Dear Client, Partner and Colleague,

Marsulex Environmental Technologies (MET) is a leader in Wet flue gas desulfurization (WFGD) and, with our technology selected for over 77 gigawatts of electrical power generation in 21 countries, has one of the largest global installation bases. Our long and successful track record includes a lineage with GE, Chemico and the very beginnings of SO₂ control.

Our technologies are solid, innovative and can satisfy the most difficult project requirements. Respected worldwide for our long term customer relationships and operating know how, MET is the trusted name that delivers total service at a competitive price.

We provide consistent value to our clients; demonstrated not only with experienced technical and execution teams, but also with flexible business models and advanced technologies that are patented and proprietary, such as our high quality fertilizer producing (AS) WFGD. For over three decades, our international expertise has developed an unmatched network that shows our commitment to the well-being of our global relationships. We bring excellent business credentials and strong financial resources to each of our projects.

On behalf of our many world-wide employees, I look forward to working with you to create an environmentally sound future for the coming generations.

Very best regards,

Robert H. Cardell, Ph.D.
President - MET

Full Service Wet FGD Technology Provider

Business Model

MET is a quality provider of environmental solutions with excellent industry credentials. We focus on customers’ needs and embrace innovation and technology to meet those needs. We understand that with different projects come different circumstances, which is why we have a business model portfolio including:

- Lump sum, firm pricing
- Technology licensing
- Cost reimbursable with fixed fee or cost plus
- Build, Own, Operate, Maintain (BOOM)

For your next project requiring environmental solutions - choose proven technologies, experience and dedication - choose MET, Marsulex Environmental Technologies.

Start-up and Training:

To ensure recommended procedures are in place, MET provides a team of engineers to work side by side with on-site personnel during start-up.

Our FGD team along with key equipment suppliers provide a customized training program including:

- Classroom training - process and system
- Mechanical equipment, instruments and controls
- On-the-job training at operating facilities
- Operational Safety Guidelines

Business Model

Since 1991, the MET business process has been ISO-9001 certified by Lloyd’s Register Quality Assurance. This certification is applicable to the development, design and supply of air pollution control systems and ensures the customer receives the highest measure of quality.

ISO-9001

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Process Design

MET is globally recognized for dependability, efficiency and state-of-the-art process engineering. Our reputation, based on years of continuous improvement and development, delivers innovative solutions to problems. This includes continually raising the bar and empowering employees to take ownership of the project execution to maintain our focus on customer satisfaction.

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Project Partnership / Management

MET is committed to excellence in the field of air pollution control and believes that this can best be achieved through state of the art project execution and building strong partnering relationships. This concept allows each organization to execute what it does best, thereby increasing the quality of the overall project. We believe this partnering concept is especially applicable for complex FGD projects. By combining the unique expertise of each FGD team member (customer, engineer, constructor, etc.) into a partnership, the overall project will benefit from each partner’s contribution in an open forum exchange of ideas and concepts. Marsulex Environmental Technologies has formulated numerous partnerships and alliances to most effectively attain project goals and objectives.

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MET Leads in Worldwide Experience

MET’s Wet FGD Technology has been applied in over 150 installations with a variety of reagents including limestone, lime, ammonia, magnesium-enhanced lime and sodium. Our WFGD technology and U.S. based engineering support has proven to be competitive and successful against many WFGD technology suppliers from the U.S., Europe and Asia, as demonstrated by our large market share in this competitive marketplace.

Total FGD Awards: 77,264 MW

Domestic Total: 19,229 MW
International Total: 58,035 MW
Europe: 21,375 MW
Asia: 36,830 MW
North and South America: 19,364 MW
**Limestone/Gypsum WFGD**

The MET Wet FGD system is a proven and efficient design that uses an open spray tower and high velocity mist eliminators. Our limestone/gypsum technology delivers SO$_2$ removal efficiencies of 98+% and demonstrates excellent performance results and favorable capital, operating and maintenance factors as compared to other designs.

Our design is a global standard of excellence and has a proven reputation for its efficiency, reliability and flexibility in addressing the most difficult requirements. In addition to limestone, MET is experienced with a variety of reagents including lime, sodium and magnesium oxide.

**Absorber Liquid Redistribution Device (ALRD)**

- Maximizes U/G effectiveness
- Negates untreated gas “sneakage”
- Dramatically improves SO$_2$ removal performance

A commercially demonstrated Absorber Liquid Redistribution Device (ALRD) can be included to deliver higher efficiency in SO$_2$ removal. This MET proprietary and patented technology maximizes gas-liquid contact in the open tower without the significant pressure drop and other problems associated with “tray” type designs.

**Ammonium Sulfate WFGD**

Ammonium Sulfate (AS) technology is a system that efficiently utilizes ammonia (aqueous or anhydrous) to convert SO$_2$ emissions into a high quality, high value commercial grade Ammonia Sulfate (AS) crop fertilizer. Designed with critical WFGD equipment redundancy and utilizing ammonia, an inherently more reactive absorption reagent than limestone, its capabilities exceed 98% SO$_2$ removal from flue gases with high sulfur content.

**Benefits of AS Technology**

- Provides significant, ongoing revenue stream
- Greater than 99% availability and reliability
- Valuable by-product contributes for return on capital investment
- Commercially accepted in the utility and refinery marketplace
- Meets rigorous environmental requirements
- Precludes CO$_2$ emissions associated with calcium based WFGD systems
- Fertilizer by-product promotes C4 plant growth to enhance capture of atmospheric CO$_2$
Dominion Virginia Power
Mt. Storm Power Plant, Units 1 and 2
Mt. Storm, West Virginia

Project: Retrofit of Wet FGD Absorbers
To comply with the Clean Air Act Amendments, MET was contracted to install environmental equipment. This project came to being after a highly successful wet FGD installation on Unit 1.

Scope:
MET provided the technology, engineering, equipment and installation to reduce SO2 and other air emissions on two 530 MW power generation units at the Mt. Storm Power Plant. The MET patented ALRD, or Absorber Liquid Redistribution Device, was installed on these units to help increase SO2 removal.

Design and Engineering:
A state-of-the-art absorber design with in-situ forced oxidation was employed to remove 95% of the sulfur load without the use of organic acid additives and alternatively, 98% removal with additives. The scrubber vessels, concrete shells with ceramic tile liner, not only provided improved maintenance for the system, but also contributed to a substantial cost savings and schedule reduction. At the time of installation, the total FGD project cost was reported to be the lowest cost scrubbing system (in $ per MW) installed in the US.

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LCRA (Lower Colorado River Authority)
Fayette Power Project Units 1 and 2
LaGrange, Texas

Project: Retrofit of Wet Limestone Absorber
Under a commitment to lower air emissions to more stringent levels, LCRA contracted MET to provide a wet limestone-gypsum flue gas desulfurization system.

Scope:
MET provided technology, engineering and supply of absorber island, ductwork and booster fans to reduce SO2 and other air emissions for Units 1 and 2, each rated at 600 megawatts. ALRDs were installed on both of these units to maximize the efficiency of SO2 removal.

Design and Engineering:
MET designed the system utilizing our Wet Limestone WFGD technology with in-situ forced oxidation. The system, utilizing some of the largest self supporting FRP internal spray piping in the world, is designed to remove 97% of SO2 with 99% reliability. The design maintains existing chimneys as alternative gas paths for the safety of the boilers by preventing the possibility of pressure-related damage in the event of boiler upset conditions.

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Reagent | Limestone
---|---
Unit Size (MW): | 2 x 560
Startup Date: | 2002
Fuel (%S): | 2.2
No. Absorbers/unit: | 1
Gas Flow (acfm): | 2,200,000
Inlet SO2 (ppm): | 1500
SO2 Removal (%): | 95%

This project was nominated for Power Engineering Project of the Year for 2002.
Dakota Gasification Company
Great Plains Synfuels Plant
Beulah, North Dakota

Project:
Ammonia Sulfate WFGD
Install an Ammonia Sulfate (AS) WFGD system to reduce SO₂ emissions utilizing internally produced Ammonia.

Scope:
First commercial application of AS WFGD Technology. Engineering, procurement and construction management was provided for the 350 MW plant including FRP pre-scrubber and absorber, ammonia sulfate dewatering system and compaction / granulation fertilizer plant.

Design and Engineering:
By providing an innovative, environmental solution, DGC was enabled to achieve:
- Compliance with SO₂ emission regulations
- Economical use of internally produced Ammonia
- Generation of commercial grade fertilizer trademarked DakSul 45 which is used in agricultural applications

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Ammonia</th>
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</thead>
<tbody>
<tr>
<td>Unit Size (MW)</td>
<td>350</td>
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<tr>
<td>Startup Date</td>
<td>1996</td>
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<tr>
<td>Fuel (%S)</td>
<td>5</td>
</tr>
<tr>
<td>No. Absorbers/unit</td>
<td>1</td>
</tr>
<tr>
<td>Gas Flow (acfm)</td>
<td>1,187,000</td>
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<tr>
<td>Inlet SO₂ (ppm)</td>
<td>4,000</td>
</tr>
<tr>
<td>SO₂ Removal (%)</td>
<td>98%</td>
</tr>
</tbody>
</table>

Minnkota Power Cooperative
Milton R. Young Station
Center, North Dakota

Project:
Wet FGD
Due to new emission goals Minnkota Power Cooperative, Inc. awarded a contract to Marsulex Environmental Technologies to design, supply and install a lime-based wet flue gas desulfurization system for Young 1.

Scope:
MET will supply technology, engineering and erection of the FGD system including the absorber island, ductwork and ID fans for the 250 MW unit. Additionally, MET will design, supply and erect a common lime reagent preparation system to be utilized by both Young 1 and the existing Young 2 FGD system.

Design and Engineering:
The design features MET’s enhanced open spray tower with patented ALRD and utilizes lime-based reagent. The system is designed to reduce SO₂, particulates and mercury emissions to specified levels and will operate in an inhibited oxidation mode.

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Lime</th>
</tr>
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<tbody>
<tr>
<td>Unit Size</td>
<td>250</td>
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<tr>
<td>Startup Date</td>
<td>2011</td>
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<tr>
<td>Fuel (%S)</td>
<td>1.3</td>
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<tr>
<td>No. Absorbers/unit</td>
<td>1</td>
</tr>
<tr>
<td>Gas Flow (acfm)</td>
<td>1,362,800</td>
</tr>
<tr>
<td>Inlet SO₂ (ppm)</td>
<td>1,466</td>
</tr>
<tr>
<td>SO₂ Removal (%)</td>
<td>97%</td>
</tr>
</tbody>
</table>
Let the MET team of chemical process experts, engineers and designers provide on-site engineering and process analysis for your existing system. Our specialists can analyze your FGD system, regardless of original OEM design, tribulations or limitations, and provide you with cost effective solutions to improve plant operations, including:

- Increasing efficiency for SO₂ removal
- Adapting to higher sulfur fuels
- Reliability issues resulting from operational/maintenance problems
- Address bypass elimination
- Improvements to mist eliminator systems
- Chemistry improvements
- Forced oxidation conversion
- Conversion of absorber into enhanced open spray design
- Upgrading and rehabilitation of auxiliary equipment/systems
- Reagent preparation and dewatering upgrades
- Conversion to alternative reagents

**Wet FGD Upgrades**

**Laboratory Capabilities**

MET also offers in-house laboratory capabilities and analysis to help correct process issues including:

**Solids**
- Weight Percent Solids determination for Slurry Sample
- Weight Percent Solids determination for Filter Cake
- Calcium Carbonate analysis
- Calcium Sulfite Hemihydrate analysis
- Acid insoluble
- Calcium Sulfate Dihydrate

**Dissolved Chemistry**
- Calcium Ion
- Total Calcium Ion
- Magnesium Ion
- Sulfate Ion
- Chloride Ion
- Sulfite Ion
- Chloride Ion in Solids

**Other**
- pH of Gypsum solids
- Acidity in fertilizer
- Limestone Reactivity Test
- Limestone & Gypsum particle sizing
- Ammonium Sulfate determinations
- Sulfite Ion or Ammonium Ion in solution
- Specific gravity of solution
- Sulfide Ion in solution
- Weight % solids in slurry

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The information contained in this brochure is intended only as an overview of Marsulex Environmental Technologies products and services. Please contact us for detailed information regarding specific applications.