BLG: Implications for the Industrial Gases Industry

BOC GASES

Our Business
BLG Impact on our Industry
Potential Business Models
Our Products

Thin Air  | Natural Gas  | Industry By-products  | Natural Deposits

Purification, Distillation, Liquefaction

Oxygen  | Nitrogen  | Hydrogen

Argon  | Helium  | Special Gas Mixtures

Special Gases  | Carbon Dioxide

Typical Analysis of Dry Air by %Mole

- 78.084% Nitrogen
- 20.946% Oxygen
- 0.934% Argon
- 0.0335% Carbon Dioxide
- 0.001818% Neon
- 0.00524% Helium
- 0.0002% Methane
- 0.000114% Krypton
- 0.00005% Nitrous Oxide
- 0.0000087% Xenon
Distribution Methods

Cylinder Delivery → Customer → Pipeline → Production

Industrial Gases – Worldwide Market

Total Market Estimate $32 Billion

- Europe: 35%
- North America: 32%
- South America: 6%
- Asia: 22%
- Rest of World: 5%
World Gas Sales...Top 4

1999 - $ Billions

<table>
<thead>
<tr>
<th>Company</th>
<th>Share</th>
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<tbody>
<tr>
<td>L’Air Liquide</td>
<td>20%</td>
</tr>
<tr>
<td>BOC</td>
<td>14%</td>
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<tr>
<td>Praxair</td>
<td>14%</td>
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<td>Air Products</td>
<td>11%</td>
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U.S. Market for Industrial Gases

- U.S. Liquid Oxygen and Nitrogen production is estimated at 75,000 tons/day
- U.S. Liquid Argon production is estimated at 5,000 tons/day
- BLG represents a potential 50,000 tons/day Oxygen market at maturity
U.S. Market for Industrial Gases

- 500 Cryogenic Plants in the U.S.
- 225 of them have merchant capability

Cost Structure for Oxygen

- Power represents from 40% to 60% of our merchant product costs
- On-site plants avoid the cost of liquifaction and transportation
- Argon recovery is a significant economic consideration
Cost Structure for Oxygen

- At a 1000 tpd merchant plant rare gas recovery is feasible
- Industrial Gas Merchant plants generally have a 150 to 250 mile radius of competitiveness. Distribution of LOX is a significant cost requiring specialty trucks and trained drivers

PGS North America Overview

**LASU Locations**

- BOC (24)
- BOC Argon Only (4)
Cost Structure for Oxygen

- Uptime rates for our industry in excess of 98%
- Customer owned units have a history of problems due to overheads to support a single facility

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Impact of BLG: Oxygen & Nitrogen

- Piggy-back merchant plants are feasible in certain geographies
- BLG could have a major impact on supply and demand for LIN and LOX
- Complimentary business in some locations (food, chemical, pipelines)

Impact of BLG: Argon

- Argon availability could increase by a factor of 3 impacting the market supply and demand
- Argon is key to cost structure of Oxygen and Nitrogen
- Cheap available Argon would create a new economic paradigm in our industry
Impact of BLG: Neon, Krypton, Xenon

- Rare Gases availability could increase by a factor of 2 impacting the market supply and demand
- Most noticeable consumer impact on high end light bulb market
- Additional impact on electron tubes and signs

Impact of BLG: Gases and your mill

- Ozone cost would greatly decrease to lower than the cost of chlorine dioxide
- Oxygen costs would greatly decrease to the rest of the mill
- Oxygen instead of air would be used for wastewater treatment
Impact of BLG: Gases and your mill

- Nitrogen with -100 degrees F dewpoint would be economically available for instrument air
- Ozone readily available for NOx control
- Oxygen enrichment of Lime Kiln and other combustion processes to increase capacity

Impact of BLG: Gases and your mill

- Low cost oxygen and ozone facilitates a closed fully bleached pulp mill with no water effluents and greatly decreased air emissions
Our Business
BLG Impact on our Industry
Potential Business Models

Market Place Reality

• The rate of return in the paper industry for the last 20 years is less than 6%
• Adjusted for inflation, the paper industry has destroyed not created capital
Market Place Reality

- The Paper Industry has effectively shifted all R & D to suppliers
- The Paper industry shifted ownership of land leaving equipment capital based companies

Market Place Reality

- Industry consolidation leaving less than a dozen key players
- Remaining companies saddled in debt
- Wall Street does not take them seriously for any new capital investment
Market Place Reality

- R & D comes from suppliers and potentially the Federal Government
- Gasification with high solids content fuel has a poor track record

### Key Markets

<table>
<thead>
<tr>
<th>Glass</th>
<th>NEG</th>
<th>Ball Glass</th>
<th>Pilkington</th>
<th>Owens Brockway</th>
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<tbody>
<tr>
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<td>Ford</td>
<td>Chrysler</td>
<td>Saturn</td>
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PULP MILL UTILITY ISLAND CONCEPT

What will be Our Business?

- We sell electricity
- We sell chemicals from syn-gas
- We sell industrial gases
- Oh Yeah........we sell pulp too!