Current status and future plan for CCS in Korea

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Current stage of CCS technology in Korea

- Development of Capture Technology
- Small-scale Demonstration of CO₂ Capture
- Large-scale Demonstration of CCS (0.3-1 Mt/a)
- Promotion of CCS Technology
- Site Selection for Large-scale CO₂ Storage
- Commercialization of CCS (4 Mt/a)

Break for public acceptance due to the Pohang earthquake (Mag. 5.4, Dec., 2017)

Future plan (2021-2023)
Small-scale demonstration of CO₂ 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/tCO₂
  - 10,000 hrs by 2021

Dry technology, PCC

- 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
  - MAB-E  2,000 hrs
  - 0.035MW, KIER
  - 2.05 GJ/tCO₂
  - Taean power plant
  - 0.5 MW
  - 2.35 GJ/tCO₂
Small-scale demonstration of CO₂ geological storage

Onshore (Janggi Basin)

2012-2020

[1] Site selection

Lower Janggi conglomerate including reservoirs.

[2] Characterization

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

[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 CO₂ 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

[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

[3] Characterization

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


[5] Drilling of injection well and well completion


[7] Monitoring (Coastal OBS seismic survey system)

[8] Injection test of 100 tons of CO₂ (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 CO₂ geologic storage in Gunsan Basin

- 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

- 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)

- 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 CO₂ reduction
Thank you for your attention!