

REINHOLD ENVIRONMENTAL Ltd.



2010 APC Round Table & Expo Presentation

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Dynegy Midwest Generation ACI Operating Experience



APC Roundtable- July 2010



Dynergy

Dynergy Generation Operations

Dynergy's power generation business consists of more than 13,000 megawatts of baseload, intermediate and peaking power plants fueled by a mix of coal, fuel oil and natural gas.

With generation facilities in 6 states and four North American Electric Reliability Council (NERC) regions, our portfolio is well positioned to capitalize on regional differences in power prices and weather-driven demand.



Illinois Mercury Rule

- Mercury rule went into affect in 2009. Required units to start injection July 1, 2009 (fabric filter units started January 1, 2010).
- Illinois law has two options:
 - Straight carbon injection rate. Requires injection rate of 5 lb/Macf for subbituminous coal or 10 lb/Macf for bituminous coal and 2.5 lb/Macf for cyclone units on PRB.
 - Emissions limit. Prove at least 90% mercury removal or <0.008 lb/GWh.
- Monitoring requirements per Illinois law:
 - First 3 years, periodic stack testing (quarterly for 90% units, semi-annual for injection rate units)
 - Starting in 2012 continuous monitoring with mercury CEMS or sorbent trap systems required. (We have opted for traps at this point.)
 - Daily coal sampling also needed for a monthly average mercury level.
- Beginning January 1, 2013 all plants must meet 90% removal.

Dynergy Activated Carbon Injection Systems

- Eight ACI systems currently in operation (5 started July 1, 2009).
- 3 units are precipitators only and 5 are baghouses after a precipitator in TOXECON arrangement.
- On TOXECON arrangement the injection is after precip and before baghouse to preserve ash sales from precip.
- Hennepin and Vermillion stations have Dustex design baghouses and ACI systems.
- All other systems are Wheelabrator/Siemens design baghouses with Delta/Ducon ACI system.
- All units burn PRB coal.
- First system put in service at Vermillion Station in June 2007.
- Sole-source contract with Norit for halogenated carbon.

Dynegy Experience

Precipitator Only Units

- We inject at default rates for precipitator only units.
- Precipitator only PC unit takes 7 lb/Macf to get >90% removal (>85% at 5 lb rate).
- Cyclone units getting 75-90% at 2.5 lb/Macf based on LOI.
- For 5 lb/Macf unit, carbon cost is approx \$1/MWHR
- For 2.5 lb/Macf units, carbon costs are approx \$0.56/MWHR
- No noticeable increase in opacity or particulate emissions.

Dynergy Experience

Fabric Filter (TOXECON) Units

- We have chosen to meet the emissions limit of 0.008 lb/GWh on the baghouse units to lower costs.
- Testing has shown >90% removal at 1.0 to 1.3 lb/Macf injection rates on baghouse units.
- First dry scrubber fabric filter system started in June. First trap sample showed >95% removal at 1 lb/Macf injection rate.
- Costs for carbon is \$0.22 - \$0.36/MWHR
- Take precautions with high carbon content in fabric filter ash.

TOXECON Arrangement Issues

High carbon concentration in fabric filters



Havana Station Injection Lances



Costs

- High cost
 - Estimating 10 million lbs of carbon usage in 2010 for fleet.
 - Stack tests and monitoring costs and coal sampling.
- Loss of ash sales at precipitator units
 - Ash disposal costs. Some sites have no room for more ash.
- Carbon cost is over \$10,000 per pound of Hg removed!
- Capital Costs
 - ACI system alone, roughly \$2 million (\$3.30-\$6.20/KW)
 - ACI plus fabric filter - \$220-\$260/KW
 - ACI plus dry scrubber and fabric filter - \$360-\$475/KW

Questions?