Artisan Partners Global Equity Team

Building A Resilient Future with Industrial Gas

Resilient Growth

March 2025

What do computer screens, rocket fuel, soft drinks and medical procedures have in common? The odds are that you didn't think of industrial gas. However, gases such as nitrogen, oxygen, argon and hydrogen can be thought of as the unheralded "silent enablers" that support manufacturing processes around the world to create the products and services that touch all aspects of our lives.

Industry sales stood at about $110 billion in 2024 and are expected to reach $185 billion by 2034. That translates into a 5.3% compounded annual growth rate, a faster pace than many developed or emerging markets. It is predicted that much of this growth will be driven by the manufacturing sector in developing markets. In addition, the fast-developing market for hydrogen could be a game-changer in helping societies achieve their net-zero goals to avoid the worst effects of global warming.

At its core, industrial gas companies utilize air—a costless input—to separate useful commodities, such as oxygen and helium, to sell as essential products to their customers. As investments, industrial gas stocks offer opportunities for short- and long-term growth.

One person who thoroughly understands the industry's investment potential and has been following companies in this space for over 20 years is Richard Logan, CFA, a senior analyst on the Artisan Partners Global Equity Team who has worked with Portfolio Manager Mark Yockey, CFA, for over 10 years.

Framework for Growth

With degrees in chemical engineering and finance and stints at noteworthy firms Arthur Andersen, Goldman Sachs, and Morgan Stanley, Richard has spent decades covering the chemicals industry, including industrial gas companies. During his 12 years on the team, Richard has worked out of the London office researching companies that span multiple specialties, including fragrance and flavor companies, renewable biofuel producers and infrastructure players.

No matter the industry, Richard seeks out companies that are well-positioned in the market, have strong competitive advantages, talented management teams and benefit from exposure to secular trends. Moreover, he tends to focus on companies that have strong bargaining power over customers and those that face minimal threats from new entrants or new products. These are the key components of fundamental analysis as outlined in Porter's five forces framework, the renowned textbook tool used by academics and corporate strategists for the past 45 years, as well as by Logan.

"You have the demand side factors, such as the exposure to megatrends like population growth, urbanization, emerging markets growth, and so forth, but, more importantly, you have supply side factors to consider, like industry consolidation, pricing power, barriers to entry, etc.," says Logan. "The strength of management team and stock valuation are also crucial factors that I look at closely."

Richard Logan
Research Analyst

"Sustainable growth is the key mantra for the Global Equity team."

—Richard Logan

This approach helps him identify companies relatively well-positioned with the characteristics needed to generate high returns and sustain growth over time. "I'm looking for companies that can grow somewhat independently of the economic environment with high underlying cash flow and a high return on capital employed," he explains. When it comes to industrial gas companies, one important way they can deliver sustained growth is through distribution density.

Distribution Density Leading to Wide Moats

Industrial gas is supplied in three ways: On-site, merchant delivery, or packaged delivery. These methods are used to reach a wide variety of businesses, from large, complex businesses to mom-and-pop retailers. These diversified end markets have added to the industry's resilient profits.

> "When the capital investment is $20 billion, the security of supply is critical. You can't afford to have an outage."

On-site distribution means that a supplier, such as Air Liquide or Nippon Sanso, will build an industrial gas plant next to a client's plant, or connect a client's plant to their gas network, which also connects other industrial gas production plants. The client could be a petroleum company, pharmaceutical manufacturer or a semiconductor fabrication plant, or "fab." Back-up liquified gas supplies are often included in case of power failures or required maintenance. The switching costs of on-site distribution are typically very high given the client's large, up-front capital investment to build the custom infrastructure. These agreements often result in long-term contracts—often 20 years or more—and contain take-or-pay clauses that ensure a level of revenue for the supplier, even when a customer requires little or no gas. They typically include price escalators and other special clauses that allow, for example, variable energy costs to be passed through to the customer. This risk-sharing arrangement benefits both parties. The supplier gains assurance that it can cover its high fixed costs and most of its variable costs, while the customer gains assurance of an uninterrupted supply, a critical consideration for a large refinery, for example, where production downtime can be extremely costly. Further decreasing customer price sensitivity is the fact that industrial gases normally constitute a relatively small cost for their businesses. While industrial gases typically account for less than 5% of a customer's operating costs, they are an essential input to production. At the end of the contract, the on-site market often has customer retention rates of over 95%, given that a plant is often already established on the customer site.

Merchant delivery involves suppliers transporting bulk liquified gas by truck to a customer's storage tank. Because transportation costs account for a large portion of this service and customers require timely deliveries, the delivery radius from a supplier facility is typically around 200 miles. This limitation often leads to regional leaders dominating local markets by fiercely protecting territories from new entrants. Here, too, take-or-pay contracts of three to seven years are often used to lock in customers and ensure consistent cash flows for gas suppliers.

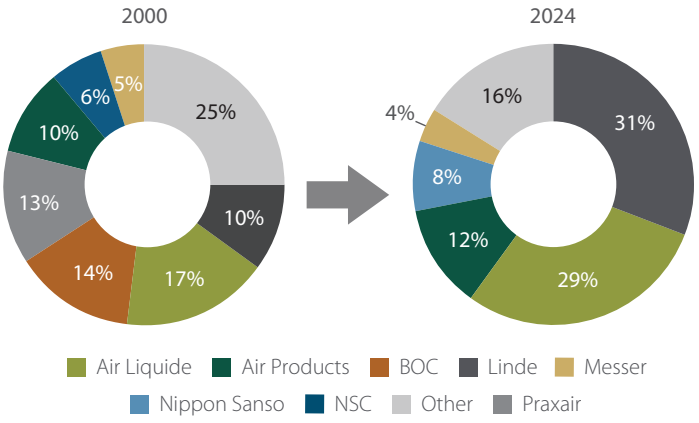
In packaged distribution, industrial gas suppliers ship compressed gas cylinders to small-volume users, such as those in welding, construction, food and beverage, and medicine. The cylinders are often distributed through independent middlemen.

Overall, distribution underlies the economics of the industry and is an important factor in influencing stock valuations. Increased density of industrial gas distribution in each of its forms leads to stronger return potential. The two leading firms, Linde and Air Liquide have built particularly strong regional distribution advantages over the years, which have lowered their costs and increased supply reliability and convenience for their customers.

Structural Advantages

According to Logan, another appealing aspect of industrial gas is its concentrated industry structure. Linde, Air Liquide, Air Products and Nippon Sanso account for over 80% of the global outsourced industrial gas market by revenues. In 2000, seven companies accounted for approximately 75% of revenues. Since then, companies began to make smart acquisitions including Linde's acquisition of BOC in 2006, Air Liquide's acquisition of Airgas in 2016, and, most notably, Linde and Praxair's merger of equals in 2018.

Exhibit 1: Moving Toward an Oligopoly



Source: BoAML and Redburn Atlantic, 2024.

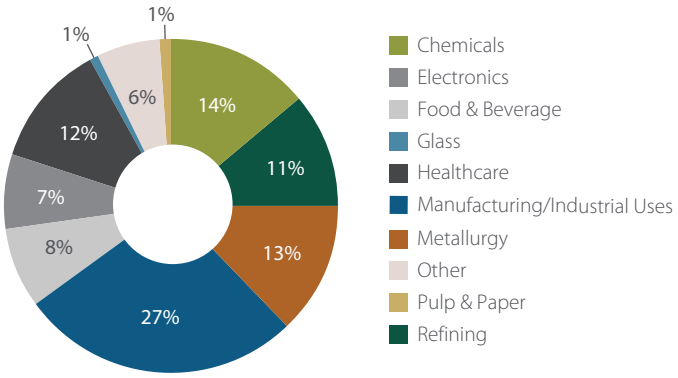
The resulting concentrated industry structure has enabled well-positioned companies like Air Liquide to raise prices when needed with minimal effects on sales volumes. Pricing power is a key component of protecting margins and delivering resilient earnings growth during inflationary times.

"The pricing we have seen in the industry over the last four or five years has really changed."

Exposure to Megatrends

On the demand side, industrial gas touches virtually all industries, making revenues durable.

Exhibit 2: Industrial Gas: An Essential Input Across Many End Markets



Source: Deutsche Bank, 2020.

Growth can be linked to several megatrends benefiting its widespread customer base: outsourcing, emerging markets industrialization, aging populations, decarbonization, and the rise of advanced electronics and digitization—particularly semiconductor fabs needed to support data center growth. These trends can provide secular tailwinds for the industry and add to stock resiliency.

Hydrogen's Multicolor Growth Story

Hydrogen is the most abundant element in the universe. It has been used in energy production since the mid-1800s. It is now coming into sharper focus as societies around the world look for cleaner alternatives to carbon-producing fossil fuels that lead to climate change, according to the large majority of climate scientists.

When burned, hydrogen does not produce carbon dioxide, only water vapor, making it an attractive replacement for fossil fuels. However, hydrogen is not found on its own but must be separated from other elements, which requires energy. In traditional gray hydrogen production, natural gas is used with a steam methane reformer, producing about 10 kg of CO_2 for every 1 kg of hydrogen. This production method represents 99% of all hydrogen produced today. However, new, cleaner methods have been developed. For example, blue hydrogen uses carbon capture utilization and sequestration (CCUS) to reduce CO_2 in the process and store it underground indefinitely. This method produces some carbon, but less than gray hydrogen. Green hydrogen, utilizing renewable forms of energy as feedstock (inputs), offers a completely carbon-free form of energy, both in the production and usage of it.

Exhibit 3: Methods of Hydrogen Production

HYDROGEN COLORS	DESCRIPTION
Gray	Using natural gas to produce hydrogen. CO_2 is the byproduct.
Blue	Producing gray hydrogen (above) then capturing CO_2 emissions and storing them underground. Emits some CO_2, depending on the process.
Green	Using renewable energy sources with electrolysis (an electrical current) to split atoms of water into oxygen and hydrogen. Carbon-free emission.

Within clean energy, Linde, Air Liquide and Air Products are currently in the driver's seat of the nascent hydrogen economy. Their offerings are supported by decades of experience in manufacturing and handling hydrogen as well as existing infrastructure such as pipeline networks. Richard estimates that of the current 5,000 km of hydrogen pipelines globally, Air Liquide owns and operates about 2,000 km, Air Products 1,300 km, and Linde 1,000 km. These companies not only provide large, complex clients with the efficiency, competency, and redundancy they require, but they are also able to leverage their proprietary infrastructure to help clients develop blue and green hydrogen, the forms of hydrogen most in demand. These vast pipeline networks, along with their expertise, are strong selling points for producers considering financing and building an in-house hydrogen operation from scratch. Included in this expertise is the ability to design and develop CCUS solutions. As mentioned above, these solutions are used in blue hydrogen production and can also be used more generally to reduce greenhouse gas emissions from other energy-intensive industrial facilities and power plants.

Another benefit of hydrogen is that it can be used to store and transport renewable energy sources, such as wind or solar energy, that are carbon-free but intermittent by nature. Converting green hydrogen (made from renewables) into ammonia enables energy to be stored in bulk for long periods under modest pressure or when refrigerated to -33°C. A distribution network currently exists in which ammonia can be stored in large, refrigerated tanks and transported around the world by pipes, road tankers, and ships. Once green ammonia reaches its destination, it can then be transformed back into hydrogen, available for use. In this way, an irregular but renewable source of energy can be stored and used when needed, solving a fundamental problem with renewables.

The Race for Clean Energy

The Hydrogen Council, a global CEO-led initiative to support the clean energy transition, predicts that hydrogen could eventually provide up to 20% of the world's energy and serve as a major component of the solution needed to reach net-zero climate goals.

Today, hydrogen is mainly used in refineries to remove sulfur from fuel to meet environmental regulations and in nitrogen-based fertilization production. Nevertheless, the demand for doing more with this most abundant element is building. To date, more than 1,500 hydrogen projects have been announced, representing $680 billion in investment globally. Many aim to use hydrogen more widely to decarbonize industries such as steel, trucking, maritime transport and aviation. Air Liquide predicts it will invest more than $9 billion in the low-carbon hydrogen value chain by 2035. At that point, hydrogen sales are expected to be three times higher than today. Recently, the company announced a $1.1 billion investment in two large-scale decarbonization projects with French energy giant Total, to reduce emissions at refineries in the Netherlands and Belgium. These initiatives are expected to eliminate up to 450,000 metric tons of CO_2 emissions annually—equivalent to taking 105,000 gas-powered cars off the road for a year. Similar decarbonization efforts are gaining momentum across industries, particularly in hard-to-abate sectors like oil and gas, steel, shipping and chemicals, which together account for up to 40% of global greenhouse gas emissions.

So, what does a hydrogen boom mean for an industry that already produces steady earnings growth and ample cash flow? "The scale of these projects is just getting bigger and bigger," Logan says, as awestruck as anyone about the dramatic shifts he has seen over the last few years.

According to the Hydrogen Council, $700 billion in global hydrogen investment is needed by 2030 to stay on track for meeting the Net Zero 2050 goal set out in the Paris Climate Agreement. And as more projects are funded, companies like Air Liquide will be able to leverage existing infrastructure and scale to further press their advantages over competitors. One only needs to look at other consolidating industries where the leaders control essential assets, benefit from economies of scale, and are experiencing secular growth to see where things may be headed (think: data centers).

While the future is never certain, one thing is clear: Share prices for these industry leaders have generally benefited from both the resilient pricing they have shown in their traditional business and the long-term opportunities they see in their future.

For more information: Visit www.artisanpartners.com

Investment Risks: International investments involve special risks, including currency fluctuation, lower liquidity, different accounting methods and economic and political systems, and higher transaction costs. These risks typically are greater in emerging markets. Securities of small- and medium-sized companies tend to have a shorter history of operations, be more volatile and less liquid and may have underperformed securities of large companies during some periods. Growth securities may underperform other asset types during a given period. These risks, among others, are further described in Artisan Partners Form ADV, which is available upon request. This is a marketing communication.

This summary represents the views of the portfolio managers as of 31 Dec 2024 and does not necessarily represent those of Artisan Partners. The views and opinions expressed are based on current market conditions, which will fluctuate, and those views are subject to change without notice. While the information contained herein is believed to be reliable, there is no guarantee to the accuracy or completeness of any statement in the discussion. Any forecasts contained herein are for illustrative purposes only and are not to be relied upon as advice or interpreted as a recommendation.

For the purpose of determining the strategy's holdings, securities of the same issuer are aggregated to determine the weight in the strategy. The holdings mentioned above comprised the following percentages of a representative account in the strategy's total net assets as of 31 Dec 2024: Artisan Non-U.S. Growth Strategy—Air Liquide SA 3.0% and Nippon Sanso Holdings Corp 1.2%. Artisan Global Equity Strategy—Air Liquide SA 1.7% and Nippon Sanso Holdings Corp 0.9%. Portfolio holdings are subject to change without notice and are not intended as recommendations of individual securities.

Unless otherwise indicated, the Artisan Strategy characteristics relate to that of an investment composite or a representative account managed within a composite. It is intended to provide a general illustration of the investment strategy and considerations used by Artisan Partners in managing that strategy. Individual accounts may differ, at times significantly, from the reference data shown due to varying account restrictions, fees and expenses, and since-inception time periods, among others. Where applicable, this information is supplemental to, and not to be construed with, a current or prospective client's investment account information.

This material is provided for informational purposes without regard to your particular investment needs. This material shall not be construed as investment or tax advice on which you may rely for your investment decisions. Investors should consult their financial and tax adviser before making investments in order to determine the appropriateness of any investment product discussed herein.

Porter's Five Forces model is used to develop an industry assessment for a company. This framework evaluates the structure of the company's industry by considering the nature of the competition, the balance of power between the company and its suppliers and customers and the elasticity of demand for the company's product versus substitutes. Each element is scored on a five-point scale (the higher being the better).

Artisan Partners Limited Partnership (APLP) is an investment adviser registered with the U.S. Securities and Exchange Commission (SEC). Artisan Partners UK LLP (APUK) is authorized and regulated by the Financial Conduct Authority and is a registered investment adviser with the SEC. APEL Financial Distribution Services Limited (AP Europe) is regulated by the Central Bank of Ireland. APLP, APUK, and AP Europe are collectively, with their parent company and affiliates, referred to as Artisan Partners herein.

Artisan Partners is not registered, authorized, or eligible for an exemption from registration in all jurisdictions. Therefore, services described herein may not be available in certain jurisdictions. This material does not constitute an offer or solicitation where such actions are not authorized or lawful. Further limitations on the availability of products or services described herein may be imposed.

This material is only intended for investors who meet qualifications as institutional investors as defined in the applicable jurisdiction where this material is received, which includes only *Professional Clients* or *Eligible Counterparties* as defined by the Markets in Financial Instruments Directive (MiFID) where this material is issued by APUK or AP Europe. This material is not for use by retail investors and may not be reproduced or distributed without Artisan Partners' permission.

In the United Kingdom, issued by Artisan Partners UK LLP, 25 St. James's St., Floor 10, London SW1A 1HA, registered in England and Wales (LLP No. OC351201). Registered office: Phoenix House, Floor 4, Station Hill, Reading Berkshire RG1 1NB. In Ireland, issued by Artisan Partners Europe, Fitzwilliam Hall, Fitzwilliam Pl, Ste. 202, Dublin 2, D02 T292. Registered office: 70 Sir John Rogerson's Quay, Dublin 2, D02 R296 (Company No. 637966).

Australia: This material is directed at wholesale clients only and is not intended for, or to be relied upon by, private individuals or retail investors. Artisan Partners Australia Pty Ltd is a representative of APLP (ARBN 153 777 292) and APUK (ARBN 603 522 649). APLP and APUK are respectively regulated under US and UK laws which differ from Australian laws and are exempt from the requirement to hold an Australian financial services license under the Australian Corporations Act 2001 with respect to financial services provided in Australia.

Canada: This material is distributed in Canada by APLP and/or Artisan Partners Distributors LLC, which conduct activities in Canada under exemptions from the dealer, portfolio manager and investment fund manager registration requirements of applicable Canadian securities laws. This material does not constitute an offer of services in circumstances where such exemptions are not available. APLP advisory services are available only to investors that qualify as "permitted clients" under applicable Canadian securities laws.

For Institutional Investors Only—Not for Onward Distribution

A R T I S A N  P A R T N E R S