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Industrial Gases

US Industry Study with Forecasts for **2013 & 2018**

Study #2460 | March 2009 | \$4700 | 291 pages

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The Freedonia Group

767 Beta Drive

Cleveland, OH • 44143-2326 • USA

Toll Free US Tel: 800.927.5900 or +1 440.684.9600

Fax: +1 440.646.0484

E-mail: info@freedoniagroup.com

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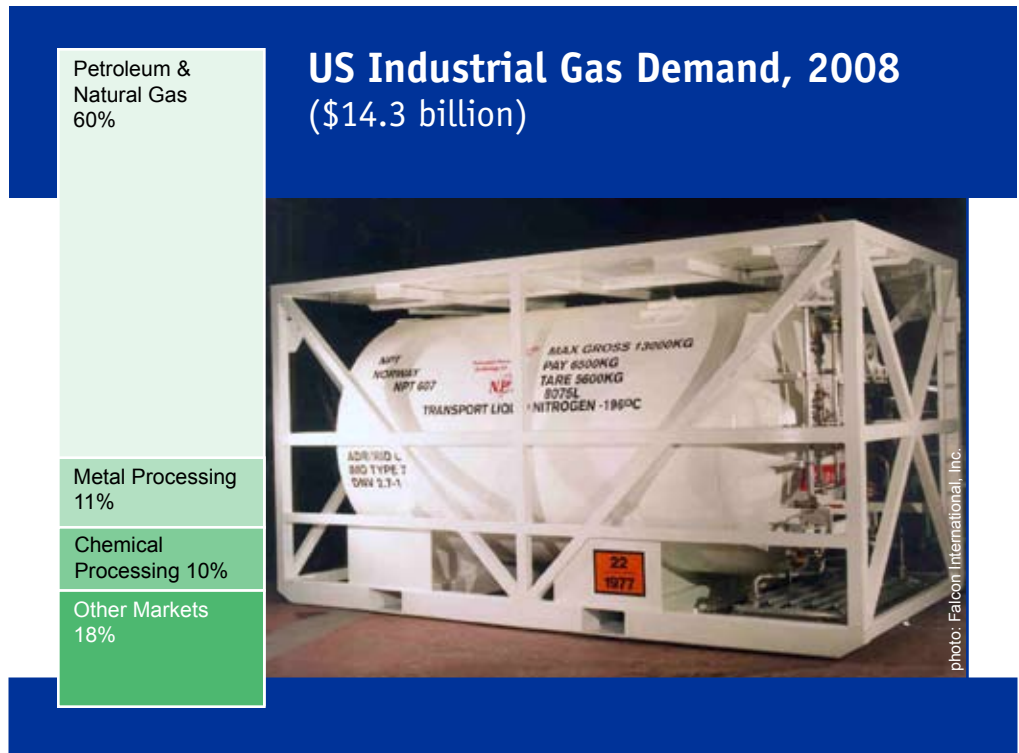
Gains will be driven by the ongoing development of new products that increase demand for industrial gases, and by stable markets such as food and beverage processing and healthcare.

US demand to grow 4.9% annually through 2013

Total industrial gas demand in the US, including some captive consumption, is forecast to increase 4.9 percent annually to 7.5 trillion cubic feet in 2013, valued at \$23.5 billion. Two factors nurture demand and growth in industrial gas markets: the steady and ongoing development of new products and technologies that increase demand for industrial gases; and a high degree of stability in markets such as food and beverage processing and healthcare. Industrial gases are essential to the markets they serve, and although their demand is subject to the cyclical nature of individual markets, the diversity of industrial gas applications mitigates the effects of cyclicity in any single business sector.

Hydrogen enjoys best growth opportunity

The petroleum and natural gas industry is by far the largest market for industrial gases in the US, accounting for 65 percent of total gas demand by volume and 60 percent by value in 2008, including huge quantities of captive hydrogen. Demand for hydrogen in the petroleum refining industry represents the largest growth opportunity for industrial gas suppliers in the US for the coming decade. Refiners are mandated to produce cleaner-burning fuels from increasingly impure crude oil, a process requiring massive amounts of hydrogen. Captive hydrogen production accounted



for 77 percent of refiners' needs in 2008, but future increases in hydrogen demand will come primarily from merchant suppliers. Demand for industrial gas in the petroleum and natural gas production segment will grow 4.3 percent annually through 2013 due to the increased use of nitrogen and carbon dioxide for enhanced oil recovery projects.

Hydrogen is the most-consumed industrial gas in the US, followed by nitrogen and oxygen. These three gases combine for 95 percent of industrial gas demand by volume. The petroleum and natural gas industry dominates hydrogen and nitrogen consumption. The chemical and metal processing industries account for

most oxygen demand and are both significant consumers of nitrogen as well. Carbon dioxide demand is dominated by the food and beverage processing industries. Argon, helium and acetylene are low volume, high value gases, demand for which is dominated by the metal processing and chemical processing industries. The electronics, food and beverage processing, and healthcare industries together accounted for six percent of total gas demand by volume in 2008. Though relatively small, the healthcare market will experience the most rapid growth of these three markets -- the result of growing oxygen demand for respiratory therapies.

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Sample Text & Tables

HYDROGEN

Petroleum Refining

Hydrogen demand in petroleum refining applications, in a significant amount of by-product production, is forecast to increase 1.5 percent annually through 2013, driven primarily by increasing hydrogen demand in hydrocracking and hydrotreating and the production of cleaner fuels.

SAMPLE TEXT

Hydrogen is used in the production of fuels and the two-pronged effect of increasing demand for first, stricter environmental regulations related to sulfur emissions from fuels increase hydrogen demand. Second, crude oil feedstocks entering refineries are increasingly of poorer quality, the vast reserves of light, sweet crude oil have been largely tapped out. This, coupled with the tighter environmental regulations, has a compounding effect on the demand for hydrogen to desulfurize crude oil.

In petroleum refining, hydrogen is used in hydroprocessing applications, which include hydrotreating and hydrocracking. Hydrotreating is a process which removes contaminants such as sulfur. Hydrocracking breaks down heavy oil molecules into simpler molecules, yielding high quality petroleum products such as diesel and gasoline. Hydrogen demand in these applications will expand as refiners are required to meet new EPA standards, such as the ultra low sulfur diesel (ULSD) requirement, which reduces the maximum amount of sulfur allowable in diesel fuel.

Petroleum refineries have traditionally supplied most of the hydrogen requirements through captive sources. The largest source of captive hydrogen production in a refinery is the catalytic reforming of naphtha, which produces syngas of about 85 percent hydrogen. Additionally, fluid catalytic cracking and thermal processes both produce significant amounts of hydrogen. The increasing use of heavy crude oil

TABLE III-3

MERCHANT & CAPTIVE INDUSTRIAL GAS DEMAND (million dollars)

Item	1998	2003	2008	2013	2018
Total Industrial Gas Demand					20
Merchant:					5
Hydrogen					7
Nitrogen					3
Oxygen					9
Carbon Dioxide					8
Argon					1
Helium					0
Acetylene					7
% captive					0
Captive:					5
Hydrogen					3
Nitrogen					7
Oxygen					1
Carbon Dioxide					2
Argon					9
Acetylene					73

SAMPLE TABLE

TABLE VIII-1

ARGON SUPPLY & DEMAND

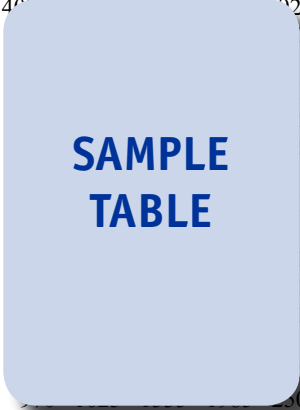
Item	1998	2003	2008	2013	2018
Gross Domestic Product (bil \$)	87	100	115	130	145
\$ argon/000\$ GDP	0	0	0	0	28
Argon Demand (mil \$)					30
\$/000 cubic feet	1	1	1	1	05
Argon Demand (mil cu ft)	12	12	12	12	00
+ exports	8	8	8	8	00
- imports					00
Argon Production (mil cu ft)	20	20	20	20	00
Exports as a Percent of Production					1
Imports as a Percent of Demand					4.9

SAMPLE TABLE

Sample Profile, Table & Forecast

TABLE VI-5
METAL PROCESSING MARKET FOR OXYGEN

Item	1998	2003	2008	2013	2018
Metal Product Shipments (bil 2000\$)	400	400	400	400	400
cu ft oxygen/\$ metal					22.0
Oxygen Demand (bil cu ft)					10
Primary Metal					50
Fabricated Metal					50
\$/000 cubic feet					17
Oxygen Demand (mil \$)					100
Primary Metal					100
Fabricated Metal					100
% metal processing					100
Total Oxygen Demand (mil \$)					100



COMPANY PROFILES

Air Products and Chemicals Incorporated
 7201 Hamilton Boulevard
 Allentown, PA 18195
 610-481-4911
<http://www.airproducts.com>

Revenues
 US Revenues
 Employees

Key Products: nitrogen, carbon monoxide, synthesis gas, and medical gases; cryogenic technologies and services

Air Products and Chemicals is a supplier of industrial gases and related equipment, and specialty and intermediate chemicals. The Company operates in four segments: Tonnage Gases, Merchant Gases, Electronics and Performance Materials, and Equipment and Energy.

The Company is involved in the US industrial gas industry primarily through the Tonnage Gases, Merchant Gases, and Electronics and Performance Materials segments. Through these segments, Air Products and Chemicals distributes industrial, specialty and medical gases for use in the petroleum refining, chemical processing, food processing, general manufacturing, medical and electronics markets, among others. In addition, the Company produces and sells cryogenic and gas processing equipment through the Equipment and Energy segment. Moreover, Air Products and Chemicals offers related technologies and services.

Segment & Product Overview -- Air Products and Chemicals' Tonnage Gases segment, which generated FY 2008 revenues of \$3.6

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“Demand for oxygen used in the manufacture and fabrication of metals is projected to increase 1.5 percent per year to 385 billion cubic feet in 2013. The steel industry is the largest consumer of oxygen and growth in this mature market, though modest, will continue to drive overall oxygen demand.”

--Section VI, pg. 134

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OTHER STUDIES

World Well Stimulation Materials

Global well stimulation material demand will grow at a double-digit annual rate through 2012. Efforts to maintain productivity in maturing oil and gas fields and to increase production in more difficult environments will drive gains. The US, Russia, Canada and China will continue to dominate demand. This study analyzes the \$4.7 billion world well stimulation material industry, with forecasts for 2012 and 2017 by type and for four world regions and four key countries. It also evaluates market share and profiles industry competitors.

#2458 02/2009..... \$5700

Specialty Fuel Additives

US demand for specialty additives used in gasoline and other fuels will grow 2.9% annually through 2012. Above average growth for deposit control agents--the largest segment--will continue to support the market. Corrosion inhibitors and additives used in diesel fuel such as cold flow improvers will show the fastest growth. This study analyzes the \$1.1 billion US specialty fuel additives industry, with forecasts for 2012 and 2017 by type, application and market. It also evaluates market share and profiles industry players.

#2440 01/2009..... \$4500

World Oilfield Chemicals

Global demand for oilfield chemicals will grow 5.7% annually through 2012. Gains will be driven by continuing growth in oil and gas production, and high levels of rotary drilling rigs in use and of wells drilled. North America will remain the dominant market while Latin America and the Asia/Pacific region will grow the fastest. This study analyzes the \$15.2 billion world oilfield chemical industry, with forecasts for 2012 and 2017 by type, world region and for 27 countries. It also details market share and profiles industry players.

#2437 11/2008..... \$5700

Well Stimulation Materials

US demand for well stimulation materials will grow 14% annually through 2012. All important product types will register strong growth as US oilfield operators struggle to sustain production levels. Proppants, the largest category, will double in market value. This study analyzes the \$2.8 billion US well stimulation material industry, with forecasts for 2012 and 2017 by product and regional market. It also evaluates market share and profiles industry competitors.

#2358 06/2008..... \$4600

World Industrial Gases

Global industrial gas demand will rise 6.9% yearly through 2011. The developing regions of Asia/Pacific, Latin America, Eastern Europe and Africa/Mideast will continue growing at above average rates. Metals production and fabrication will remain the largest market, while the medical/health care market grows the fastest. This study analyzes the \$26.4 billion world industrial gas industry, with forecasts for 2011 and 2016 by type, market, world region and for 15 countries. It also evaluates market share and profiles major players.

#2318 04/2008..... \$5500

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