REINHOLD ENVIRONMENTAL Ltd.

2011 APC Round Table
& Expo Presentation

July 11-12, 2011, in Cleveland, OH / Hosted by FirstEnergy

Shaw's Power Group

Low Cost Capital APC Solutions and O&M Cost

Reinhold, July 12, 2011

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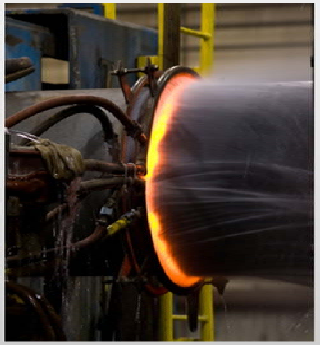
Corporate Profile

The Shaw Group Inc.® is a leading global provider of engineering, construction, technology, fabrication, remediation and support services for clients in the energy, chemicals, environmental, infrastructure and emergency response industries.

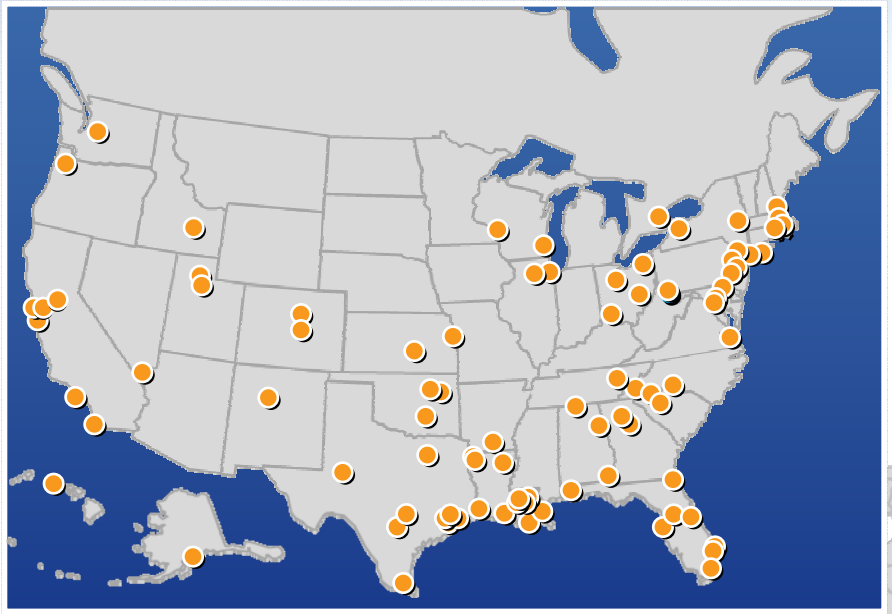
- **Headquarters:** Baton Rouge, LA
- **Stock Ticker:** NYSE: SHAW
- **Number of employees:** 27,000
- **FY 2010 Revenues:** $7 billion

FORTUNE 500 TOP 500 LARGEST US FIRMS #309

Operating Segments

Power (formerly Fossil, Renewables & Nuclear)	Plant Services (formerly Maintenance)	Energy & Chemicals	Fabrication & Manufacturing	Environmental & Infrastructure
				

Worldwide Locations



131 U.S. Locations
19 International Locations

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ENR's No. 1 Power Design Firm Three Consecutive Years

- No. 1 in Power
  - No. 1 in Fossil Fuels
  - No. 1 in Nuclear

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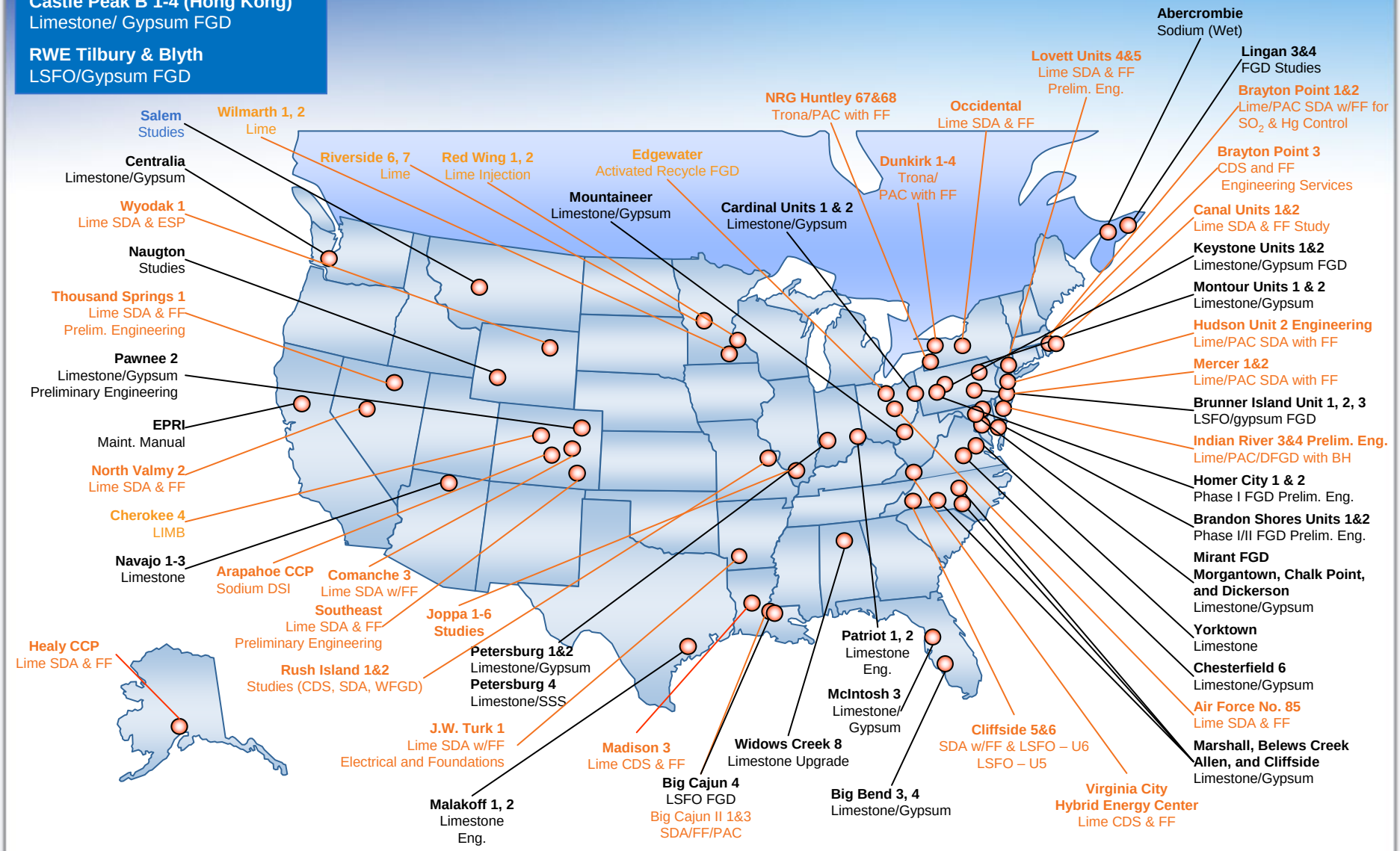
Shaw FGD Projects

International Projects:

Castle Peak B 1-4 (Hong Kong)
Limestone/ Gypsum FGD

RWE Tilbury & Blyth
LSFO/Gypsum FGD



Wet FGD Projects in Black

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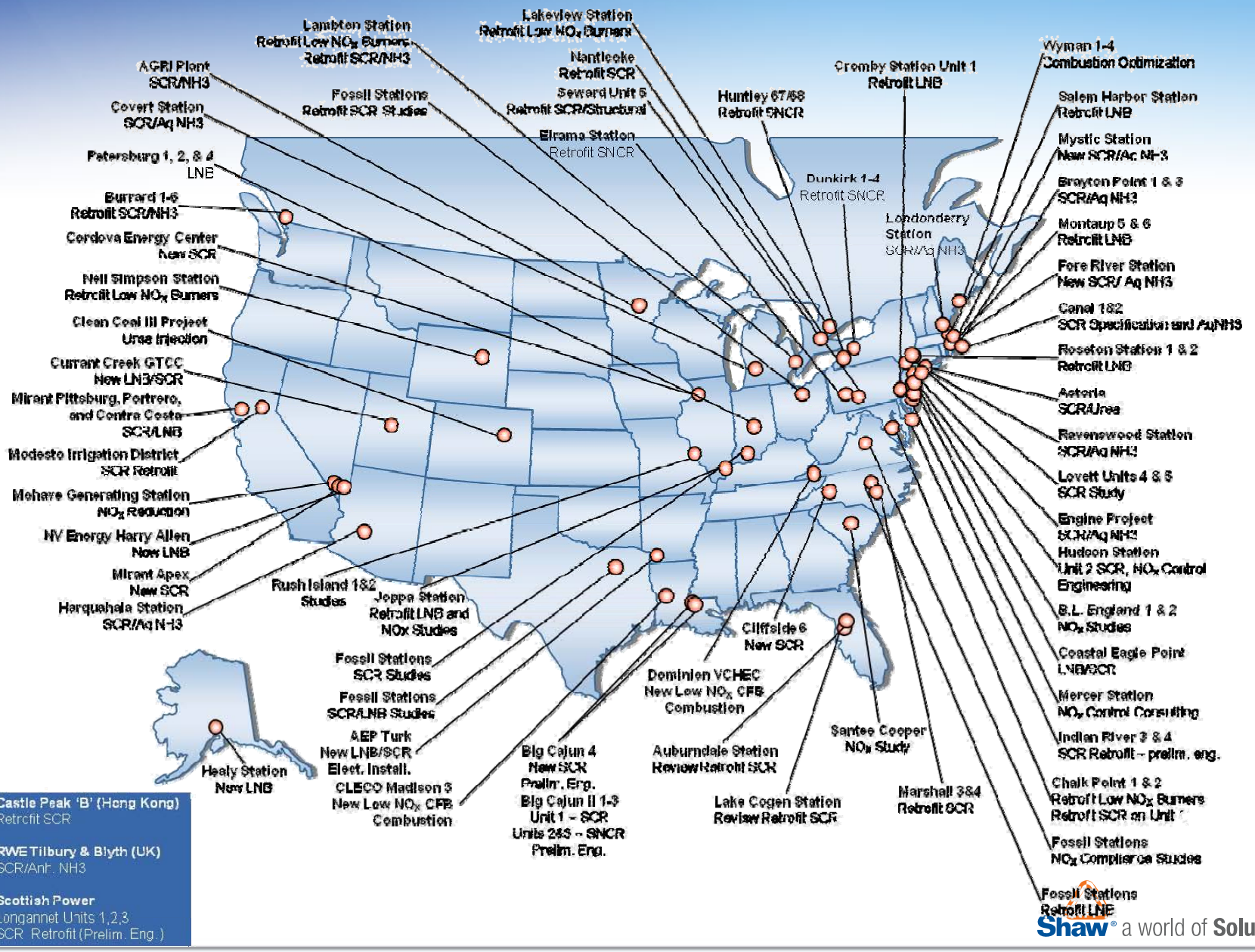
SCR/Nitrogen Oxide Experience



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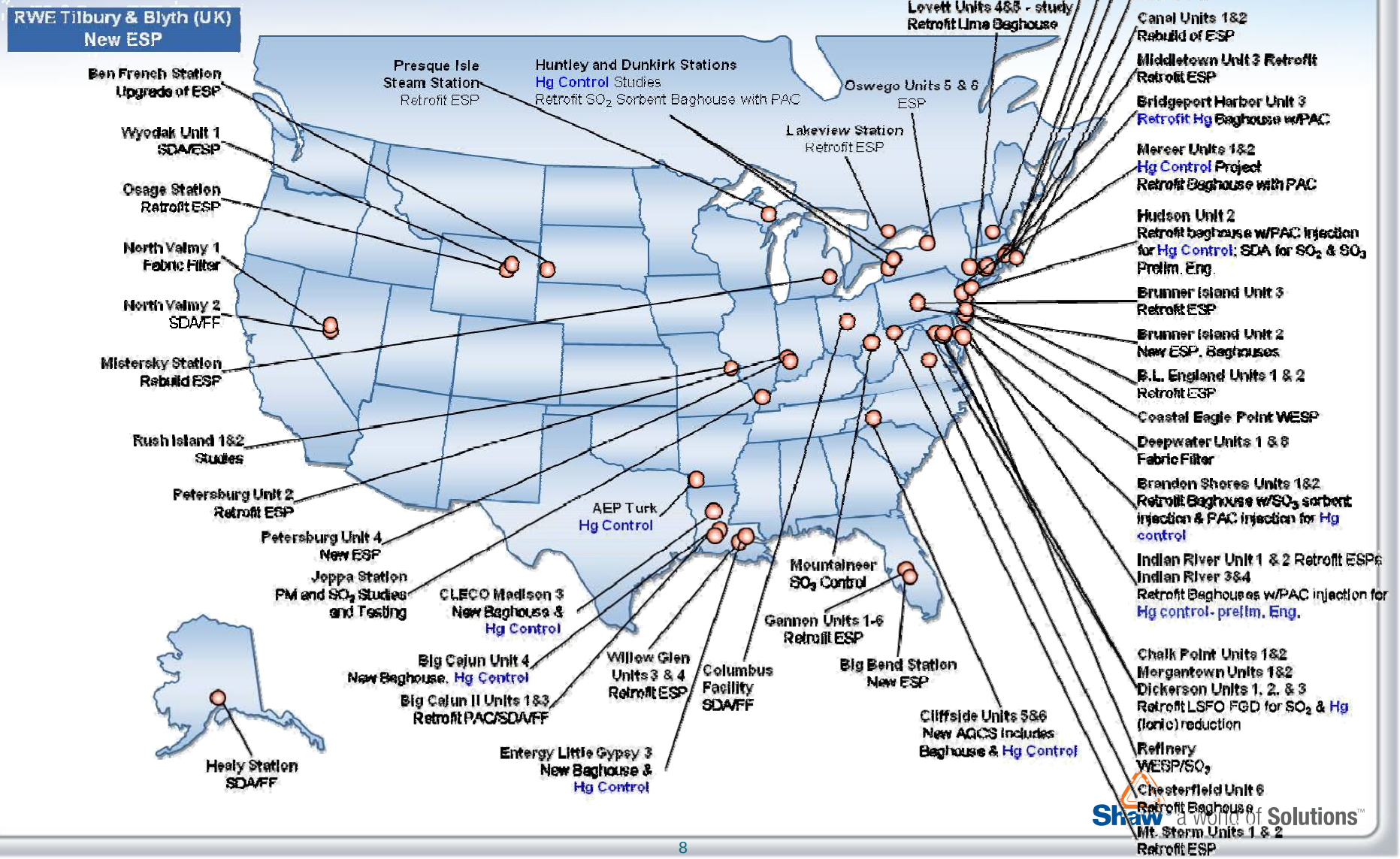
Particulate, SO_3, and Mercury Control Experience



AQCS Experience

Installed Capacity in the Past 10 Years	
Technology	**MW**
Wet Flue Gas Desulfurization (WFGD)	26,101
Dry Flue Gas Desulfurization (DFGD)	6,230
Precipitator – Fabric Filter Baghouse Retrofits	7,430
Mercury Control Projects	11,800

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AQCS OEM Technologies

- Wet Limestone/Gypsum FGD Technology
  - Advatech
  - Alstom
  - BPEI (RPI)
  - B&W
  - Chlyoda
  - Hitachi
  - Siemens
- Dry Lime FGD Technology – Circulating Dry Scrubber (CDS)
  - Allied
  - Alstom
  - Babcock Power
  - Nooter Erlksen
- ACI/Trona/Lime Injection Technologies
  - Alstom
  - B&W
  - CB-EEC
  - FL Smidth, Inc.
  - Hamon
  - Nalco Mobotec (BCSI)
  - Nol-Tec
  - Siemens
  - UCC
  - Shaw EMO™
- Baghouse (Fabric Filter)
  - Alstom
  - B&W
  - Hamon
  - Siemens
- SNCR Technology
  - Fuel Tech (ACT)
  - Others
- SCR Technology
  - Alstom
  - BPEI (RPI)
  - B&W
  - Hitachi
  - MHI
- Dry Lime FGD Technology – Spray Dryer Absorber (SDA)
  - Alstom
  - B&W
  - Siemens
- Multi-Pollutant Systems
  - ReACT
  - Others

Presentation Outline

1. Upcoming EGU MACT
2. Portfolio of options and solutions
3. Decision 2012? support or shut down
4. Expected Capital and O&M
5. Detailed Focus on specific Hg technology
6. Co-Benefits
7. Conclusions

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Proposed MACT Regulation

Subcategory	Total particulate matter	Hydrogen chloride	Mercury
Existing coal-fired unit designed for coal ≥ 8,300 Btu/lb	0.030 lb/MMBtu (0.30 lb/MMBtu)	0.0020 lb.MMBtu (0.020 lb/MWh)	1.2 lb/Tbtu (0.09 lb/MWh)
Existing coal-fired unit designed for coal < 8,300 Btu/ib	0.030 lb/MMBtu (0.30 lb/MMBtu)	0.0020 lb.MMBtu (0.020 lb/MWh)	4.0 lb/Tbtu (0.040 lb/GWh)

EPA United States Environmental Protection Agency

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Decision 2012?
support or shut down

- The time is fast approaching
  - By 2014 will be approximately 50 GW of power shut down
  - DSI system 9 to 12 months
  - ACI system 6 months
  - Gas Conditioning System 6 months (EMO/H2O2) 6 Months
  - Adding any of these options will extend meaningful lifetime and capital flexibility of operations under new requlations
- Limited resources
- Extend life

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Portfolio of options and solutions

- Dry Sorbent Injection
  - SO2
  - SO3
  - HCL
  - TPM
- Activated Carbon Injection
  - Hg
- Pre-combustion treatment
  - Hg
- Flue Gas Treatment Additives
  - Hg
  - NOx

	Dry Sorbent Injection (trona, SBC, H-lime)	Hydrogen Peroxide Injection	Activated Carbon Injection	Calcium Bromide Application	Halogen HBr Gas Stream Conditioning
Effective Removal	SO2, SO3, HCL	Nox	Hg	Hg	Hg
Capital Cost	$2 –5 million	$2 – 5 million	$1.5 – 10 million	$500k - 2 million	$1.5 – 5 million
O&M Cost/yr.	7 to 15 million/yr.	$10 - 15 million/yr.	$1- 3 million/yr.	$1- 2 million/yr.	$1- 2 million/yr.

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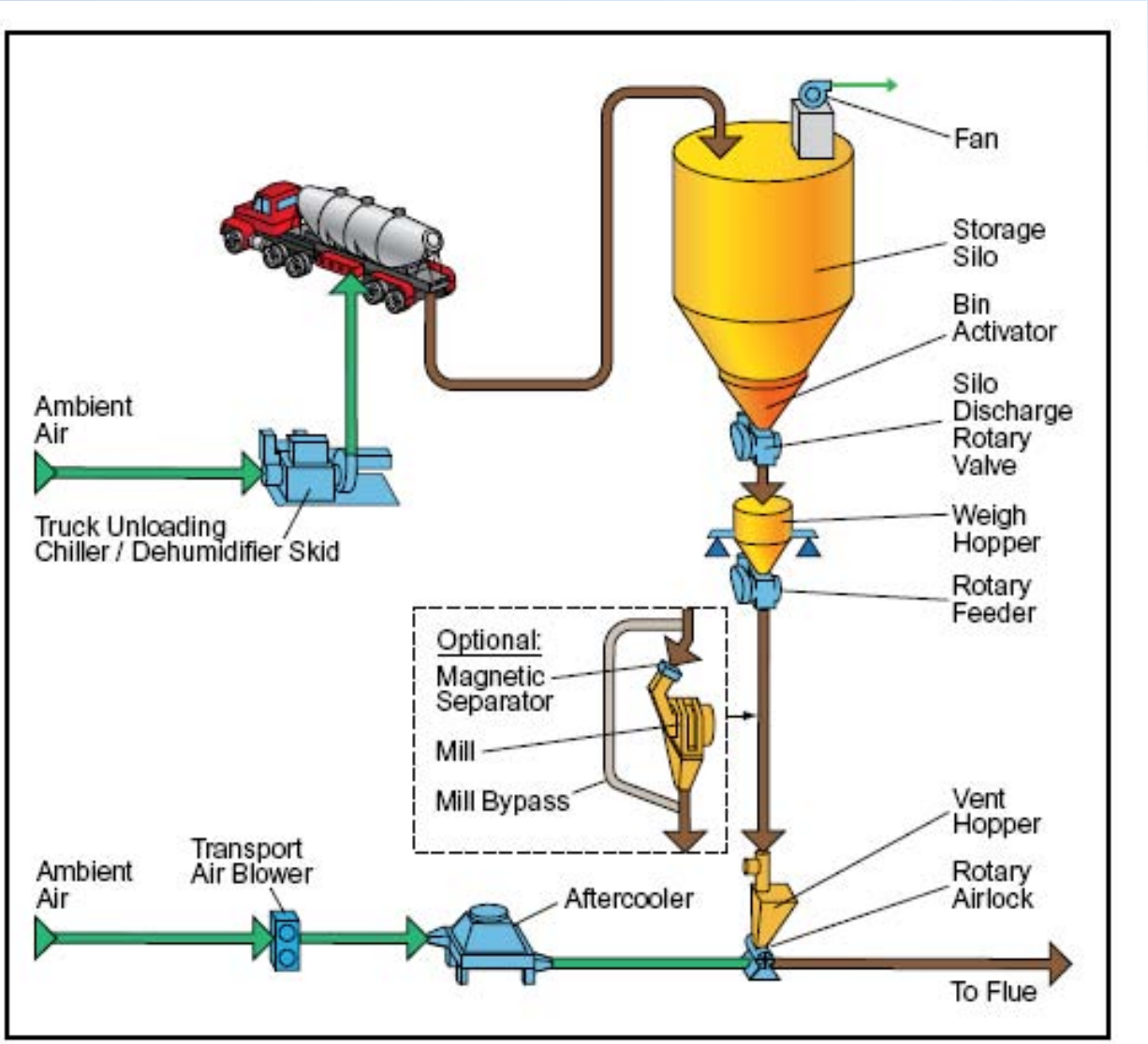
System Make Up Generally Simple

- Common design
- Storage tanks
- Mixing or conditioning components
- Distribution system (feeder, duct)
  - Valves
  - Metering
  - Lances
- Distribution is key to maximizing effects

Dry Sorbent System (DSI)



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Peroxide Injection Lances

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PAC Injection

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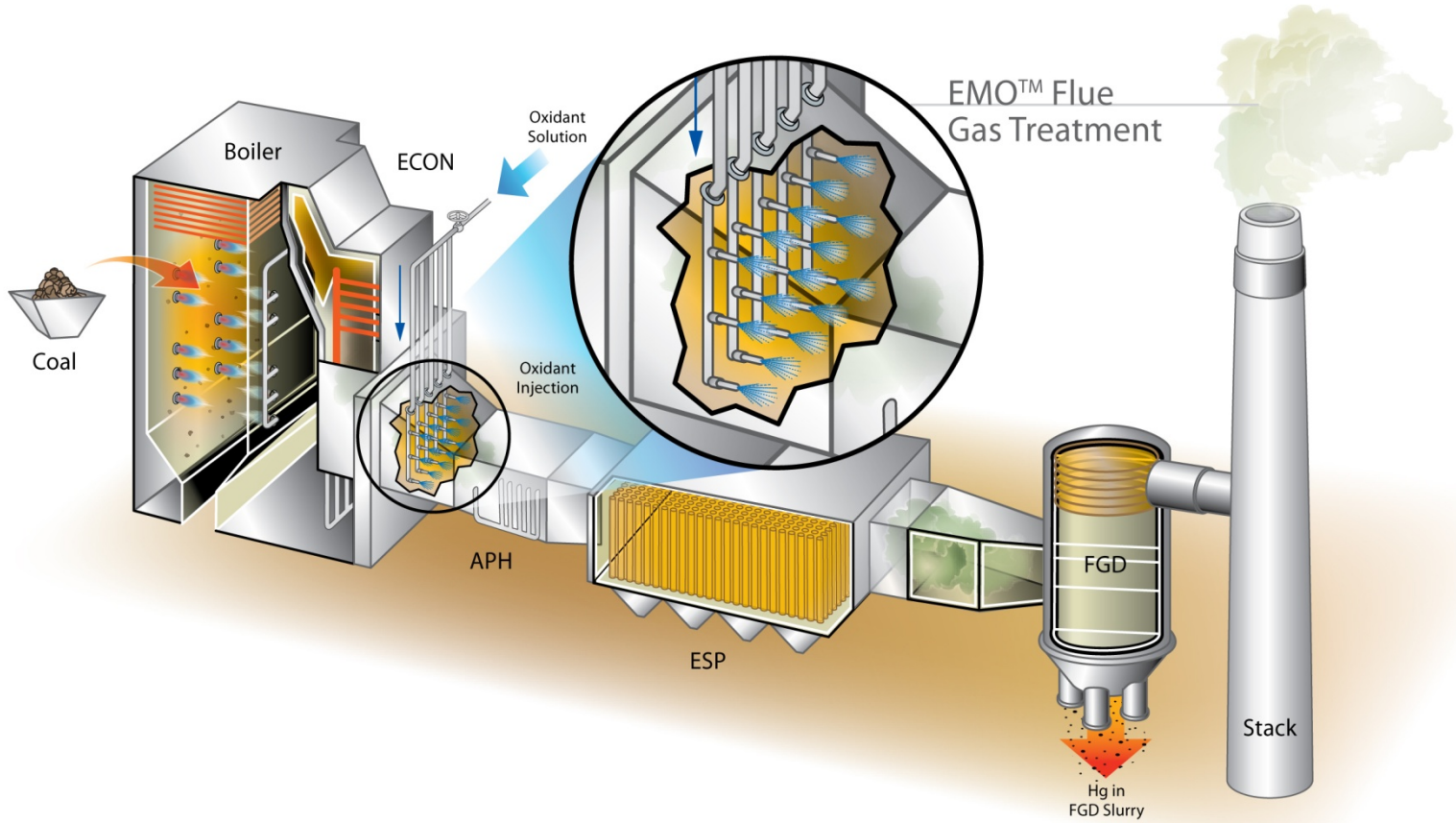
Enhanced Hg Oxidation System



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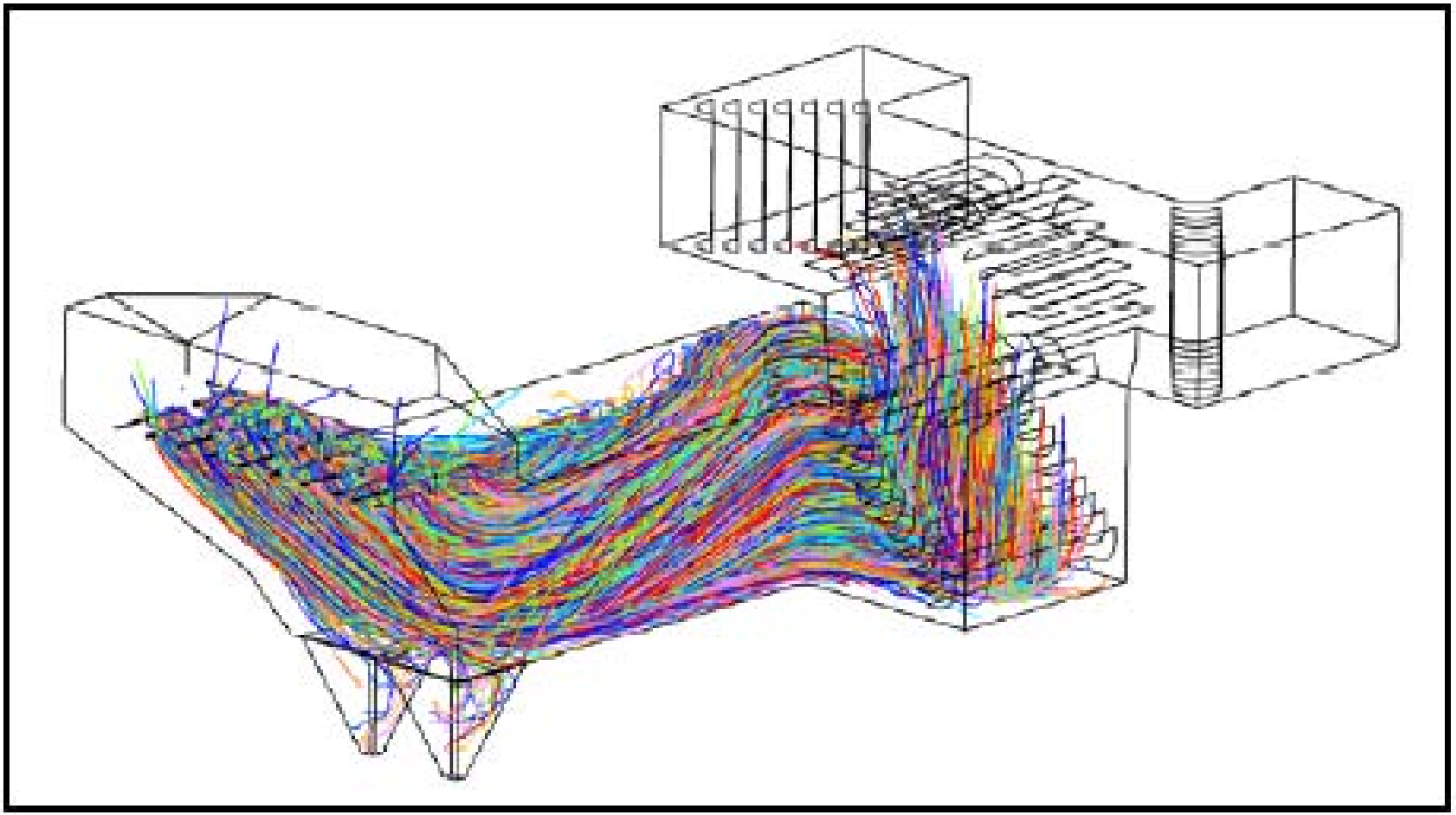
CFD Modeling



One Low Capital Cost Solution you should know and understand for Hg

HBr

- Hg control
- Particulate control

Hydrogen Bromide

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What Does HBr Do?

Provides a high level of Hg *oxidation* to facilitate Hg *capture*

Current Applications and results

- Maryland, 320 MW Unit Bituminous coal 90+ % oxidation at 8ppm injection 90+ % removal at stack
- Illinois, 340 MW Unit PRB 90+ oxidation at 6ppm injection 90+ % removal at the stack
- Texas 650 MW Unit Lignite 90+ % oxidation at 10ppm injection 90+ % removal at stack

Benefits of separating sorbent medium from HBr

- May not need carbon
- Could use Dry Sorbent (Trona)
- May only need a small amount of carbon to capture Hg
- Use only the optimal amount of HBr

Low Capital Cost Halogen Additive Control Solution

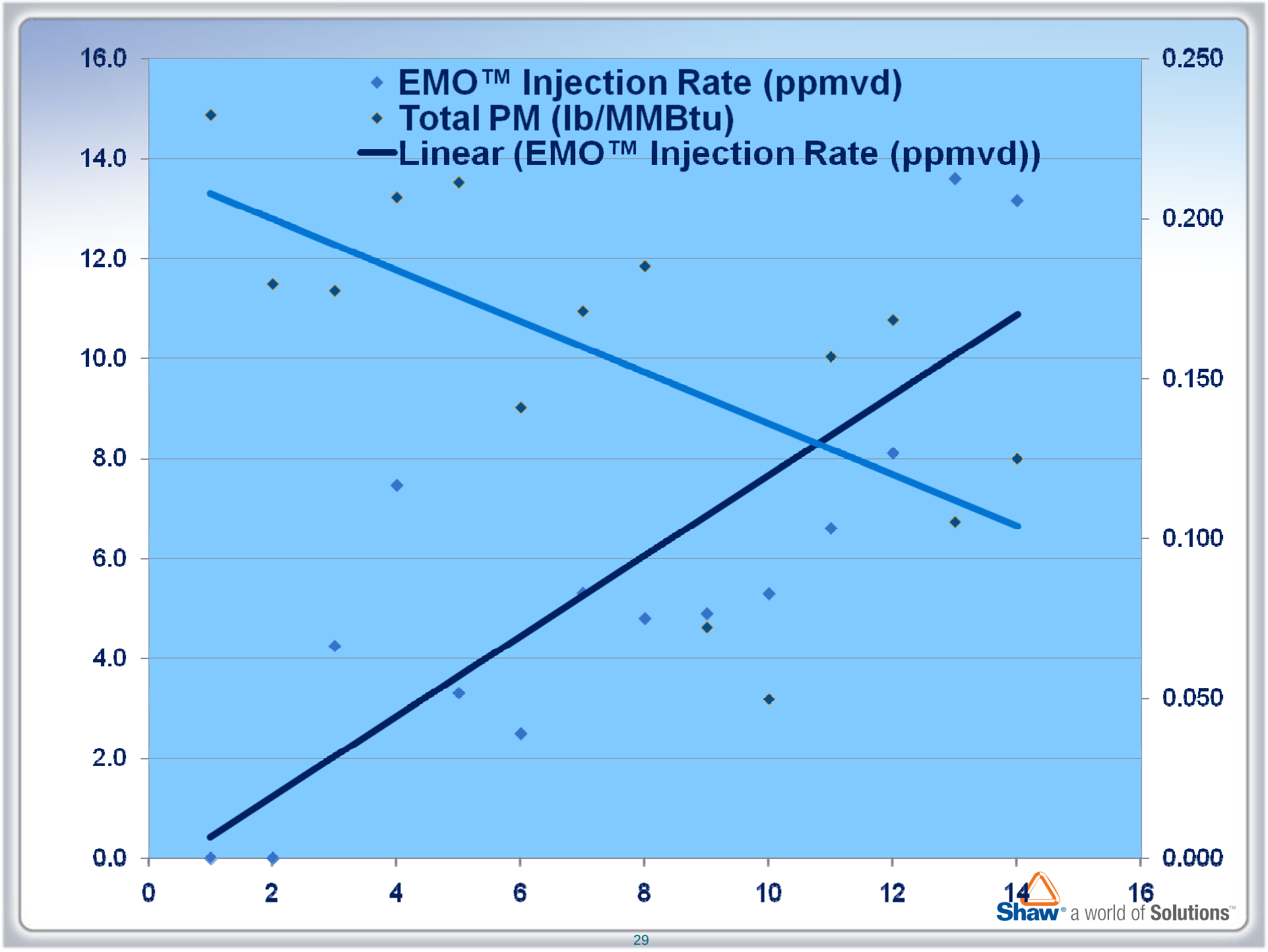
- Where do you find it?
  - Suppliers Albermarle & ICL are two largest in the world
  - Major Supply Dead Sea
- How do you apply it?

HBr System Components

- Injection Lances
- Mixer module
- Water and Chemical Pumps
- Compressed Air
- Distribution and valuing panel

Co-Benefits of Injecting HBr

- Reduced Opacity
- Reduced Total Particulate Matter
- Improved performance of SCR
- Eliminate need for SO3 generation



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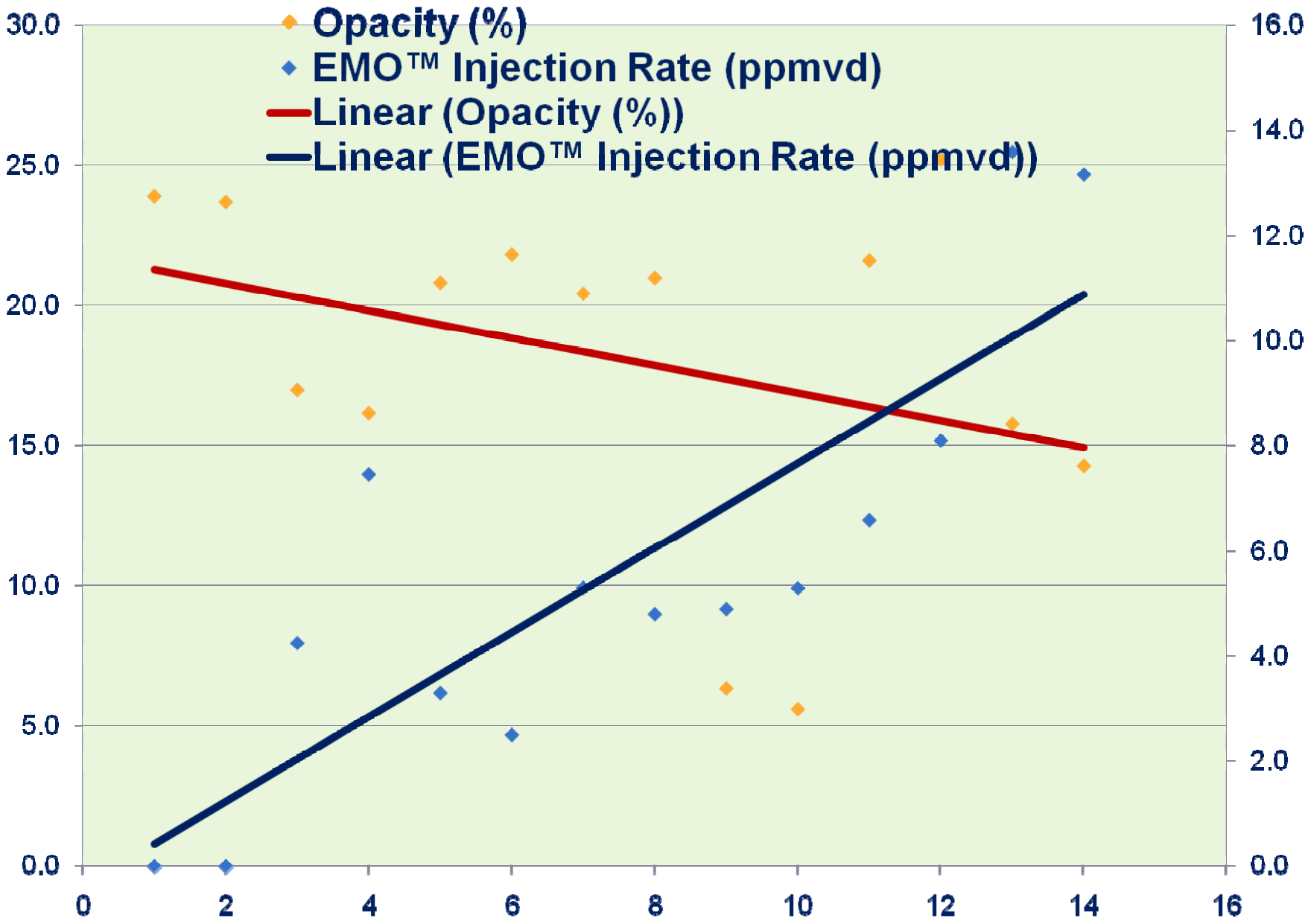
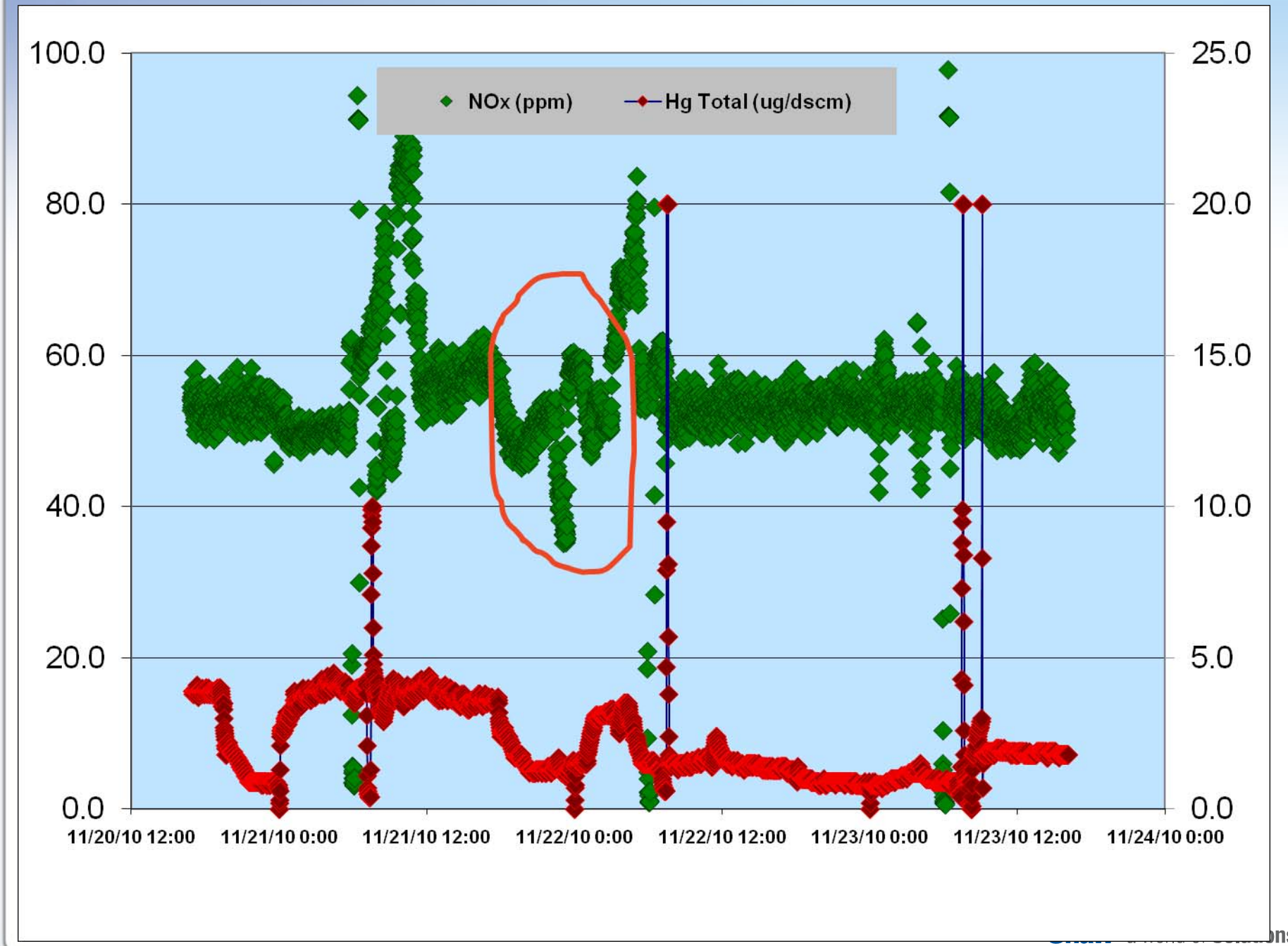

Opacity (%)
EMO™ Injection Rate (ppmvd)
Linear (Opacity (%))
Linear (EMO™ Injection Rate (ppmvd))
30.0
25.0
20.0
15.0
10.0
5.0
0.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
2
4
6
8
10
12
14
16


NOx (ppm)
Hg Total (ug/dscm)
100.0
80.0
60.0
40.0
20.0
0.0
25.0
20.0
15.0
10.0
5.0
0.0
11/20/10 12:00
11/21/10 0:00
11/21/10 12:00
11/22/10 0:00
11/22/10 12:00
11/23/10 0:00
11/23/10 12:00
11/24/10 0:00

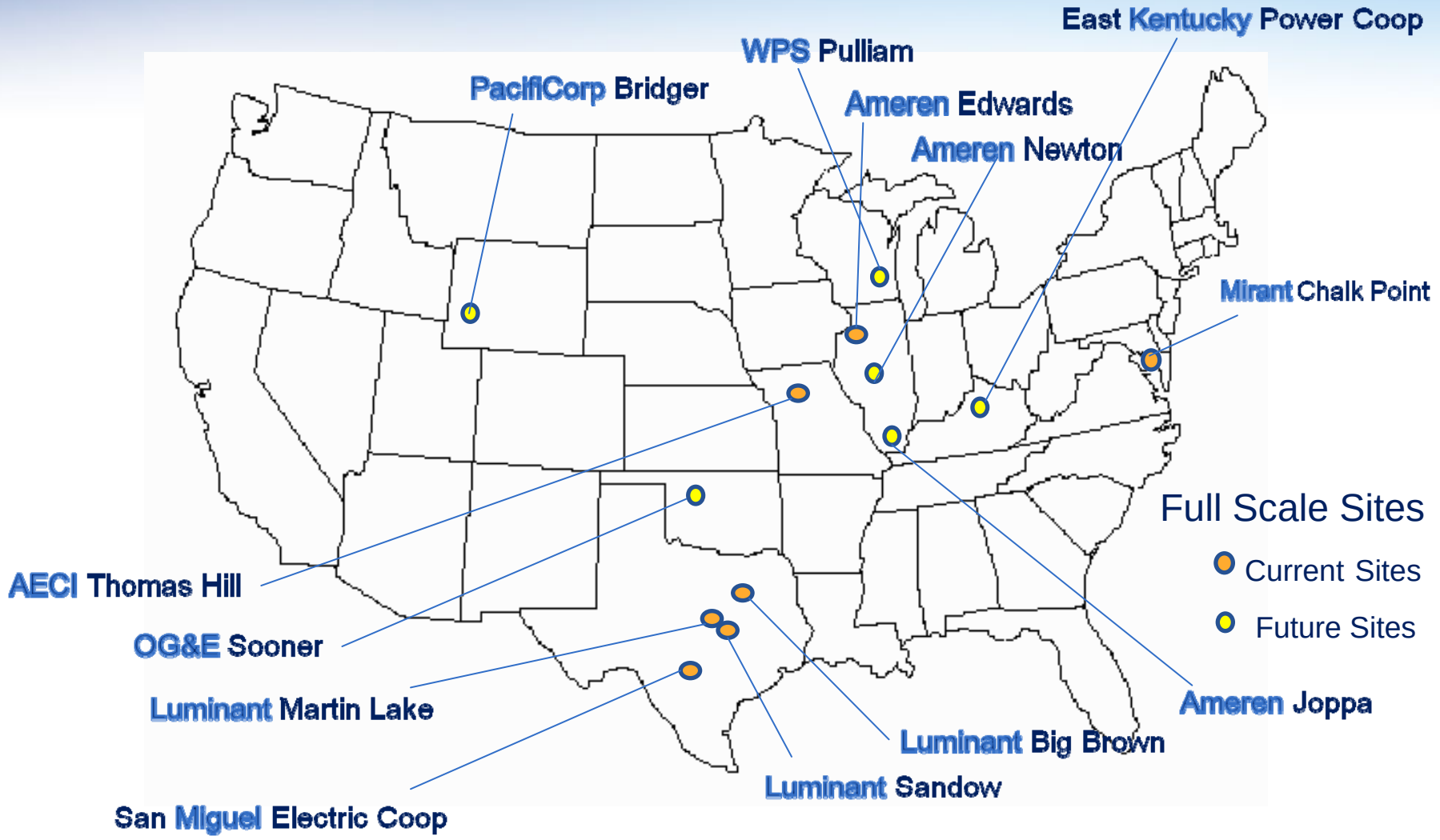
How long will it take to get a system designed and Commissioned?

- Six months includes site specific design parameters

  Variables include:

  – Pipe routing
  – Duct Size
  – Gas flow modeling
  – System configuration
  – Number of lances

EMO™ Full Scale Trials and Planned Trials



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Thank You

Reinhold, July 12, 2011

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