the large-scale capture through the establishment of the guideline, the methodology, and the system for the evaluation of the technology and the source
- Establishment of the evaluation platform and system to estimate the capture technology and deduct the improvement point for the medium and long term
- Development and suggestion of FEED for the application of the selected capture technology to the 150MW capture plant



Quoted from the Global Status of CCS (Global CCS Institute, 2018)

Future plan (2021 - 2023)

[4] Demonstration of mineral carbonation technology using desulfurized gypsum and Establishment of approval methodology for greenhouse gas reduction



- Construction of demonstration plant for mineral carbonation technology using desulfurized gypsum
- Continuous operation of demonstration plant for 700 hours
- Establishment of approval methodology for greenhouse gas reduction
- Acknowledgement for the quantity of CO_2 reduction

Thank you

for your attention !