



# JUPITER OXYGEN CORPORATION

---

## **JUPITER OXYGEN CORPORATION**

Jupiter Oxygen is a privately held Illinois company that has developed and pioneered a revolutionary technology that makes it both practical and cost effective for electric power plants to capture CO<sub>2</sub>, have ultra low emissions and save fuel. Unlike most clean coal technologies being developed, Jupiter's patented process can be either designed into new plants or used to retrofit existing plants. Plus, Jupiter's technology can also be used on gas fired electric power plants, which results in virtually no emissions levels for NO<sub>x</sub>.

## **BACKGROUND**

Jupiter Oxygen is a recognized leader in the development, application and use of oxy-fuel. Jupiter's expertise lies in its continued research, development and everyday use of oxy-fuel combustion. Experimenting and developing the patented oxy-fuel process began in the mid-1990's as a way to cut fuel costs and lower emissions at Jupiter Aluminum, an aluminum recycling and manufacturing business and a patent licensee. Jupiter's technology has been in use at the aluminum plant since 1997, and is now emerging as the most promising environmental control technology for use in both coal and gas fired electric power plants.

## **INITIAL TECHNOLOGY DEVELOPMENT**

Since 2001, Jupiter has taken its technology from industrial furnaces to fossil fuel steam boilers and electric power plant test applications. In 2002, the company tested its oxy-fuel technology in a steam boiler using oxygen instead of air, and firing with both natural gas and coal. These successful trials were followed by additional testing in 2004 that proved that it is both practical and cost effective to capture CO<sub>2</sub>. The tests were done in cooperation with the US Department of Energy (DOE) and its National Energy Technology Laboratory (NETL). In 2004, Jupiter Oxygen's technology was also certified by Canada's Environmental Technology Verification Program.

Throughout its history, Jupiter Oxygen's developmental goal for its patented oxy-fuel technology has been to reduce NO<sub>x</sub> emissions, prove that CO<sub>2</sub> can be effectively and economically captured, and improve boiler energy efficiency in order to save fuel. The 2004 tests were coordinated with the US Department of Energy and showed that a clean coal technology based on Jupiter's patented high flame temperature oxy-fuel combustion process, combined with the NETL's Integrated Pollutant Removal System, is the path to a cost effective clean coal future for both retrofits and new electric power plants.



## **HAMMOND TEST FACILITY**

Jupiter is operating a 15 MW<sub>thermal</sub> oxy-fuel test facility. This research and development facility is testing a 50 MMBtu oxy-fuel burner that serves a 5 MWe equivalent test unit, and provides developmental engineering for power plant retrofits as well as new build plants. The development work is based upon Jupiter's oxy-fuel technology and NETL's Integrated Pollution Removal [IPR] technology. Jupiter Oxygen will advance the creation of a close to zero emission fossil fuel power plant, limiting NO<sub>x</sub>, SO<sub>x</sub>, particulate and mercury emissions to ultra low levels even without CO<sub>2</sub> sequestration. The plants will be fully equipped for CO<sub>2</sub> capture and prepared for CO<sub>2</sub> sequestration pipelines. The Hammond test facility is Jupiter Oxygen's 3rd generation oxy-fuel development unit. The unit and testing are being done with the Department of Energy's National Energy Technology Laboratory.

## **MAJOR BENEFITS FOR RETROFITS AND NEW FOSSIL FUEL AND BIOMASS POWER PLANTS**

- NO<sub>x</sub> is greatly reduced with properly designed combustion and burner systems without any back-end emissions control technology. In fact, coal combustion NO<sub>x</sub> levels in the exit gas are below the federal goal of 0.1 Lbs/MMBtu, and are expected to be 0.05Lbs/MMBtu without any post-combustion emission controls.
- Flue gas exhaust from the boiler is approximately one-fourth that of air-fired boilers, making emission capture easier, as well as more effective and economical.
- CO<sub>2</sub> becomes highly concentrated, making capture easier and more economical with 95%+ capture of CO<sub>2</sub> possible. Since air is not part of the combustion process, there is no expense to separating CO<sub>2</sub> from air prior to compression, unlike with air firing.
- Elimination of key pollutant emissions: 99%+ SO<sub>x</sub>, 99%+ PM and 90%+ mercury capture
- Fuel efficiency is improved because nitrogen uses up a great deal of heat/energy produced by combustion. Furthermore, the patented high flame temperature process improves radiant heat transfer and therefore efficiency. Test results from retrofitting older natural gas boilers show a 6.7% to 14.3% drop in fuel consumption in the boiler based on patented high flame temperature oxy-fuel combustion. Less fuel also means a corresponding reduction of greenhouse gases and pollutants.
- Boilers can be retrofitted without major changes to the boiler itself.
- More water is recovered for re-use than boiler feedwater needs.

**FOR MORE INFORMATION** email: [info@jupiteroxygen.com](mailto:info@jupiteroxygen.com) or visit: [www.jupiteroxygen.com](http://www.jupiteroxygen.com)