


Activated Carbon Injection Systems: Preparing for MACT

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ADA Environmental Solutions creates and delivers cutting edge technical and chemical solutions to reduce emissions from coal-fired power plants, Portland cement kilns and industrial boilers, helping customers meet environmental goals while balancing their business needs.

NASDAQ: ADES

www.adaes.com

ADA: Innovate, Develop, Commercialize

- Mercury Control
- Sorbent Compliance Solutions: SO_3 , SO_2 , HCl
- Non SO_3 Flue Gas Conditioning for Particulate Control
- Developing CO_2 Capture Technologies



- *Red River Parish, LA: Largest activated carbon plant in North America*
- *ADA-ES joint venture with Energy Capital Partners, LP*



ACI Systems for Power Generation Industry

- Over 45 systems sold
- Wide range of boilers
- Wide range of fuels
- Many configurations
 - ESP's
 - Full-Scale FF's
 - DFGD Systems
 - Conventional Semi-Dry and CDS
 - TOXECON



Expected Laws that Will Create ACI System Demand

- **U.S. EPA MACT for Coal-Fired Boilers**
 - Will cover all 189 Hazardous Air Pollutants (“HAPs”)
 - Should result in 90 to 95% limit for mercury
- **U.S. EPA MACT for Cement**
 - AC needed for both mercury and volatiles



- **U.S. EPA Industrial Boiler MACT**
 - Mercury removal 50 – 80%

| Industry Sector | Number of Facilities |
|--|----------------------|
| Utilities | 161 |
| Food Manuf. | 107 |
| Wood Product Manuf. | 188 |
| Paper Manuf. | 165 |
| Petroleum Manuf. | 71 |
| Chemical Manuf. | 216 |
| Plastics & Rubber Products Manuf. | 82 |
| Primary Metals & Metals Product Manuf. | 96 |
| Transportation Equip. Manuf. | 90 |
| Furniture Manuf. | 45 |
| Educational Services | 27 |
| National Security | 22 |

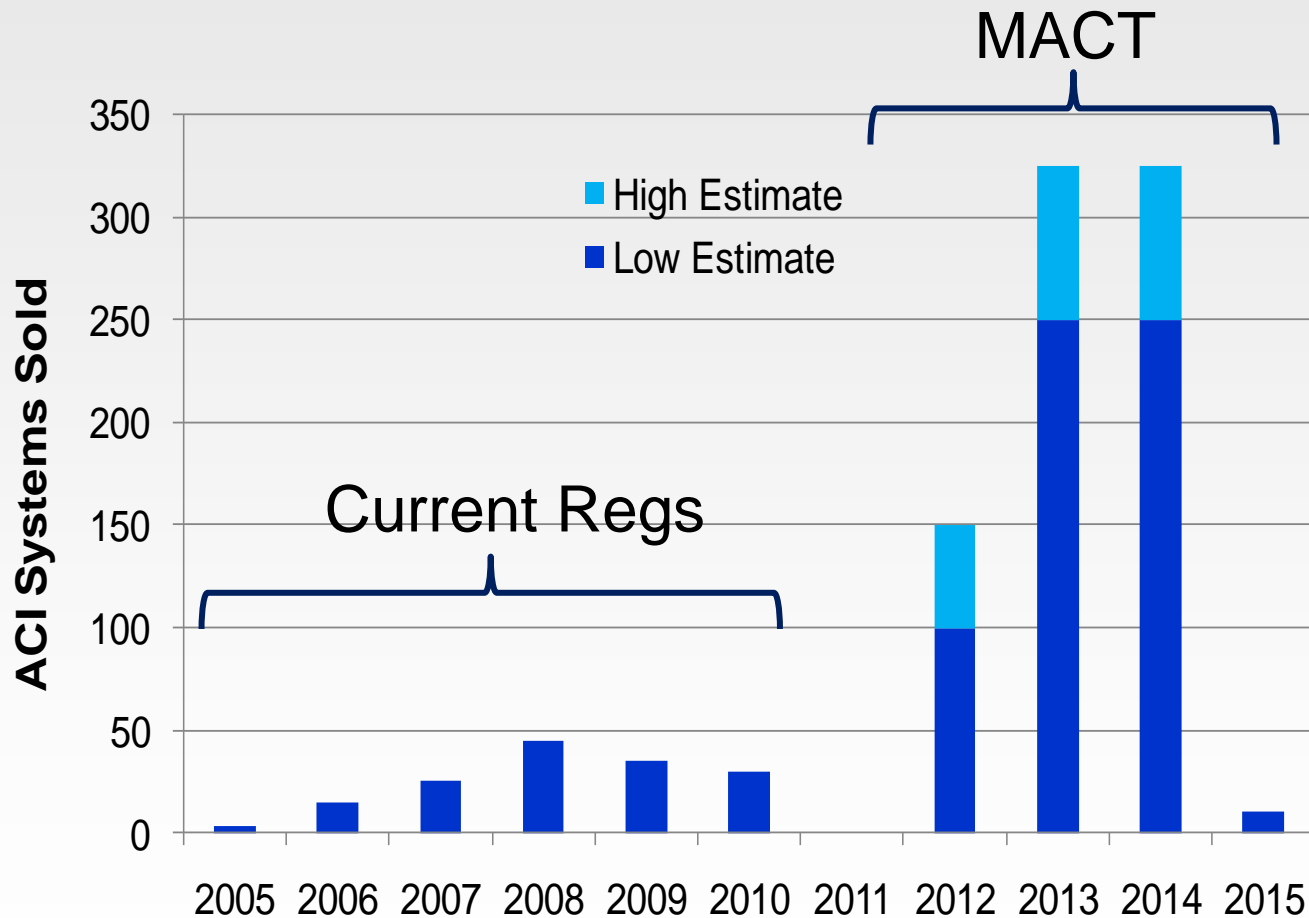


MACT ACI System Market Potential

| MACT | ACI System Market Potential |
|--|-----------------------------|
| Coal-fired power plants (silo) | 600 |
| Industrial Boilers (silo and bulk bag) | 500 |
| Cement Plants (silo and bulk bags) | 90 |
| Total Systems | 1190 |



Projected ACI System Demand from Utility MACT



Preparing for MACT Regulation

- Avoid creating shortage of supply of equipment and labor by
 - Learning from experience with first wave of installations
 - Prudent planning



Lessons Learned from ACI System Purchase, Installation and Operation

- Bid Specification
 - Standardized offerings
- Procurement
- Distribution
- Blowers
- Feeders
- Materials of Construction
- Equipment Access



Bid Specifications

- Tailor bid specification for ACI systems
- Sample bid specification available from Institute of Clean Air Companies web site

“Bid Specification Information Requirements and Bid Evaluation Form for Activated Carbon Injection Systems”

Institute of Clean Air Companies web site icac.com

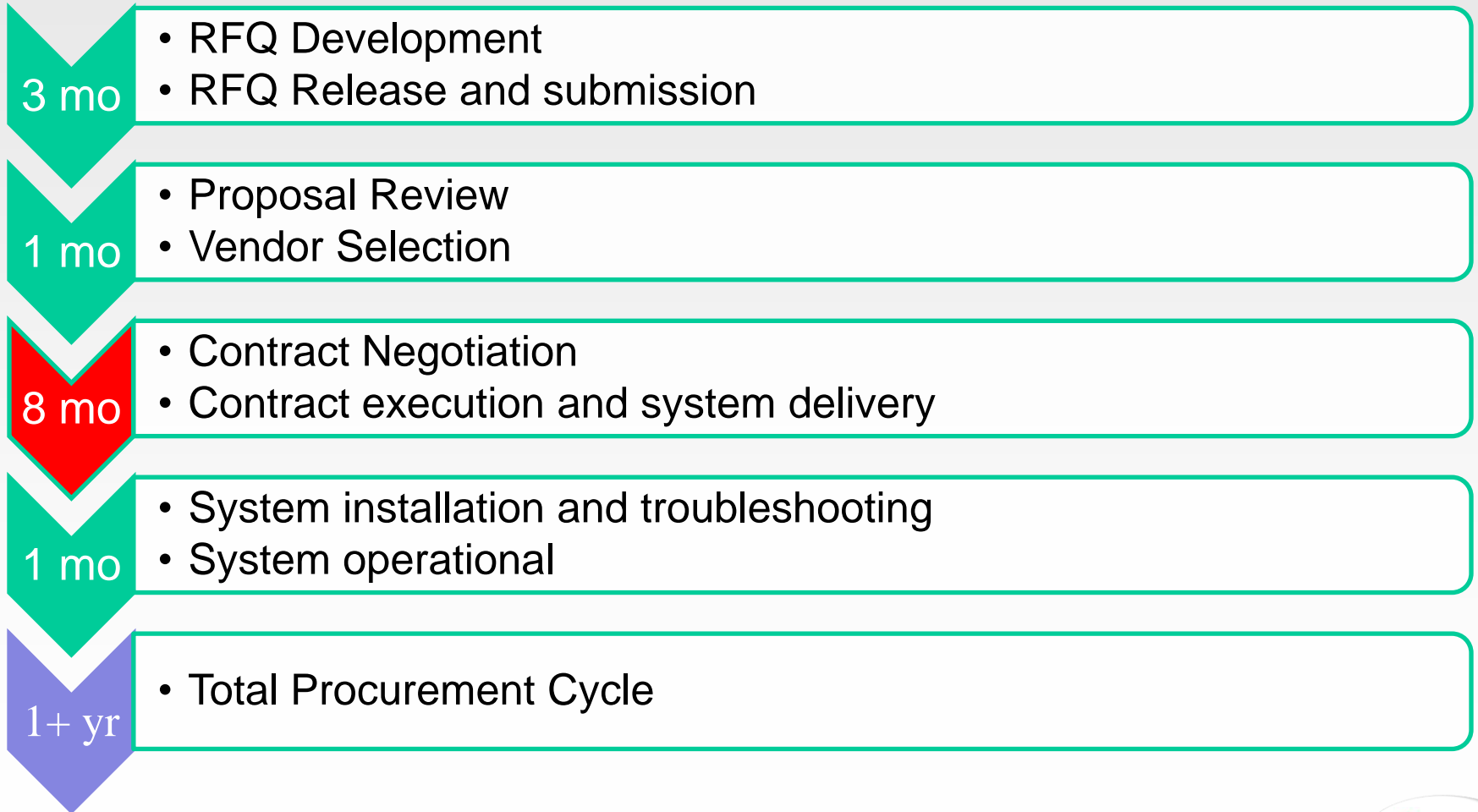


Case for Standardized Systems

Coal-Fired Power Plant

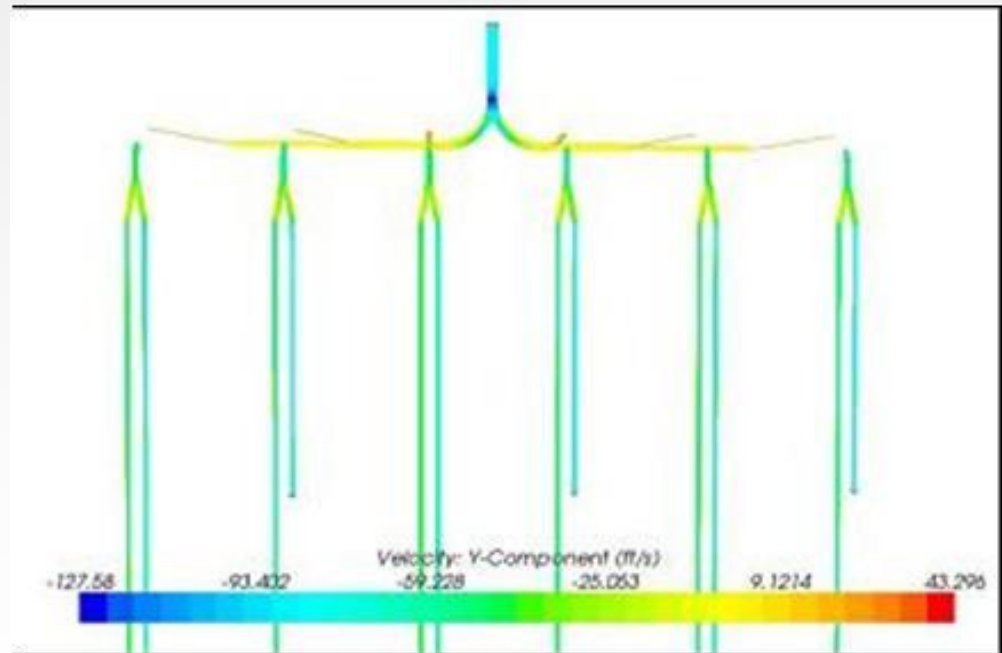


ACI System Procurement



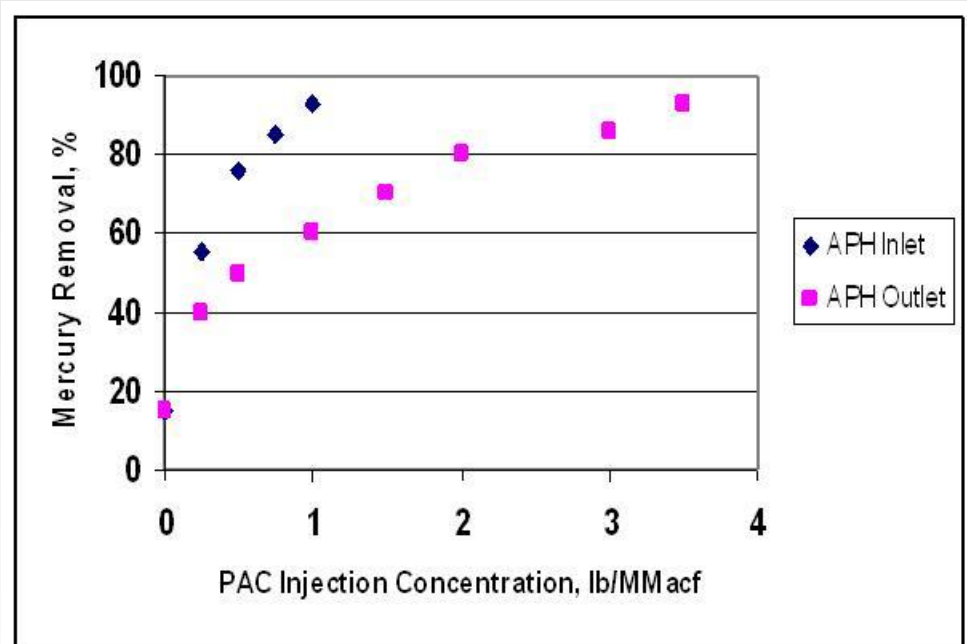
PAC Distribution

- Manifold Design Considerations
 - Challenge: Promote equal PAC distribution across each take-off.
 - Particle behavior vs. air flow
 - Pressure Drop
 - Eductor Applications
 - Component degradation
 - Wear/Erosion
 - Access
 - Maintenance



Injection Location

- APH Inlet vs. Outlet
 - Critical for ESP applications where distribution and in-flight capture are important
 - Less critical for Fabric Filter



Dilute Phase – Lessons Learned

- Blowers – PD vs Regenerative
 - Both used successfully
 - Regen blowers less expensive and smaller footprint
 - PD provides higher flow and motive force for installations with higher feedrates, long pipe runs and many turns
 - Trend is towards PD blowers



Gravimetric vs. Volumetric

Volumetric Feeder

- Discharges a specified volume/unit time: ft³/hr
- Typical accuracy: +/- 2 to 5%
- Maintains consistent hopper conditions:
 - Mechanical agitation
 - Frequent refill logic
- Does NOT detect or adjust to changes in product density



Gravimetric Feeder

- Continuously monitors hopper weight and adjusts screw speed
- Recommended for following applications:
 - Accuracy of +/- 3% or better is required
 - Multiple PAC sources
 - Record of weight of material used required
- Typically more expensive than standard volumetric unit
- Fill time is critical (switch to volumetric during fill cycles)
- Requires isolation from external sources that may impact weigh signal

Equipment Access

- System suppliers have multiple options for equipment access:
 - Caged Ladders
 - Spiral/Wrap Around Stairs
 - Stair Towers
 - Cross Over Platforms
- OSHA Compliance
- Component Access
 - Modular Layout
 - Maintenance



Conclusions

- MACT regulations with mercury emissions limits will create new demand for ACI systems for utilities, industrial boilers and cement plants
- Coal-fired power plants may require between 600 and 800 systems between now and 2015, 4 to 5 times the number procured from current regulations
- Industrial boiler and cement MACT will create competition for systems in same time period
- Good planning and learning from the past will help suppliers and purchasers successfully meet upcoming compliance standards and dates





Creating a Future with Cleaner Coal

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