



**Eco Power Solutions**

Energy Recovery & Emissions Control Systems



# Multi-Pollutant Control Systems

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Sanjeev Jolly, P.E.  
VP Engineering  
Eco Power Solutions (USA) Corp.  
950 Breckenridge Lane  
Louisville, KY 40207



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## CORPORATE OVERVIEW

### Organization

- Founded 2006
- Corporation Incorporated in Delaware
- Privately Held Company

### Global Operations

- Boston, Massachusetts – Global Headquarters
- Louisville, Kentucky – Technology Center & Global Engineering
- London, England – European Operations (Sales & Engineering)
- Santiago, Chile – South American Operations (Sales & Engineering)
- Hyderabad, India – (Sales & Engineering)

### Product

- COMPLY 2000 ®
- Air Quality and GHG Emission Control – Multi-Pollutant Strategy
- Waste Heat Recovery

### Industry Leadership

- Recognized by EPA as potential EGU MACT Multi-Pollutant solution
- 2011 – Kentucky Department of Energy Grant
- Recipient of the 2010 Rice Alliance Award – Most Promising Clean-Tech Company
- Over 60 client engagements
- Three US Patents granted



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## EMISSION CONTROLS

Compared to traditional technologies, the COMPLY 2000® offers superior environmental performance metrics in one complete system with the added benefit of recovering of waste heat

Pollutant	Current Best Available Control Technology (Percent Removal)	COMPLY 2000®
NOx	75% - 90%	95%
SOx (SO <sub>2</sub> & SO <sub>3</sub> )	80% - 96%	99%
Particulate Matter (PM <sub>10</sub> )	99%	99%
Particulate Matter (PM <sub>2.5</sub> )	N/A	99%
Mercury (Hg)	70%	95%
Halogens	N/A	99%
CO <sub>2</sub>	N/A	25%



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## COMPLY 2000



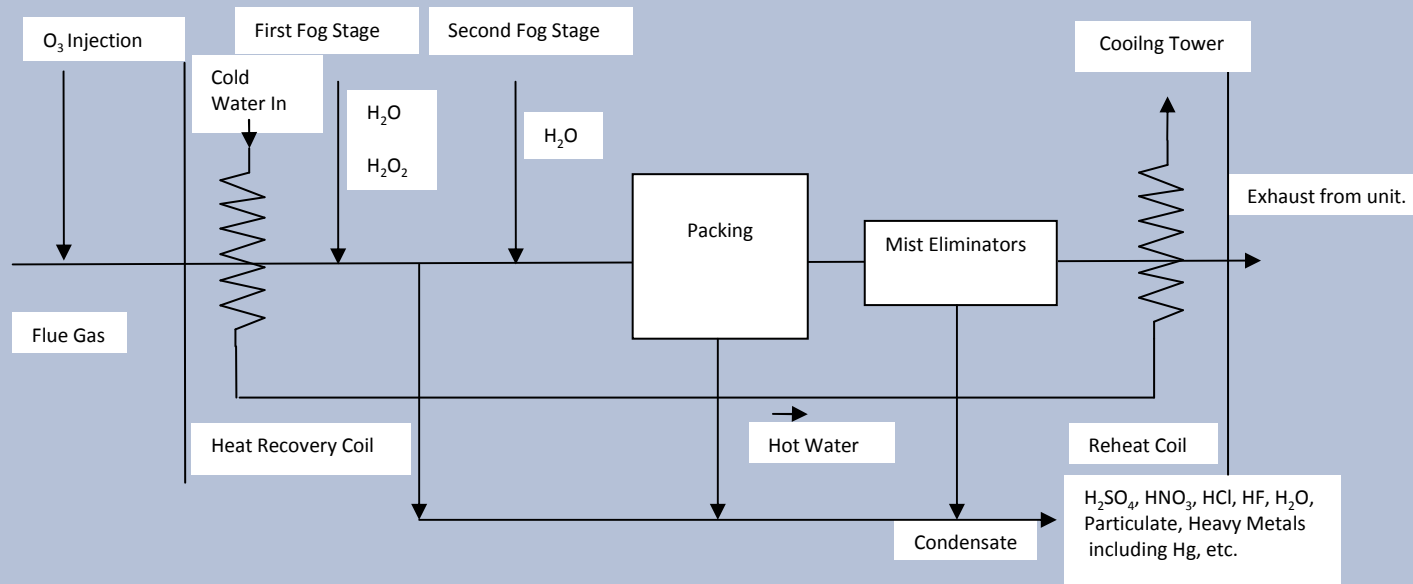


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## PROCESS SCHEMATIC





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## NOX REDUCTION MECHANISM

- NO<sub>x</sub> typically consists of 5 to 10% NO<sub>2</sub> and 90 to 95% NO.
- NO<sub>2</sub> is water soluble but NO is not.
- NO is oxidized by injecting Ozone in the ductwork
- Simple reaction:  $\text{NO} + \text{O}_3 \rightarrow \text{NO}_2 + \text{O}_2 + \text{light}$
- Water sprayed in the foggers in the unit convert NO<sub>2</sub> to nitric acid mist.



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## SOX REDUCTION MECHANISM

- Applicable only when sulfur is present in fuel
- SO<sub>x</sub> mostly consists of 99% SO<sub>2</sub> and 1% SO<sub>3</sub>.
- Hydrogen peroxide/water injected in the first fogging stage to help convert SO<sub>2</sub> to sulfuric acid mist.
- $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$ ;  $\text{H}_2\text{SO}_3 + \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{SO}_4 + \text{H}_2\text{O}$
- $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$



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## SECOND STAGE – FOGGING & CONDENSATION PROCESS

- Only water injected through foggers
- Primary function of second stage is to assure any remaining chemical reactions required for process.
- Water dew point temperatures are reached.
- Second stage foggers followed by packing material.
- Remaining acid/water/particulates condense out.
- Condensate consists of various acids, particulates, heavy metals, etc.
- Mist eliminators downstream of the packing to prevent droplet carryover to the outlet duct and stack.



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# ACID CONDENSATION PROCESS

- Adiabatic cooling provided by first set of foggers.
- Air temperature starts to drop below certain acid dew point temperatures, primarily sulfuric acid.
- Acids starts to condense and are collected through the condensate collection system at the bottom of the COMPLY.
- Wastewater is routed to the holding tank from where it is routed to another tank for further treatment.
- Wastewater consists of various acids, particulate and heavy metals. .



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## CONDENSATION HANDLING

- First stage condensation primarily consists of strong acids (low pH) and second stage consists of relatively weaker acids
- The 2 streams could be separated or combined
- Wastewater routed to holding tank for intermittent storage.
- Wastewater neutralized with a reagent in treatment tank – limestone, quick lime or caustic
- Byproduct is salt and water.



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## MERCURY REMOVAL

- Mercury – elemental (insoluble in water) and oxide (water soluble)
- Formation of acids helps oxidize mercury (first fogging stage)
- In addition, hydrogen peroxide also help oxidize mercury
- Mercury ends up in the wastewater stream
- Disposal to landfill after neutralization of acids by reagents



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## SYSTEM MATERIAL MAKEUP

- Shop-assembled units – 12' x 12' x 40' (shipping) (25 MW)
- Field erected units for higher flows (>150 MW)
- Multiple units can be used for larger plants – provides redundancy
- Two sets of fogging arrays
- Packing material.
- Optional mist eliminator/reheat coil.
- Internally lined with 686 alloy.
- All 686/stainless steel construction for fogging arrays.
- Condensing coils – 316L with Teflon coating

**COMPLY**   
**2000**

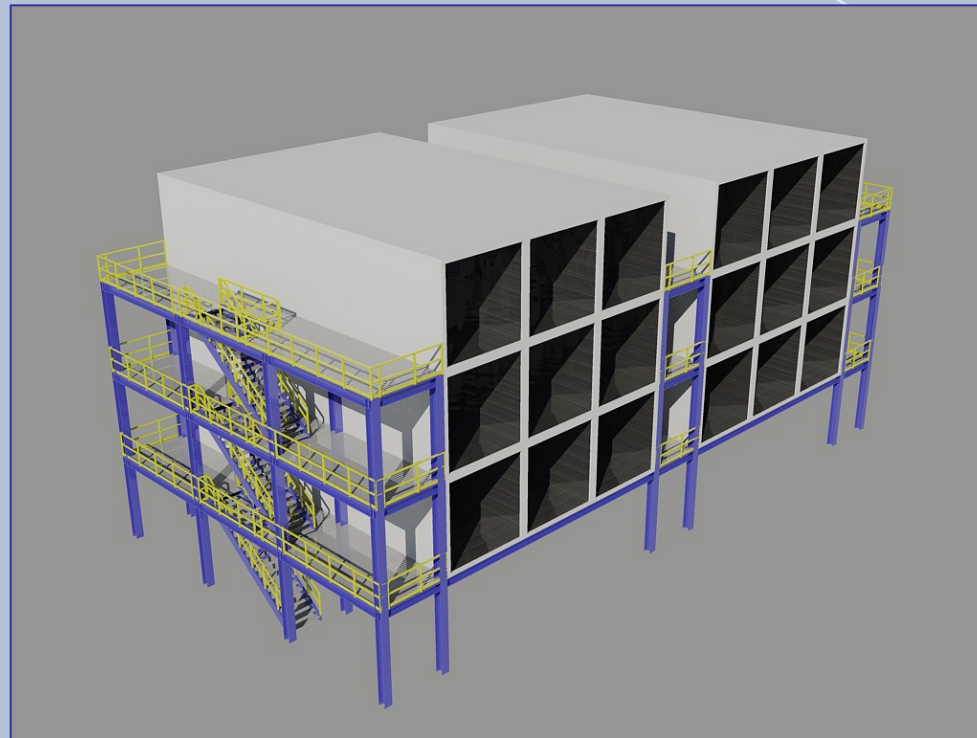


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## 500 MW – FIELD ERECTED UNITS



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## SUPPORT

- Design Engineering
  - Mechanical
  - Electrical
  - Civil/ Structural
  - Drafting, etc.
- Project Management
- Construction
- Field Services
  - Supervisor
  - Start-up/commissioning
  - Testing

**COMPLY**   
**2000**



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## SUPPORT

- Ductwork fabrication
- Piping including pipe supports
- Valves & Instruments
- Structural steel
- Components – dampers, expansion joints, etc.
- RO unit
- Wastewater Treatment

**COMPLY**   
**2000**



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Leading  
the way in **Energy**  
Sustainability &  
**Environmental**  
Certainty.®

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