Mercury Control Technology Using Sorbent Enhancement Additives

Marcus Sylvester
VP Sales
Midwest Energy Emissions Corp
The Company – ME₂C

* Commercialization of UND- EERC Technology

* Provide Technologies that Meet New EPA MATS Standards
  * With the Most Effectual Approach (Meet Emission Reduction Goal)
  * Most Economical Manner (Meet Plant Capital and O&M Budgets)
  * Least Balance of Plant Disruptions (Reduce MW-hr Costs)

* Develop and Deliver Cost Effective Mercury Capture Systems
  * 19 Patents – US, Canada, China, & Europe

* Strong Focus on Continuous Innovation - EERC
ME$_2$C’s Technology Development

Since 2000, our Total Mercury Control™ was developed with over $60M spent by ME$_2$C, EERC, DOE, Utilities

All coal types, various boiler designs & operational configurations

ME$_2$C has partnered with EERC for its testing & demonstrations last 6 years

Commercially proven at 15 utilities (~$15M)
Mercury–Sorbent Interactions

The EERC’s chemisorption model for mercury–flue gas interactions with sorbents is both descriptive and predictive.

Based on years of CATM research and empirical data, it shows the interactions involved in mercury capture by sorbents. Understanding flue gas interactions is critical.
**ME2C Total Mercury Control Program**

* A tunable (2 Chemical) approach to mercury capture

* **Sorbent Enhancement Additives** (Front End)
  * Proprietary Chemicals
  * Designed to Promote and Protect activated sites
  * Distribute chemical throughout furnace system

* **Sorbent** (Back End)
  * Proprietary Chemicals
  * Provide active capture sites for mercury adsorption
  * Protect activated capture sites
Injection and Sampling Locations

Coal Bunkers

Coal Feeders

Pulverizers

SEA™ Injection System

Boiler

Air Preheater

SIDE A

SIDE B

ESP

SIDE A

SIDE B

ID Fans

Stack

ME2C Patented Technology

Sorbent Injection System
Demonstration Results (2009)

Injection Rate, lb/Macf (at 350°F)

Mercury Removal, %

Back-End Injection Rate, lb/hr

- 25 lb/hr SF10
- 38 lb/hr SF10
- 60 lb/hr SF10

- 20 lb/hr SF10

- SF10-SB24
- BAC 1
- BAC 2

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**Demo Summary at 700 MW Unit**

- **BAC**
  - Not able to achieve 90% - economically
  - 80% Capture Rate
    - 475#/hr
    - 3.2#/MACFM
  - Killed Fly Ash Sales
  - LOI >3.5% (adjusted)

- **Midwest Energy Emissions:**
  - 90% Capture Rate
    - SEA @ 52#/hr
      - (0.3#/MACFM)
    - Sorb @ 178#/hr
      - (1.2#/MACFM)
  - 80% Reduction
    - SEA @ 23#/hr
      - (0.15#/MACFM)
    - Sorb @ 84#/hr
      - (0.7#/MACFM)

Flyash <0.8% (adjusted)
SEA Chemical Feeder
Blower Cabinet
SEA Injection Points
Sorbent Feed System
Commercial Program Performance (as MACF)

Commercial Unit #2
Mercury Removal Performance Curve

- Actual Removal
- Guaranteed Removal

0.3#/MACF – SF10
92.7%

~1.15#/MACF – SB24
Commercial Program Performance (lb/Tbtu)

Commercial Unit #2
Mercury Removal Performance Curve

Commercial Program Performance (lb/Tbtu)

- Hg Stack Emissions, lb/TBtu
- Backend SB24 Injection Rate, lb/hr
- Lb/TBtu
- Actual % Removal Achieved During Performance Tests
- MATS limit showing required percent removal and injection rate

 ME2C
Midwest Energy Emissions Corp
Economic Summary
ME$_2$C vs. Brominated Activated Carbon (BAC)

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<tbody>
<tr>
<td>Mercury Removal</td>
<td>80% removal</td>
<td>90% removal</td>
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<tr>
<td>Cost, US $Million/yr (7600 hr/yr)</td>
<td>47%</td>
<td>51%</td>
<td>70%</td>
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<td>28%</td>
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Next Steps for Utilities

* Cost estimates on any specific units
* Cost-share demonstration (7 days)
* Site visit of ME$_2$C installations
* Open invitation to EERC
Thank You

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