Significance of Plant Barry Demonstration Project

SECARB Annual Stakeholders' Briefing
Atlanta, Georgia

March 27, 2019

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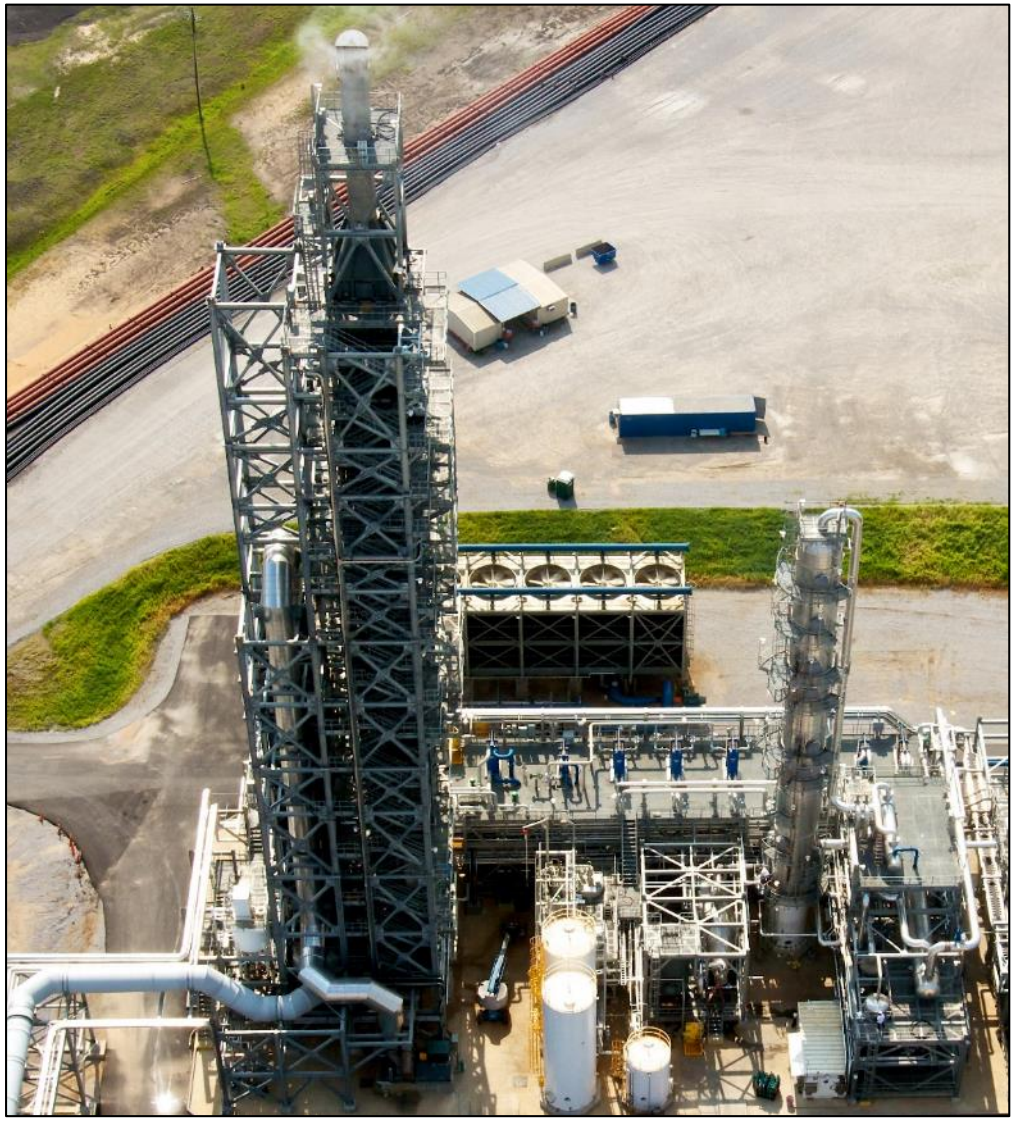
January 2017 Owner's PR:

"NRG Energy, JX Nippon complete world's largest post-combustion carbon capture facility on-budget and on-schedule[1]"

[1]NRG press release

Large-Scale Coal Demonstration Project at Plant Barry (25MWeq)



Large-scale demonstration was necessary to combine the lessons learned from the smaller pilot projects before scaling up for commercial power projects.

- Majority of funding by Southern Company and MHI.
- CO_2 capture capacity: 500 tpd
- From 2011-14: over 12,000 hours, over 250,000 tons captured, over 125,000 tons injected

✓ Tested various technologies developed from pilots.

✓ Confirmed design expectations and performance.

✓ Confirmed long-term stable system operation.

✓ Verified long-term performance under various flue gas conditions and coal characteristics.

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25MW$_{eq}$ CCS Demonstration Project at Plant Barry

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Verified Process Improvements

Energy Saving System

Deployed and verified an optimized system for reduced steam consumption

Automatic Load Adjustment System

Deployed and verified dynamic response simulator and automatic control system for load following

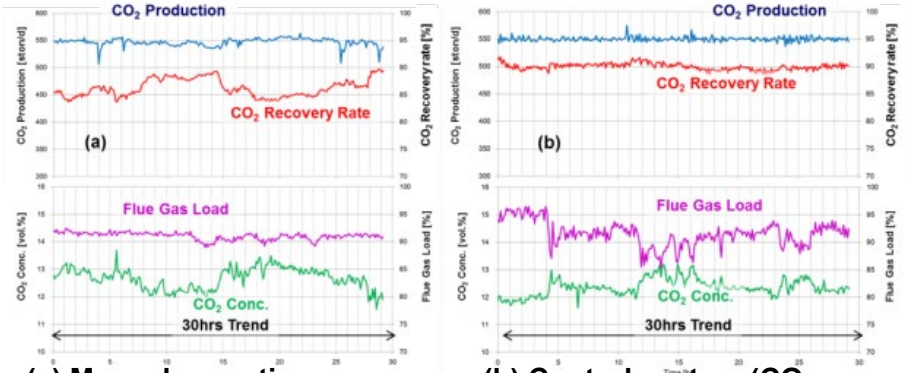
Amine Emission Reduction System

Deployed and verified countermeasures including multi-stage wash and demisters at elevated inlet SO_3 conditions.

Amine Purification System

Verified performance of batch reclaiming operation to remove coal combustion impurities from solvent

Automatic Load Adjustment System



(a) Manual operation **(b) Control system (CO_2 production control mode)**

- Automatic system control including solvent circulation and steam use depending on plant load, flue gas condition, and CO_2 demand
- Allows rapid response to changing system conditions and turndown to 50%

Amine Emissions Reduction System

MHI Plant without Amine Reduction System

MHI Plant with Amine Reduction System

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Petra Nova Project – World's Largest Post-Combustion CO_2 Capture Project

Fall 2016 View of the Site

The Petra Nova project is MHI's first commercial power project and has ~10x the capacity of the Plant Barry demonstration.

- Plant is owned by NRG and JX Oil & Gas.
- Captures 4,776 mtons/day (240 MWeq, 90% capture) from a ~37% flue gas slip stream.
- MHI was able to offer commercial guarantees after confirming the performance at Plant Barry.

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Without large scale demonstration of the KM CDR Process™, the performance of the Petra Nova Project could not have been guaranteed.

Thoughtful technology development, extensive testing, and large scale demonstrations are essential for successful commercial projects.

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