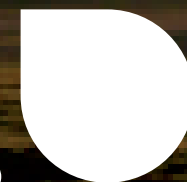


Airgas[®]

an Air Liquide company

CLIMATE OBJECTIVES

Taking Actions



in our company
with our customers
for our planet

Act responsibly

Industry plays a major role in meeting the challenge of climate change by developing new technologies and value chains for transitioning to a low-carbon footprint. At Airgas, we acknowledge our responsibility and have been working with Air Liquide Group to combine growth with respect for our environment.

[Airgas.com](https://www.airgas.com)

Airgas is taking action now for climate change

in our company



Reduce emissions from Airgas and contribute to Air Liquide's commitment targeting carbon neutrality by 2050, with key milestones in 2025⁽¹⁾ and 2035⁽²⁾

- Increasing the share of renewable electricity in our energy purchases
- Improving the energy efficiency of our production units
- Reducing the carbon footprint of our operations, assets and product transportation

(1) Reduce our carbon intensity by -30% in kg CO₂/€ EBITDA in 2025, compared to 2015

(2) Decrease our Scope 1 and 2 CO₂ emissions by -33% by 2035, compared to 2020

examples

- Increasing our renewable wind and solar electricity with Power Purchase Agreements (PPA)
- Automating and centralizing our operations allows us to optimize plant performance and our energy consumption, avoiding CO₂ emissions
- Converting our fleet of trucks to alternative fuels

with our customers



Act for a clean industry by developing low-carbon solutions

- Helping customers reduce their direct emissions
- Helping customer processes achieve better energy efficiency
- Providing gas and other products that have been produced and supplied using a lower carbon footprint

examples

- Reducing emissions with oxy-combustion solutions for metallurgy and glass industries
- Offering competitive and improved energy efficient on-site gas solutions like FLOXAL™
- Saving energy with ECO CHILLER by recycling the cold generated by vaporization
- Developing offers to limit transport-related emissions: optimal gas supply modes including bulk and new innovative cylinders, and supply chain solutions

for our planet



Contribute to the development of a new, low-carbon society, with an acceleration in hydrogen development

- Contributing to the decarbonization of industry ecosystems
- Developing a circular economy through biomethane production and usages, with Air Liquide
- Developing carbon-free hydrogen usages, for clean mobility, renewable energy storage and industrial processes, with Air Liquide

examples

- Promoting cryogenic products used for cold transportation
- Developing biomethane solutions, with production capacity now exceeding 1 TWh/year worldwide, with Air Liquide
- Designing and installing more than 120 hydrogen stations for clean mobility, worldwide by Air Liquide

BENEFITS | SUMMARY

Regulatory Compliance

Best Practices

Increased governmental regulation requires primary and secondary data recording and documentation that biological material has been stored at appropriate temperatures over time. Multiple level alarm systems, redundant data monitoring and recording are standard features of the Airgas Total System Integration.

Reduce Risk

Protect Your Work

Reduce the risk to your cryopreserved materials. The security of liquid nitrogen supply, the reliability of high-efficiency storage units, and the reassurance that critical data is monitored and recorded on redundant systems in real-time add up to the longest hold time in the industry.

Simplify

Low-Touch Systems

Airgas' low-touch systems allow your staff to better manage their time and resources. Systems are fully maintained and monitored by Airgas, allowing your staff to concentrate on their area of expertise.

Facility Management

Maximize Floor Space; Plan for Future Expansion

Each facility makes efficient use of expensive and essential laboratory floor space while allowing for system expansion to meet your storage needs over time. Single-source supply that can be located outside the laboratory and vacuum-insulated piping that delivers liquid nitrogen overhead to standardized large capacity storage units eliminate laboratory clutter from liquid cylinders and various styles and sizes of cryo-storage units.

Preventive Maintenance Proactive, Not Reactive

As part of the standard Airgas cryorepository offering, all preventive maintenance is included. As with all equipment, freezers require maintenance and calibration. Over time, parts wear and ice builds up. Regular maintenance and cleaning keeps systems operating efficiently and effectively.

Visual Appeal

Simple and Refined

Airgas facilities are efficient and elegant solutions. The detailed design and concise engineering are based on your vision. All major components are fabricated from high-grade stainless steel to exacting specifications.

Manage Costs

Turnkey Sale or Fixed Monthly Pricing

The Airgas solution is offered two ways: turnkey sale or a fixed monthly price. A turnkey sale is a one-time fixed fee which includes design, furnishing and installation of a complete cryorepository. The monthly price reflects the recurring cost of a reliable liquid nitrogen supply, the capital infrastructure cost of a high-tech facility and the on-going costs associated with continual real-time monitoring, preventative maintenance, and extended unconditional warranty. The contract is simple and flexible and allows the costs to be amortized over an extended period.

Ownership

Fixed Monthly Fee Option

Airgas retains ownership of the facility throughout the life of the contract and is responsible for system validation, periodic maintenance, and full service warranty on all components of the facility. Airgas capitalizes the cost of the engineering, procurement and installation of the high tech facility, and provides the liquid nitrogen in a single cost-efficient monthly payment. The costs associated with your storage will be known throughout the life of your cryorepository.

Discover how Airgas can engineer the right solution for you.

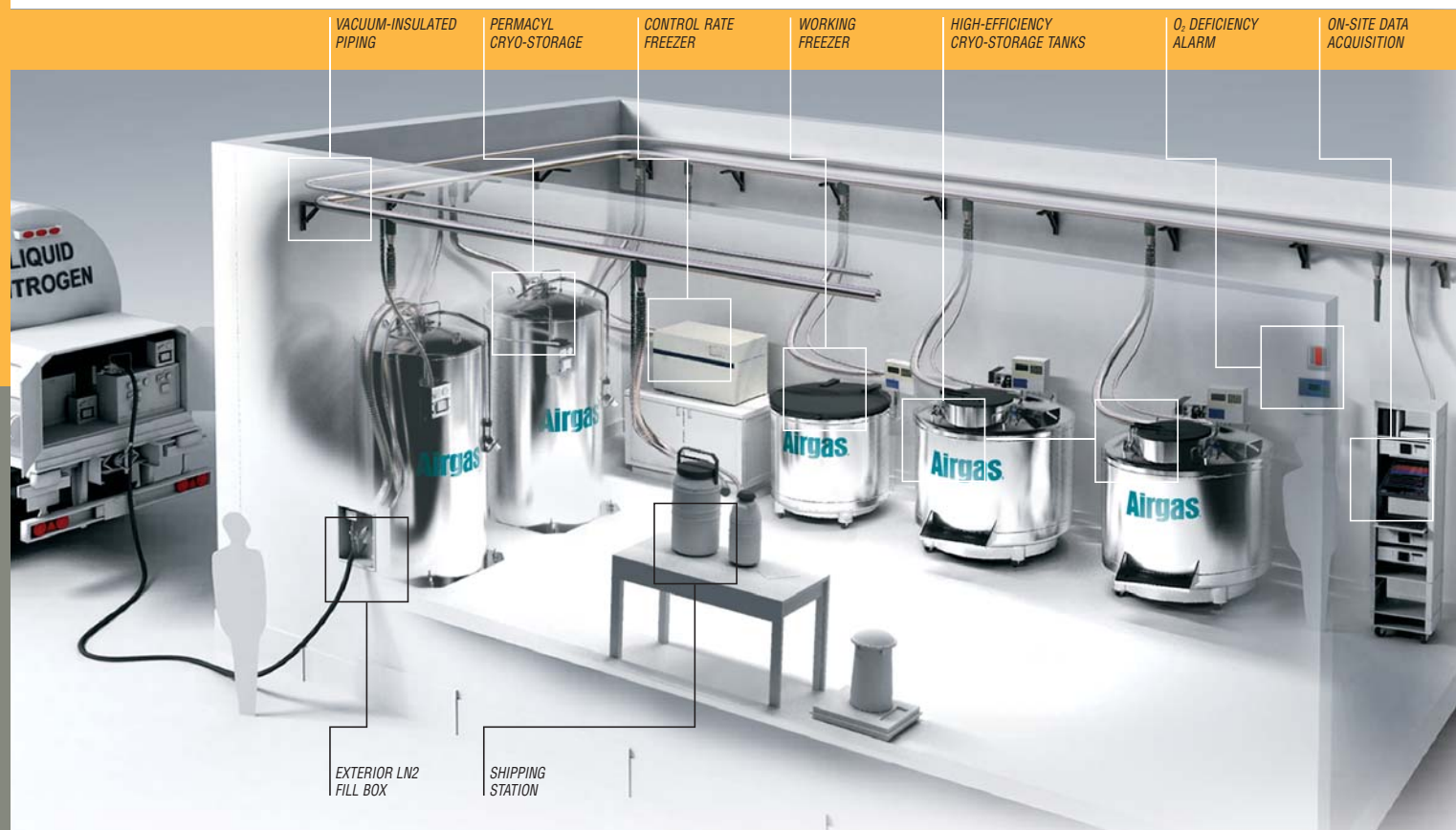
ENGINEERING THE RIGHT SOLUTIONS FOR LIFE SCIENCES



Turn-key cryogenic solutions for medical and biopharmaceutical research. You'll find it with Airgas.

From cryogenic storage systems and liquid nitrogen to vacuum-insulated piping and redundant monitoring and alarm systems, Airgas is the one source for advice and support for protecting irreplaceable biological and clinical samples.

COMPLETE | MONITORED | MAINTAINED | SYSTEM



CRYOGENIC | REPOSITORY SYSTEMS

- Custom Cryorepository Systems
- Turn-key Solutions
- Liquid Nitrogen Supply
- Expandable VIP Supply Lines
- Remote Monitoring and Data Logging

Total Integration Approach

Long-term, secure storage of biological materials is a critical challenge faced by institutions in the life science and health-care industries. All too often, storage requirements outgrow the capacity of the facility. Systems become a mixture of components that are difficult to maintain and validate. Building a new system demands large capital outlay and requires valuable personnel time to commission, operate and monitor the equipment.

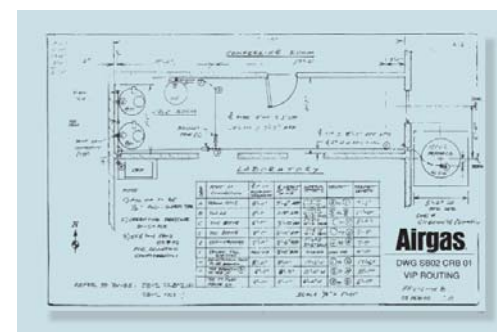
Airgas offers a proven and cost-effective solution: Total System Integration. From engineering and design through installation, maintenance, monitoring and validation, Airgas provides customers with technologically advanced on-site or off-site cryorepository facilities specifically tailored to both current and future storage requirements. You are assured of having a fully validated, state-of-the-art facility that has the potential to grow with your storage needs. Best of all, the facility is monitored on a 24/7 basis and all critical data, including storage temperature and liquid nitrogen levels are logged.

Protect your frozen assets.

In the event of a failure, long duration hold times and redundant backup systems are designed into the facility. The result of Airgas' Total System Integration is a solution that reduces risk and anxiety associated with the long-term storage of critical biological materials at cryogenic temperatures.

Total System Integration Includes:

- New facility planning, design and engineering
- Installation and commissioning of system
- Low-touch operation
- Validation
- Preventative maintenance and complete system warranty
- Automatic LN2 supply management
- 24/7 temperature monitoring and data logging
- Emergency response
- Total project financing (optional)
- Procedure and staff training



Custom floor plans are designed to maximize floor space utilization.

Data Collection & Facility Monitoring

Airgas facilities are monitored in real time and are displayed locally on-site and off-site. Liquid levels are monitored in the liquid nitrogen supply units and in the storage units. The temperature profile within the storage units are monitored on redundant and independent systems.

Cryogenics Data Flow Break-down

All vital data is collected, stored, and distributed via the Airgas central monitoring systems which consists of the following elements:

SENSORS:

- Cryo-storage unit controller
- Cryo unit independent thermocouple
- Liquid Nitrogen supply sensors
- Room oxygen level sensors

DATA COLLECTION & STORAGE

- CPU with visual basic software
- PC monitor with visual status report

- Uninterruptible power supply
 - Digital independent temperature display
 - Hard disc with tape backup for data storage
 - Print hard copy on site
- #### ALERTS & ALARMS
- See list to the right

Monitoring

Airgas cryorepositories are monitored in real-time and all data is stored automatically for audit purposes. System status displayed locally on-site. All vital signs are monitored on redundant and independent systems:

- Liquid nitrogen supply levels
- Cryo-storage unit temperatures (top and bottom)
- Cryo-storage unit liquid level
- Data is stored on-site
- Alerts are sent via pager, email, and telephone



Proves samples are kept cold.

Liquid Nitrogen Tanks

Storage tanks can be located either inside or outside the storage facility.

- Remote filling – reducing disruption to your facility and to lab personnel
- Airgas offers a range of vessels including small portable dewars to large storage systems
- Telemetry assures no product run-outs



Reduces staff hours spent on non-core activities.

High-Efficiency Cryo-storage Units

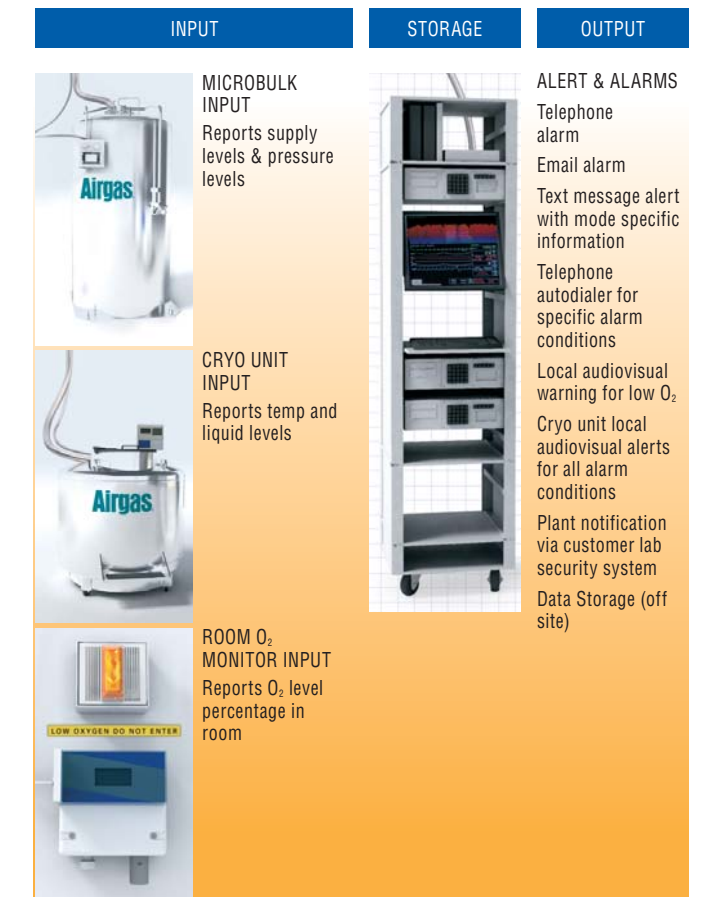
Highly efficient cryo-storage units maintain the best temperature profiles in the industry. Temperature probes at various levels constantly monitor all temperatures and feed data to the automatic fill system.

- High-capacity units free up expensive laboratory floor space for critical work
- High-efficiency design reduces consumption of liquid nitrogen
- Long hold time for increased protection of your assets



Preserves biological viability through long-term storage shelf life.

Maintain biological viability throughout long-term storage.



Vacuum-Insulated Piping

Vacuum insulated piping system is designed with extra drops and bayonets for easy expansion as the need arises.

- Multiple drops and bayonets permit uncomplicated facility expansion
- Low heat gain and low pressure drop design reduce liquid nitrogen usage
- Designed for overhead installation to eliminate the clutter of hoses
- Hot gas bypass valve is vented to the exterior through a stainless steel vent system



Eliminates the 'hodge podge' look and feel of homegrown systems.

Oxygen Deficiency Monitoring

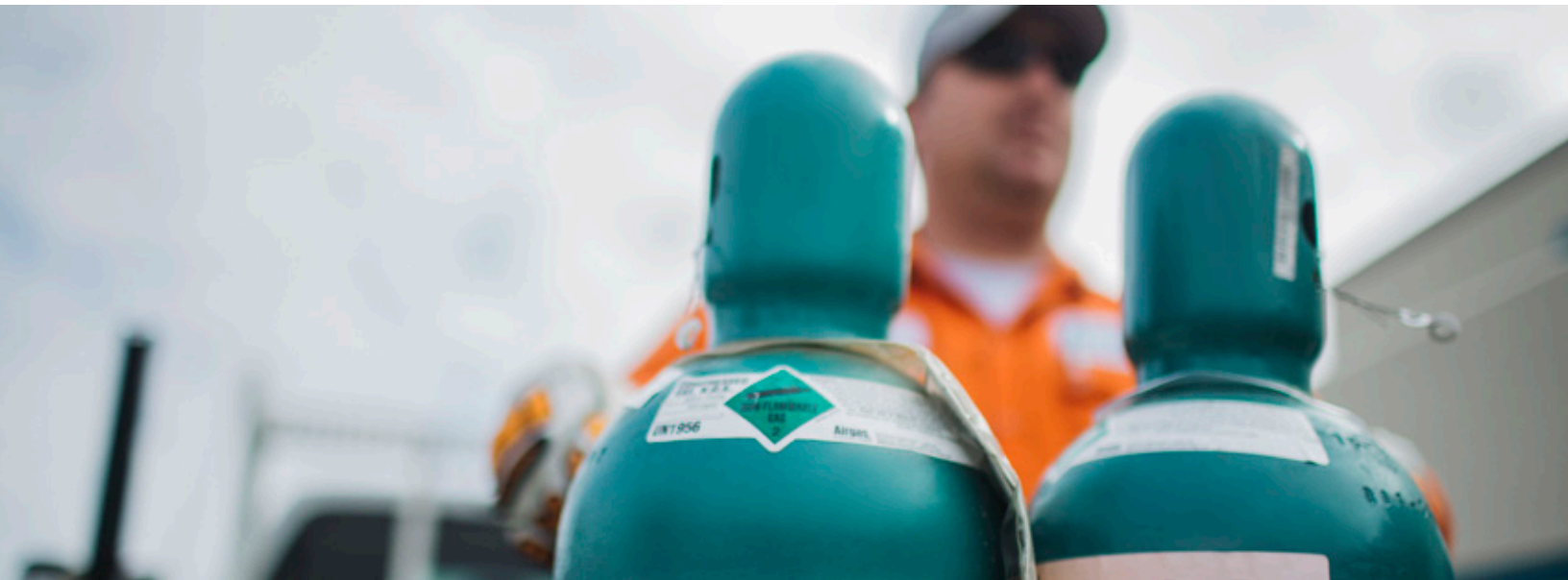
Nitrogen expands 696 times when it converts from a liquid to a gas. Displacement of room air poses a serious health and safety risk if not managed properly.

- All Airgas systems are designed with staff safety as the first priority
- Accurate oxygen deficiency monitors with local and remote audio visual alarms on all installations



Improves work place safety.

On spec. All the time. Specialty gases and equipment



- Guaranteed accuracy improves analytical measurements
- Consistent gas mixtures means no deviation, cylinder to cylinder
- Accredited laboratories throughout the US
- Provider of NIST SRMs used globally to benchmark measurements
- High-purity gas equipment safely delivers gas to your point of use

Whether you manage a single facility or multiple sites, you need gases that are accurate, on-spec and available when you require them. Airgas, an Air Liquide company, can help. We have the technical know-how and national presence to meet your requirements for high-purity pure gases, precise calibration mixtures and gas delivery equipment.

Tap into the industry's largest network of laboratories, fill plants and service locations nationwide, where meeting the highest standards for quality and production management is important to us because it's important to you.

Specialty gases

Innovative solutions keep you on spec, all the time

If high-performance gases are required as part of your demanding application and analytical accuracy is key, Airgas can help. You can count on this during blending with the latest analytical equipment and techniques, in specialty gas labs where most are ISO 9001 registered, eight are also ISO/IEC 17025 accredited, and one that is ISO 17043 proficiency testing accredited. Plus, our proprietary and automated high-tolerance specialty gas filling system AcuGrav®, that when combined with our precision laboratory automation, produces precise, quality gas mixtures. This means you are guaranteed the accuracy, consistency and reliability you need, every time.

- Ultra-high-purity (UHP) pure gases
- Ultra pure carrier (UPC) grade gases
- Research grades up to 99.9999%+ purity
- Pure and mixed hydrocarbons
- Refrigerants and halocarbons
- Process chemicals
- Medical device gases
- Electronic and semiconductor grade gases
- Laser gases including excimer gases
- EPA Protocols
- Bar gases and vehicle emissions standards
- HRVOC/VOC mixtures
- Calibration standards
- BTU reference
- Refinery gas
- Flare
- Total sulfur
- Stable isotopes
- Custom and liquid mixtures are available to suit any stringent requirements
- Multiple packaging options available based on your requirements



And equipment

State-of-the-art gas and cryogenic delivery systems and components ensure consistencies in analytical applications — these systems maintain your samples without worry, now and into the future.

Airgas provides complete gas and cryogenic delivery systems, or just the components, with unique features built into our regulators, changeover manifolds and other equipment that ensure gas purity all the way from the source to your point of use.

- Regulators (with check valve cylinder connections)
- Changeover manifolds, from simple to fully automatic PLC controls
- Indicating purifiers to let you know there are no issues
- Valves, including shut off, check, excess flow
- Custom gas delivery systems

More expertise is available

Keep these guides handy to help ensure you use your gas and cryogenic products safely and that your applications perform to their full potential. For more information, ask your Specialty Gas Specialist.

- Online specialty gas reference guide at AirgasSGcatalog.com
- Chromatographer's Guide to Gases and Gas Delivery Systems
- Guide to Gas Cabinet Safety and Code Conformance
- Architects and Engineers Systems Guide for Laboratory Gases and Cryogenics

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an Air Liquide company