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MHI's CO_2 Capture Technology (KM CDR Process™)

June 8, 2023

Mitsubishi Heavy Industries, Ltd.

MITSUBISHI HEAVY INDUSTRIES

MHI's Learning Opportunities

1. MHI R&D Center Pilot Plant
- CO2 Capacity 1 MTPD, KS-1™ ,Japan

2. Nanko Pilot Plant
- CO2 Capacity 2 MTPD, KS-21™ & KS-1™, Natural Gas Fired with CO2 Recycle, Japan

3. SOCO Demonstration Plant
- CO2 Capacity 500 MTPD, KS-1™, Coal Fired Boiler, US

4. Petra Nova Commercial Plant
- 4776 MTPD, KS-1™, Coal-fired Boiler, US

5. TCM - Technology Centre Mongstad
- CO2 Capacity 90 MTPD, KS-21™ & KS-1™, GT & RFCC, Norway

TCM Demonstration Test

MHI has completed the demonstration using KS-21™ solvent at Technology Centre Mongstad's carbon capture facility.

Facility Information

Site Location	Technology Centre Mongstad, Norway
Owner	TCM-DA
CO_2 Source	CCGT, RFCC flue gas
Solvent	KS-21™ Solvent KS-1™ Solvent

Key Results

- KS-21™ and KS-1™ showed **CO_2 capture rates of 95-98% and even up to 99.8%** where the absorber outlet CO2-% was lower than atmospheric CO2

- KS-21™ showed lower emission and better energy performance than KS-1™, which also outperformed MEA

Photograph courtesy of Technology Centre Mongstad

Testing Conclusions

- **From Hiroshima R&D Center Pilot Plant and SOCO Demonstration Plant, it was confirmed that:**
  - Amine emissions increased significantly with a small amount of SO3
  - MHI's amine emission reduction system decreases amine emission below 1/10 of the conventional system

- **From the Nanko Pilot Plant and Petra Nova, it was confirmed that:**
  - MHI's simulator has a high accuracy

- **From TCM pilot test, it was shown that …**
  - Target CO_2 capture rate of 98% and more can be achieved at various packing heights
  - Low level emissions were confirmed by online analyzer (FTIR) throughout the test period
  - Substantial reduction of amine emission from CO_2 absorber top was confirmed by acid washing
  - Corrosion by KS-21™ solvent was not observed based on accumulation of soluble iron in the solvent

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