Background

Flue gas CO₂ capture technology separates CO₂ from large CO₂ emission sources derived from combusting coal, natural gas or oil fuel. In the case of coal-fired power plants as shown in Figure 1, flue gas CO₂ capture technology is applied downstream of the existing emissions control systems.

Captured CO₂ is compressed and then used in enhanced oil recovery (EOR) where the CO₂ will remain sequestered in the underground rock formations.

Technology Overview

The MHI flue gas CO₂ capture process, so called “KM CDR Process®” (Kansai Mitsubishi Carbon Dioxide Recovery Process) can be applied to either existing or new power plants. This technology has been co-developed by MHI and Kansai Electric Power Company (KEPCO) since 1990.

The process is built on proven, advanced flue gas CO₂ capture technologies with specific application for fossil fuel power generation facilities. It utilizes the proprietary KS-1 trademark solvent that has improved absorption and regeneration properties while also lowering corrosiveness and degradation features, compared with normal amine applications. These aspects contribute to lower energy requirements, solvent consumption and emissions of waste products.

MHI is a world-leading flue gas CO₂ capture technology supplier and is strategically positioned to provide the most technically proven, environmentally friendly and economically robust CO₂ capture process.
KM CDR Process®:

- World’s largest operating flue gas CO₂ capture plant – eleven operating plants for various flue gas sources including the largest post combustion CO₂ capture plants in the world (as of June, 2014)
- World’s most energy efficient process with KS-1 solvent – leading to reduced costs
- World’s most advanced and comprehensive industrial R&D programs for more than 20 years – deployment of multiple R&D pilot plants and research facilities led to significant process and technology improvements
- More than 207 patents pertaining to the KM CDR Process® all over the world (as of June, 2014)
- Widespread commercial experience with large scale various Air Quality Control Systems (AQCS) equipment

Experiences

The experience gained from the deployment of eleven operating plants has been invaluable in strengthening operation and reliability in CO₂ capture plants. Eleven major MHI CO₂ capture plants are currently under operation as shown in Figure 3.

Technology Demonstration

Coal-fired power plants are the largest producer of CO₂ emissions. The 500 mtpd (metric ton per day) CO₂ capture and sequestration project at Plant Barry in Alabama is currently the world’s largest start-to-finish carbon capture and storage project from coal fired flue gas. The CO₂ produced from the capture plant is transported via a pipeline and sequestered at the Citronelle oil field.

The capture plant began successful operation on June 2, 2011 and achieved a 100,000 ton of CO₂ injection until October, 2013.