

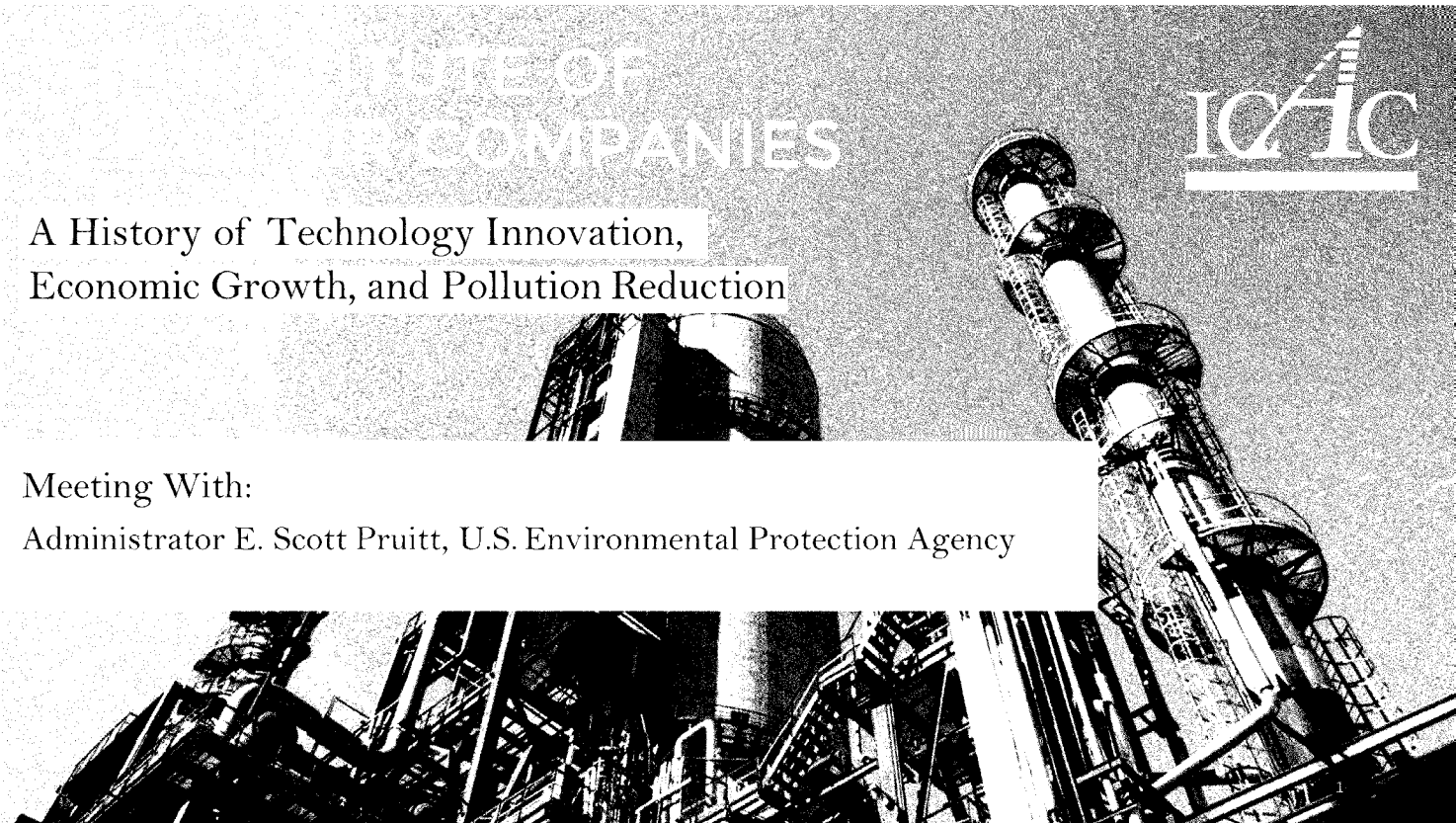
**To:** Millan Hupp[millan.hupp@gmail.com]; Hupp, Sydney[hupp.sydney@epa.gov]  
**From:** Jackson, Ryan  
**Sent:** Wed 5/3/2017 3:19:04 PM  
**Subject:** FW: Presentation  
[170503 Pruitt.pdf](#)  
[ATT00001.txt](#)

Here's something for Pruitt's notebook for tomorrow. Place me in this meeting.

-----Original Message-----

**From:** Chris Hessler [mailto:CHessler@ajw-inc.com]  
**Sent:** Wednesday, May 3, 2017 9:47 AM  
**To:** Jackson, Ryan <jackson.ryan@epa.gov>  
**Subject:** Presentation

Ryan,  
Here is our presentation for tomorrow.  
Let me know if yo have any questions.  
Hessler



# INSTITUTE OF ENERGY COMPANIES



A History of Technology Innovation,  
Economic Growth, and Pollution Reduction

Meeting With:  
Administrator E. Scott Pruitt, U.S. Environmental Protection Agency



## ABOUT

Since the 1960s, the Institute of Clean Air Companies (ICAC), comprised of more than 60 member companies, has represented suppliers of air pollution monitoring and control systems, equipment, and services for stationary sources in the U.S. and Canada.

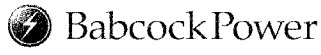
Public  
Health

Environmental  
Quality

Industrial  
Progress

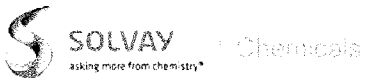
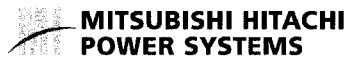


# MEMBERS






# MEMBERS



# Technology Is The Enabler

 **MEMBER PERSPECTIVE**

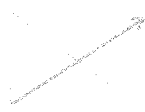
ICAC members see *technology as an enabler* to achieve cleaner air with minimal disruption to the processes being controlled.

Since the enactment of the CAAA's, ICAC member companies have been behind the design and deployment of technologies that make improvements in air quality possible.

**TECHNOLOGY:** where advancements in health, environmental protection, & economic growth intersect.



**Creates Quality Jobs**



**Grows the Economy, Reduces Pollution**



**Global Technology Exports**



# Background



## WHAT WE DO

### MISSION

- To be *the* independent expert voice of the stationary source air pollution control and monitoring industry
- Provide a forum for experts to come to a common understanding of industry challenges and opportunities.
- Leverage the collective knowledge and project experience to advance technology

### VISION

- To achieve a balance between air quality and industrial growth by providing credible high quality technical information

### VALUES

- Encourage policies that are achievable and cost-effective with technology innovation
- Treat all stakeholders equally and with respect

# Delivering Clean Air

ICAC always works in cooperation with industry; federal, regional, and state governments; and other stakeholders to demonstrate and deploy technology.

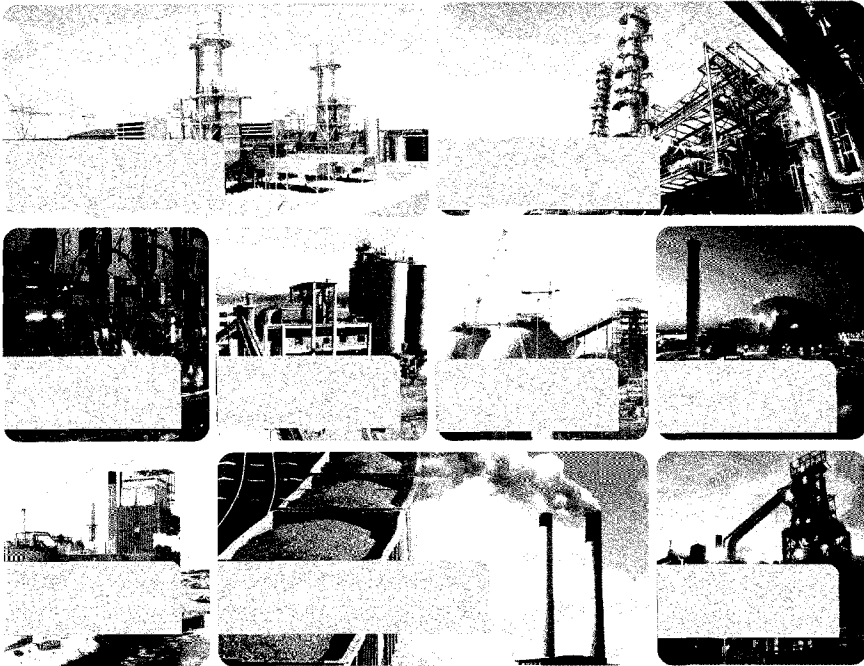
## Industry

- Electric Power Research Institute (EPRI)
- Edison Electric Institute (EEI)
- Coal Utilization Research Council

## Government

- Environmental Protection Agency
- Department of Energy
- State, Local, And Regional Governments

# ICAC CUSTOMERS



# Our Successes:

## Utility & Industrial Emissions Dramatically Decline

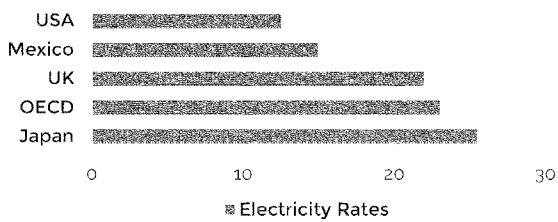
ICAC Members' technology innovations have enabled:

- *More* energy production
- *More* economic productivity

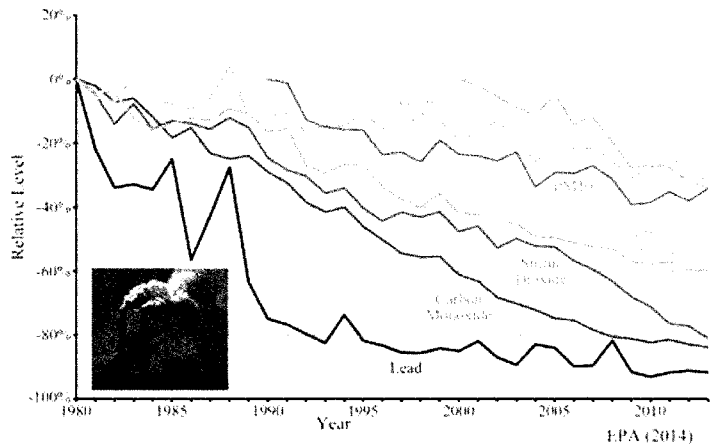
Together With:

- *Dramatically* cleaner air

Electricity Rates



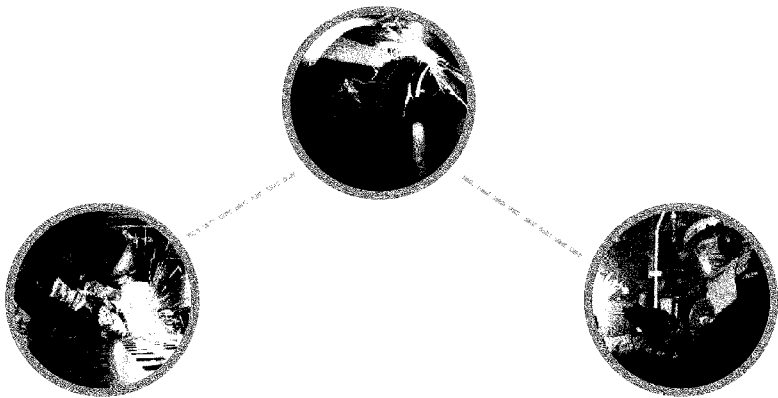
US Air Pollution 1980-2013



# A JOB-CREATING INDUSTRY

Environmental Standards Drive  
Job Creation:

Interstate  
resulted in:  
**1000 Jobs**  
over 7 years



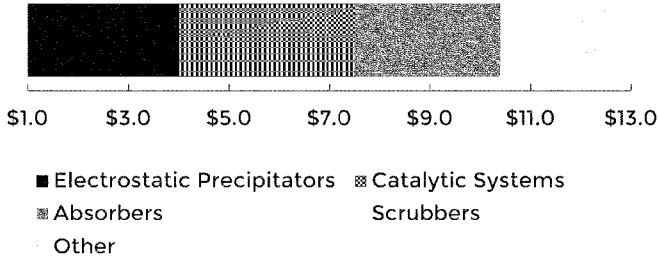
Direct and Indirect  
Labor includes:

Engineers; project managers; boilermakers; steel workers; fabricators; concrete makers; manufacturing of slurry pumps, fans, motors and catalysts; processing of reagents for pollution controls, such as hydrated lime, sodium bicarbonate, and activated carbon.

# Strong U.S. and Global Markets

**\$12.5 Billion**

U.S. Industrial Emission Control Market Size 2015



**\$1.05 Trillion**

Global Environmental Technologies Goods and Services Market Size 2015



**\$303.0 billion**  
U.S. environmental technologies market size

**\$51.2 billion**  
Value of exports from U.S. environmental companies

Note: Figures are all in USD and estimates for 2015

Source: [http://www.trade.gov/topmarkets/pdf/Environmental\\_Technologies\\_Executive\\_Summary.pdf](http://www.trade.gov/topmarkets/pdf/Environmental_Technologies_Executive_Summary.pdf)



# Decades Of Success

*Actual Costs Often Run Below Initial Estimates*

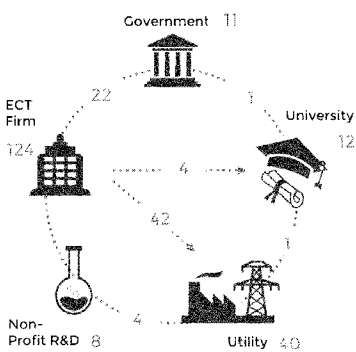
• *Costs Often Run Below Initial Estimates*

• *Costs Often Run Below Initial Estimates*

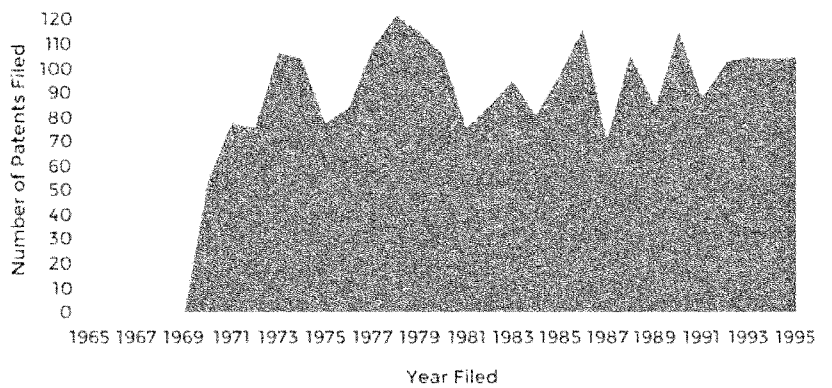
# Innovation Leads to Economic Activity

Government Action Has Spurred Innovation in SO<sub>2</sub> Control Technology. Cost-effective policies have stimulated research collaboration between institutions, which has led to technological development (evident in the growth of patents filed).

Co-Authorships between Institutions



U.S. Patents Filed



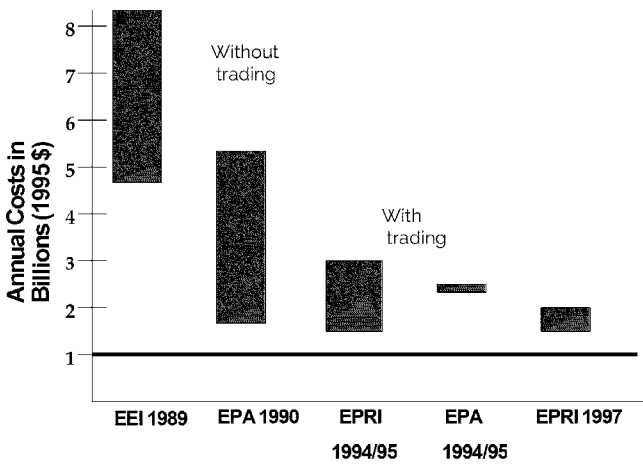
Sources:

[https://www.researchgate.net/figure/9030073\\_fig5\\_Figure-7-Evolving-coauthorship-ties-between-organization-types-for-three-time-periods](https://www.researchgate.net/figure/9030073_fig5_Figure-7-Evolving-coauthorship-ties-between-organization-types-for-three-time-periods)

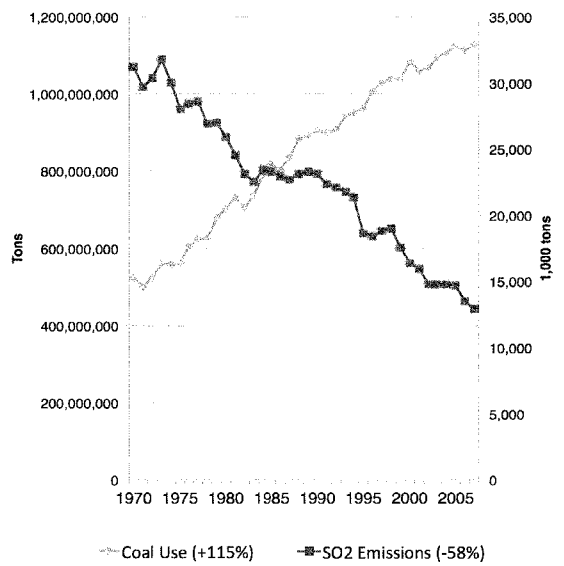
[https://www.google.com/search?q=so2+control+technologies&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiZz62iy8TTAhVELyYKI-HVksBnsQ\\_AUICygC&biw=1366&bih=662#imgrc=WLV3NXl42n67M](https://www.google.com/search?q=so2+control+technologies&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiZz62iy8TTAhVELyYKI-HVksBnsQ_AUICygC&biw=1366&bih=662#imgrc=WLV3NXl42n67M)

# Costs of Emissions Control Decrease Over Time with Increased Experience and Improvements

Example: Phase II Federal Acid Rain Program



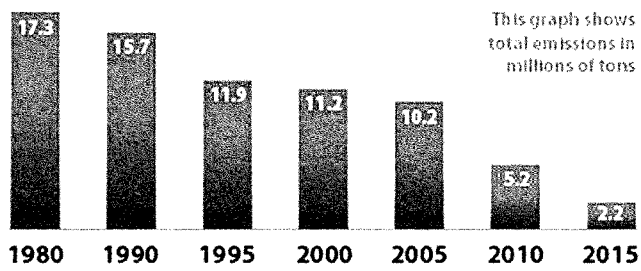
Coal Use vs. SO2 Emissions



Source: <http://www.powerlineblog.com/archives/2015/04/a-note-on-coal.php>

# Success of American Ingenuity

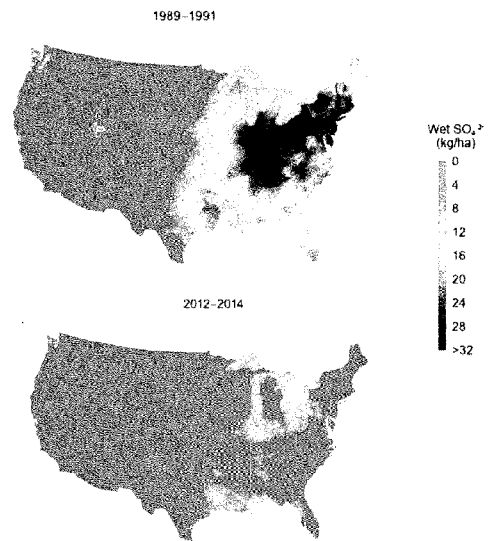
Declining Annual SO<sub>2</sub> Emissions



**Contributing to Success**  
 • Increased environmental regulations  
 • Stricter fuel transport  
 • Technological innovation

Significant Declines in Wet SO<sub>2</sub>

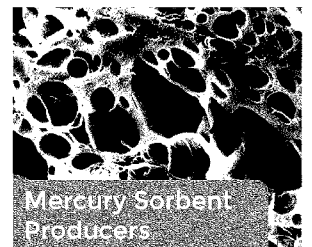
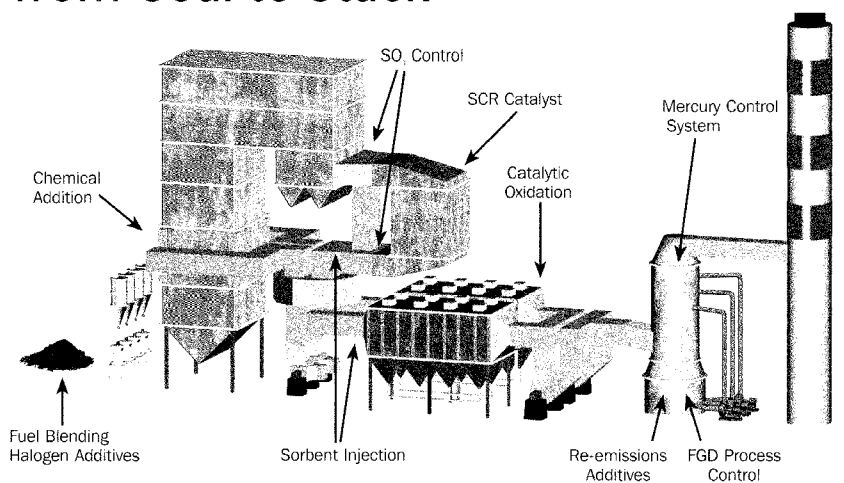
Three-Year Wet Sulfate Disposition



Source: EPA, SO<sub>2</sub> Compliance 06/2017

# Mercury Control Options from Coal to Stack

GAO  
 United States Government Accountability Office  
 Report to the Chairman, Subcommittee on Clean Air and Nuclear Safety, Committee on Environment and Public Works, U.S. Senate  
 October 2009  
**CLEAN AIR ACT**  
**Mercury Control Technologies at Coal-Fired Power Plants Have Achieved Substantial Emissions Reductions**  
 GAO  
 Accountability • Integrity • Reliability  
 GAO-10-17



<http://championed.info/wiring-diagram/oil-fired-power-plant-overview-diagram.html>

# Collaboration & Innovation Drove Actual Costs Down ~90%

**COAL-FIRED MERCURY CONTROL**  
 studied by EPRI, EPA, DOE and others since 1990

### 1990s

- Multiple-pollutant control laboratory & pilot-scale studies
- Major issues with Hg measurement at low levels

### Early 2000s

- Introduction of halogen-treated activated carbons
- Measurement improvements & options expanded

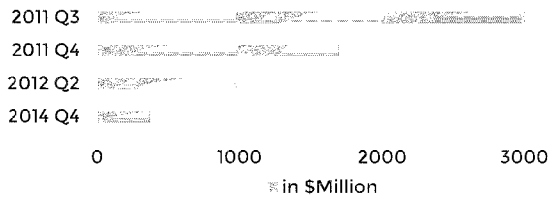
### Today

- Identification of critical aspects of carbon that drive performance in mercury capture
- Measurements still challenging and high-maintenance

### Ongoing Development

- Solutions tailored for specific circumstances to achieve optimal compliance solutions

Industry Cost Estimates for MATS Compliance (in \$ Million)



Mercury control has been used on commercial coal fired power plants since 2007



# Our Technologies

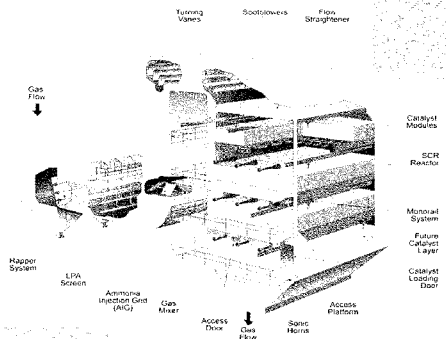
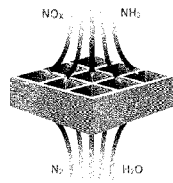
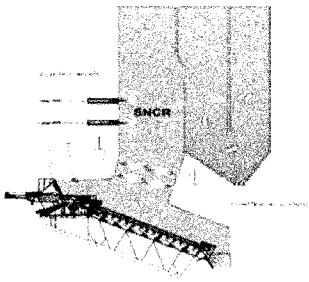
# Substantial APC Advancements:

## ICAC Members Pollution Control Technologies, Goods and Services

<b>Mercury Controls</b>	Hg removal demonstrated at 90%+
<b>NOx Controls</b>	NOx removal of 95%+
<b>VOC Controls</b>	VOC typical destruction of 98%+ for a wide range of applications
<b>Particulate, SO<sub>2</sub>, HCL Controls</b>	PM removal of >95% with wide range of technologies <ul style="list-style-type: none"><li>• SO<sub>2</sub> removal of 90+% with DSI, 95%+ with WESP</li><li>• Acid gas control using Dry Sorbent Injection of Alkaline Sorbents<ul style="list-style-type: none"><li>• HCL &gt;90% control</li><li>• SO<sub>3</sub> &gt; 95% control</li></ul></li></ul>
<b>Carbon Monoxide Controls</b>	Carbon Monoxide Controls CO control up to 99% DRE (>1,000 power plants and industrial boilers)
<b>Consumable Products</b>	Consumable Products Reagents, Sorbents, Hydrated Lime, Sodium Bicarbonate, Activated Carbon, Trona, Ammonia, Ammonium Sulfate, Urea
<b>Emissions Measurement &amp; Monitoring</b>	
<b>Engineering, Consulting, System Services</b>	

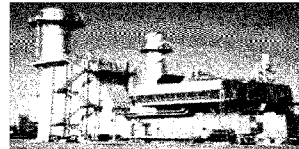
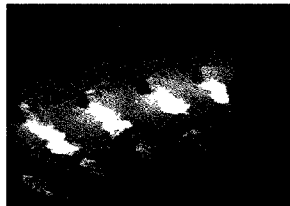
# OUR TECHNOLOGY

## NOx & CO Controls



For Sources of Combustion:

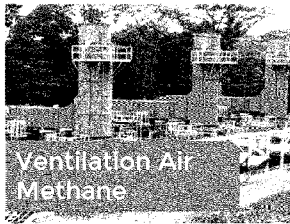
- Boilers, Turbines, Engines, Process Heat, Iron and Steel, Lime Kilns, Glass, Cement, etc.



## OUR TECHNOLOGY

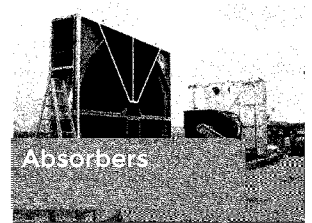
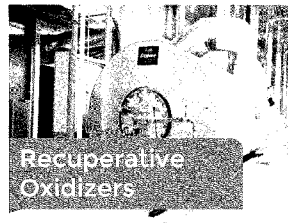
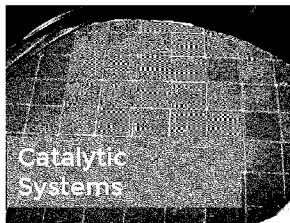
## VOC Controls

VOC controls are deployed over a wide range of industries, capable of up to 99% destruction.

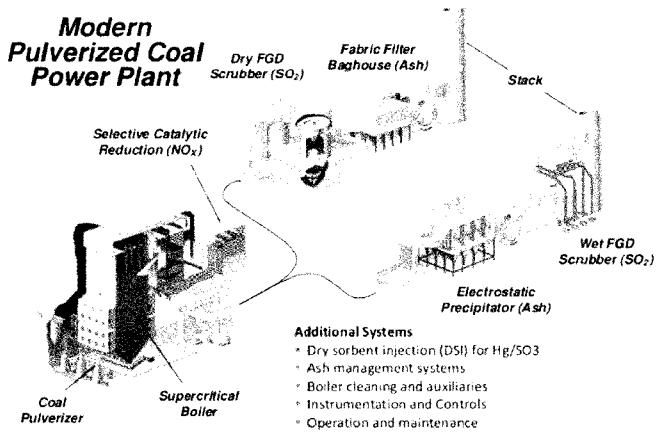


### DEPLOYED IN:

- Petrochemical
- Chemical
- Pharmaceutical
- Wood Products
- Painting
- Coating
- Electronics
- Oil & Gas



# SO<sub>2</sub>, Acid Gas and Particulate Controls



**Additional Systems Needed At:**

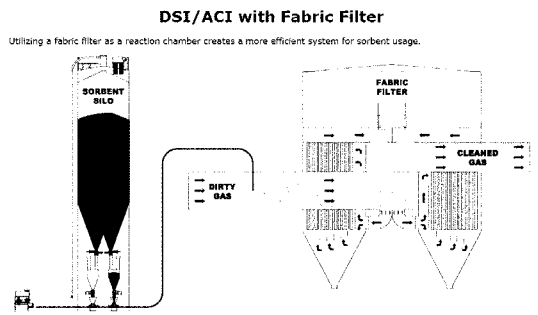
- Institutional Boilers | Cement Kilns
- Brickmaking facilities | Asphalt |
- Limestone Quarries | Lime Kilns | Brickmaking
- Ferrous Metals | Petroleum Coke

**WET FGD SCRUBBER** Low Capitol Cost - reagent required, also captures Hg

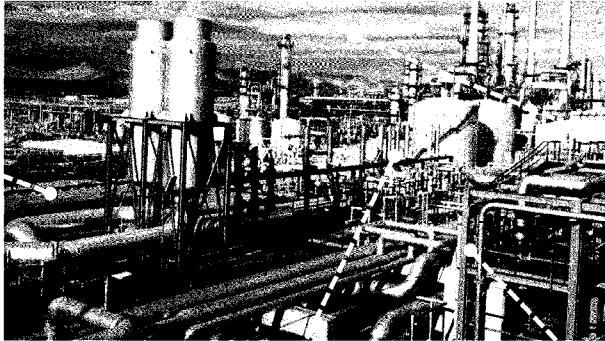
**FABRIC FILTER** High Capitol cost, captures Hg, PM and HCL at high levels

**WET FGD SCRUBBER** Low Capitol Cost, Requires Reagent, captures Hg

**ELECTROSTATIC PRECIPITATOR** Provides PM control, often in conjunction with a fabric filter



# Emissions, Measurement, and Monitoring

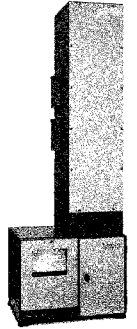


Leak Detection



Continuous Emissions Monitoring Systems

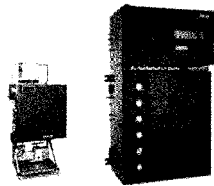
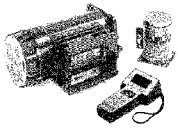
Source & Ambient Gas Analyzers



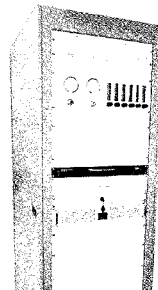
Ambient Particulate Monitors



Personal Monitors



Process Gas Analyzers





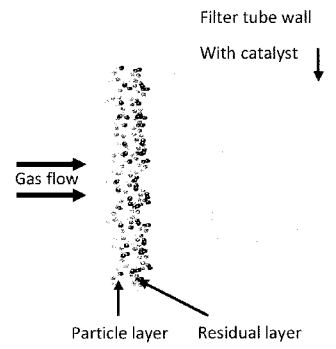
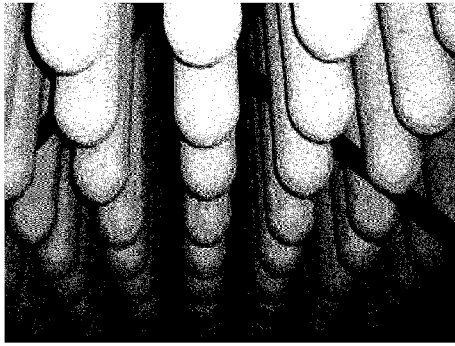
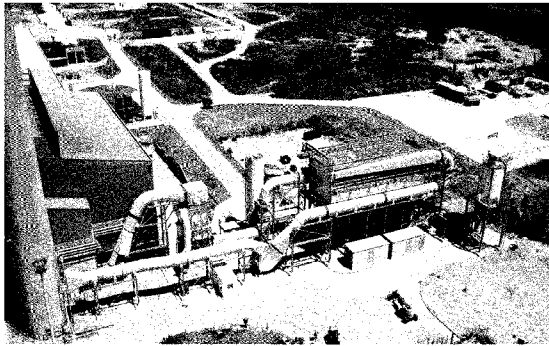
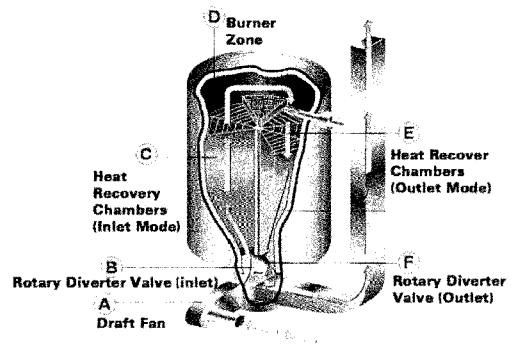
A MEMBERSHIP OF  
**CLEAN AIR  
COMPANIES**

# Continuous Innovation

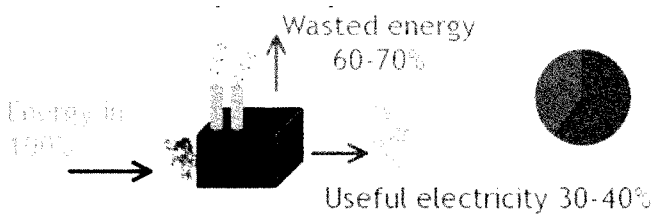
*Cost-Effective Technologies to Meet Global Demand*

# Continuous Innovation

- Improved efficiencies
- Innovative materials
- Significant OPEX and CAPEX reductions

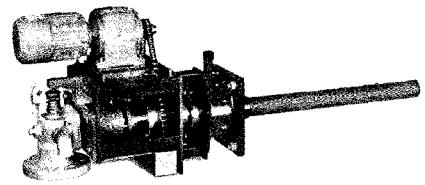
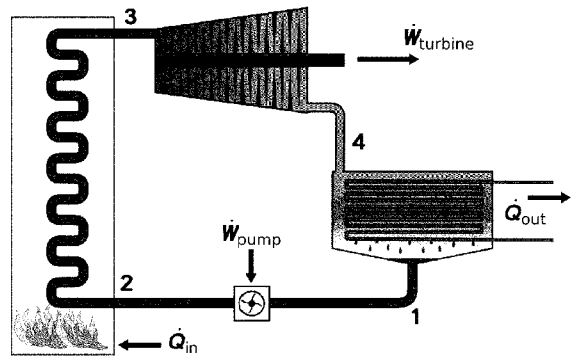
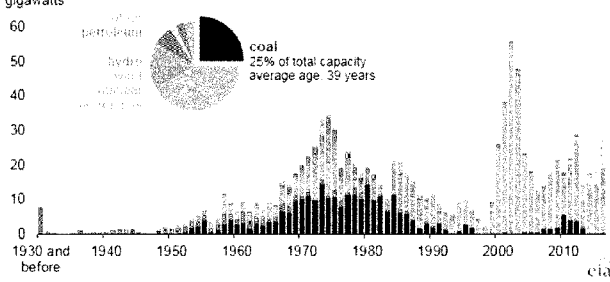


# IMPROVING POWER PLANT EFFICIENCY to Reduce Emissions of All Kinds



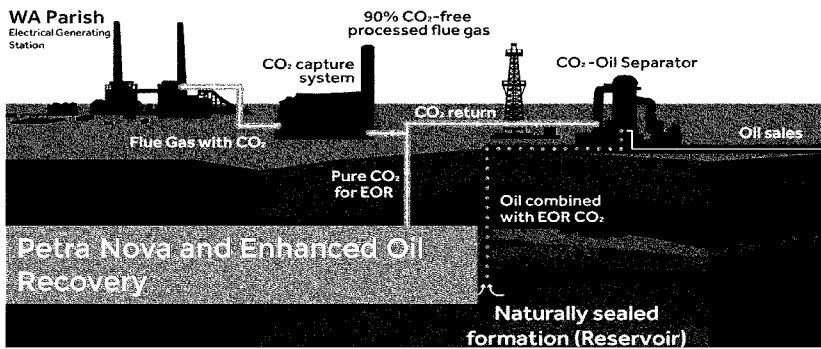
Most coal plants in the United States were built before 1990

U.S. utility-scale electric generating capacity by initial operating year (as of Dec 2016)  
gigawatts



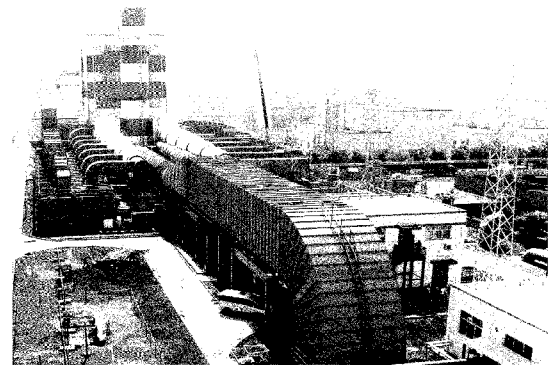
Rotating Soot Blower

# Commercial-Scale Clean Coal & Enhanced Oil Recovery Projects



Petra Nova and Enhanced Oil Recovery

World's Largest Coalmine-Mouth Methane Capture Project



Investor confidence requires commercially viable technologies and stable investment environments



# Concluding Thoughts



# Ready To Be An Indispensable Resource To The EPA & Industry

Technology Has No Agenda. ICAC Members Make It Happen.

The ICAC has a **proud history** of accomplishment since before the Clean Air Act first became law.

Air pollution control technologies enable continuous progress toward:

**Lower COSTS**

**Healthier AIR**

**Higher EFFICIENCY**

**Greater Certainty** for COMPLIANCE

These technologies have created high caliber jobs and promoted economic growth.

**Economic GROWTH**



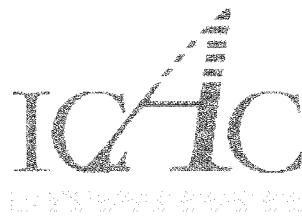
**High Caliber JOBS**

ICAC members **continuously invest** in technology and stand ready to **meet new challenges**.

EPA can help further the progress industry has made by providing certainty, a requisite for long-term investment in global leading technologies.

MISSION STATEMENT A Presentation by 2017 American Market

# The Institute of Clean Air Companies



[www.icac.com](http://www.icac.com)

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