

## Supply Side Energy Efficiency and Fossil Fuel Switch

---

### Case Study: Jupiter's Oxy-Fuel Combustion Technology Energy Efficiency in Industrial Re-melting Aluminum

---

**Carbon Expo – May 11, 2006**  
Cologne, Germany

## Overview: Energy Efficiency in Industrial Re-melting Aluminum

---

1. Energy Use in Industrial Business-As-Usual Applications
2. Energy Saving Opportunities Through Oxy-Fuel Technology
3. Advanced Oxy-Fuel Application in Industrial Furnaces:  
Potential for CDM/JI Projects Based on Significant Fuel Savings  
and CO<sub>2</sub> – Emission Avoidance

## Advanced Aluminum Recycling Technology – Significant Potential for Clean Development Action

### Dr. Subodh Das (SECAT, 2004):

... process heating and burners offer major energy saving opportunities (60% – 80%) in secondary aluminum industry plants...

... process heating consumes more than 70% to 85% of the total energy used for the secondary aluminum industry



## Aluminum Recycling - U.S. Energy Efficiency Averages

### Air Fired Combustion U.S.

[source: SECAT, 2004]

Current Average: 2,200 Btu/lb

Projected Achievable: 925 Btu/lb

### Projected Energy Efficiency

Savings Opportunity: 1,275 Btu/lb

**~60% to save from today's average!**



## Jupiter's Oxy-Fuel Energy Savings Potential Today

- 750-900 Btu/lb energy use for continuous runs
  - + additional energy input from required electricity for oxygen production
- Jupiter's Energy Savings Potential:  
[compared to average 2,200 Btu/lb]

**50% - 60% of today's U.S. average!**



## Jupiter's Best Practice Development

Starting in the 1990s  
**Dietrich Gross**, *Chairman & CEO of Jupiter Aluminum Corp.*,  
focused on process heating in his  
aluminum recycling facility.



## Jupiter's Best Practice Development – cont.

### Jupiter's technology is a...

- patented process for the combustion of fossil fuels with **pure oxygen**
- using an undiluted high flame temperature, but keeping the same process temperatures
- existing furnace materials can mostly be used and the same melting temperatures are maintained





JUPITER OXYGEN CORPORATION

MAKING ENERGY MORE EFFICIENT ◦ [WWW.JUPITEROXYGEN.COM](http://WWW.JUPITEROXYGEN.COM)

## Jupiter Oxygen's Private R&D Program

**In 2001 Mr. Gross founded Jupiter Oxygen Corporation:**

- To develop, establish and promote Jupiter's technology
- Technology is patented in the U.S. and worldwide
- Private R&D program has required costs of over 15 million dollars





## Oxy-Fuel: Best Practice Technology – cont.

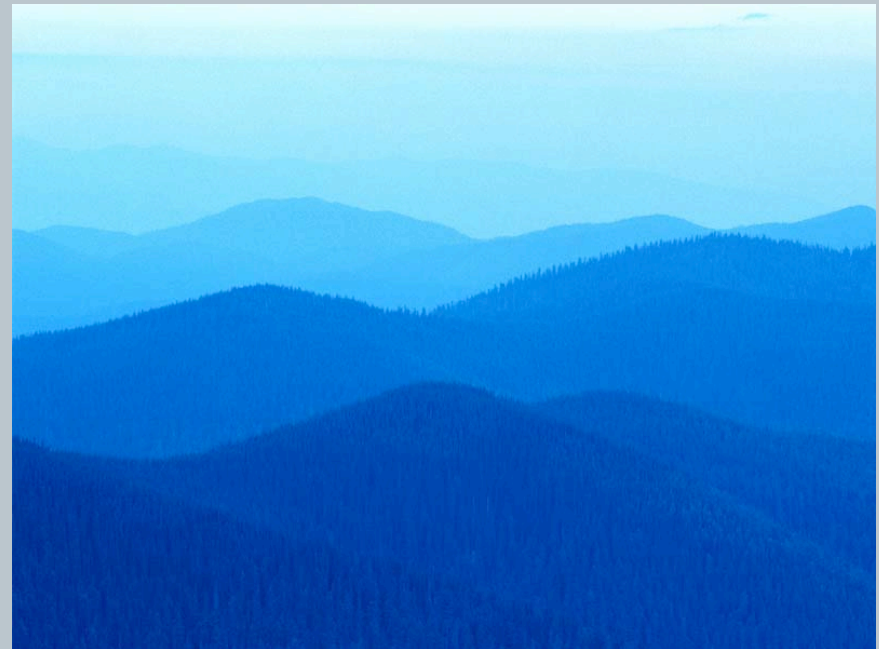
- **Improved Energy Efficiency**
  - 750-900 Btu/lb for continuous runs
  - Elimination of airborne nitrogen
  - More radiant heat transfer
  - Longer gas residence time
- **Lower Fuel Costs**
  - Natural gas fuel reduction up to 73%
  - Oil fuel usage reduction up to 68%
- **Improved Production**
  - Better heat transfer



## Environmental & Health Improvements

---

- Virtually eliminates  $\text{NO}_x$  emissions with natural gas or oil
- Up to 69% reduction in CO and  $\text{SO}_x$
- Up to 31% reduction in VOC's
- Without any back-end emissions control technology
- Reduces air pollution and lowers health care costs



## Sustainable Industry Concept: low cost – high impact

---

### Industrial user with 400 MMBtu/hr fuel usage:

Medium size application / 8 furnaces in operation

- **Would require a capital investment US dollars of \$11,500,000**
  - Cryogenic Plant \$8,000,000
  - Combustion System(s) \$2,000,000  
[Air Fuel Combustion System would cost \$1,000,000]
  - Additional Infrastructure \$1,500,000

## Sustainable Industry Concept: low cost – high impact

---

### Industrial user with 400 MMBtu/hr fuel usage:

- 1.8 million MMBtu annual energy savings!
- \$ 8,000,000 operational savings per year!
- 100,000 tons CO<sub>2</sub> - avoidance from fuel savings per year!

## Creating Local Markets as Part of a Sustainable Concept

---

- **Air Separation Plants Construction**
- **Technical Equipment and Supply**
- **Advantages for the Community**

## Summary & Conclusions

---

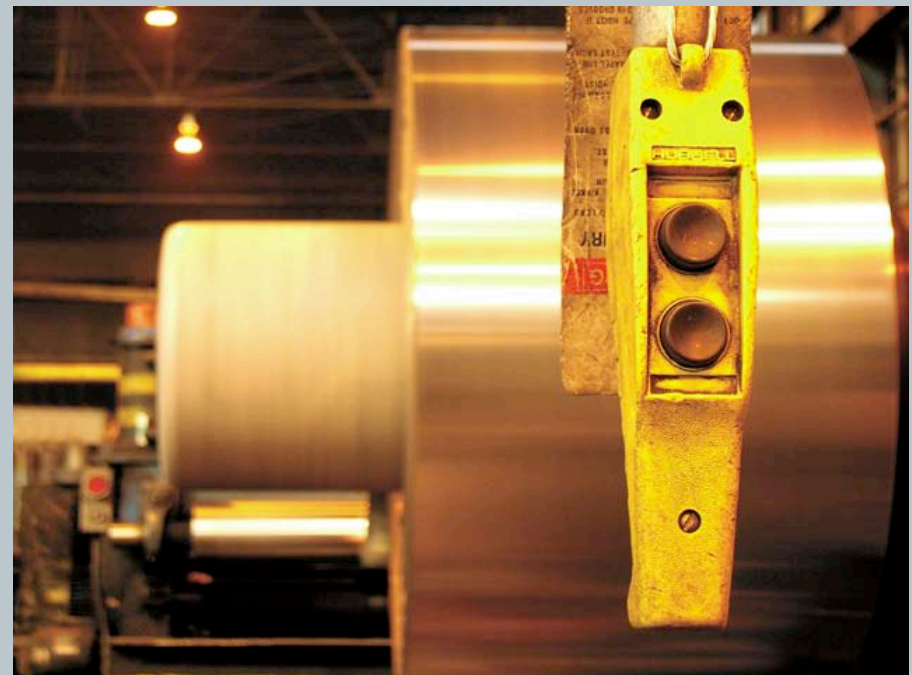
### Jupiter's Oxy-Fuel Combustion Technology

- Advanced technology proven in day-to-day operation
- Practical solution for retrofit and new furnaces
- Easy to apply to existing materials and operational conditions
- Ideal for near term technology transfer and deployment
- Technology implementation creates local markets

## Proposed Project for Kyoto's Flexible Mechanism

### Retrofit Aluminum Recycling Facility

- With oxygen combustion furnace technology proven in industry
- Significant fuel savings and CO<sub>2</sub>-emission avoidance
- Low cost – high impact, near-term solution
- Sustainable concept





# JUPITER OXYGEN CORPORATION

MAKING ENERGY MORE EFFICIENT ◦ [WWW.JUPITEROXYGEN.COM](http://WWW.JUPITEROXYGEN.COM)

Visionary Innovation | Scientific Approach | Operational Experience



**WEB:**

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

**CONTACT US:**

**Thomas Weber, Vice President**

Jupiter Oxygen Corporation  
4825 N. Scott St., Suite 200  
Schiller Park, IL 60176 USA

**PHONE:** 001 – 219 512 5374

**Brian Patrick, Director of Development**

Jupiter Oxygen Corporation  
4825 N. Scott St., Suite 200  
Schiller Park, IL 60176 USA

**PHONE:** 001 – 219 746 5586