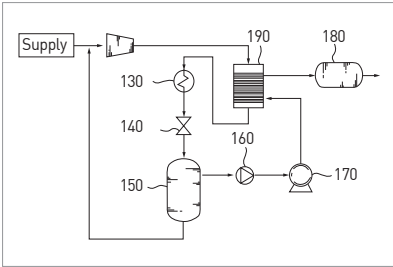


# Ground System for CO<sub>2</sub> Geological Sequestration

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⇒ Carbon dioxide liquefaction and underground injection apparatus

### Client / Market

- CO<sub>2</sub> underground injection facility manufacturer, CO<sub>2</sub> utilizing industry

### Necessity of this Technology

- With ocean storage, CO<sub>2</sub> emitted from the earth is expected to be stored for 500 years by releasing CO<sub>2</sub> below 3,000 m-deep ocean floor, but due to safety issues including problems with ecosystems and ocean acidification, this is prohibited by international laws. Surface storage method takes CO<sub>2</sub> to react to addible mineral such as magnesium or potassium for chemical reaction, but there is an issue of the cost for chemical reaction and the treatment of resulting chemical products.
- Cooling for CO<sub>2</sub> liquefaction requires a great energy consumption, and for underground injection, it is heated up to a high-pressure supercritical state, which also requires extensive energy. It is problematic to consume a lot of energy for liquefaction and storage of CO<sub>2</sub>, even though CO<sub>2</sub> sequestration is required for environment preservation.

### Technical Differentiation

- By resupplying the gas CO<sub>2</sub> that went through the gas-liquid separator with a compressor, energy required for liquefaction is reduced.
- By adopting an injection part with injection pump and heater, CO<sub>2</sub> is relatively easily made into supercritical state for underground injection.
- The injection part includes a high-pressure pump to prevent cavitation.
- By adopting a heat exchanger for heat exchange between CO<sub>2</sub> from the injection pump and CO<sub>2</sub> from the compressor, energy consumption for CO<sub>2</sub> liquefaction and storage is significantly reduced.
- The heat exchanger is located between the injection pump and the heater to heat CO<sub>2</sub> with the heat exchanger and then again with the heater to reduce energy consumption for CO<sub>2</sub> storage.
- It is a CO<sub>2</sub> liquefaction and underground injection apparatus that saves energy through heat exchange between CO<sub>2</sub> liquefied for transportation and CO<sub>2</sub> heated into the supercritical state for underground injection.

### DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

Other



### TECHNOLOGY READINESS LEVEL [TRL]

- |                             |                                     |                              |                       |   |                           |  |                                  |   |
|-----------------------------|-------------------------------------|------------------------------|-----------------------|---|---------------------------|--|----------------------------------|---|
| Research, basic explanation | Project concept or idea development | Technology idea verification | Prototype development | Trial product production/ evaluation in similar environment | Pilot field demonstration | Development and optimization of commercial model | Commercial product demonstration | Mass production and initial market launch |
|-----------------------------|-------------------------------------|------------------------------|-----------------------|---|---------------------------|--|----------------------------------|---|

### Excellence of Technology

- It is composed of the gas-liquid separator to separate CO<sub>2</sub> that went through the feed, compressor, and cooler into gas CO<sub>2</sub> and liquid CO<sub>2</sub>, injection part that converts liquid CO<sub>2</sub> into supercritical CO<sub>2</sub> for underground injection, and compressor where gas CO<sub>2</sub> is resupplied for recompression.



### Current Intellectual Property Right Status

#### PATENT

- CO<sub>2</sub> Liquefaction and Underground Injection Apparatus (KR1399442)

#### KNOW-HOW

- System design and engineering technology
- Flow mixing, heating apparatus design technology
- CO<sub>2</sub> heat exchanger design technology
- CO<sub>2</sub> injection turbo pump technology