

HONEYWELL **INTEGRATED** **LNG**

**COMPLETE LNG SOLUTIONS FROM
CONCEPT TO OPERATION**

Powering Success With Leading
Technology and Unparalleled Expertise



Honeywell

FUELING THE FUTURE OF LNG WITH A WORLD-CLASS, INTEGRATED OFFERING

THE IMPORTANCE OF LNG IN THE ENERGY INDUSTRY

Although the industry is just over 80 years old, liquefied natural gas (LNG) has rapidly transformed the global energy market. As the world continues to develop a renewables-based energy infrastructure, LNG serves as a lower-emission, cost-effective transition fuel, bridging the gap between today's energy needs and tomorrow's renewable future.

Based on current LNG demand and capacity forecasts, a gap of nearly 130+ million tons per year needs to be filled to meet global consumption by 2040.¹ Driven by a combination of this increased demand, along with changes to the U.S. administration and likely policy reforms, new liquefaction projects are expected to drive a 40% increase in global LNG production capacity between 2024-2028 alone.²

The LNG market has **quadrupled** over the past 20 years and is **expected to double** over the next two decades.²

STRENGTHENING HONEYWELL'S LNG OFFERING

Honeywell completed the acquisition of Air Products' LNG process technology and equipment business in 2024, enhancing our ability to deliver top-tier solutions for managing energy transformation. The acquisition adds nearly 475 new team members, world-class expertise, and state-of-the-art technologies, including the



Photo Courtesy: Hanas Group

industry-leading Port Manatee, Florida coil-wound heat exchangers (CWHE) manufacturing facility, to create one comprehensive LNG offering.

THE BENEFITS OF SEAMLESS, END-TO-END INTEGRATION

Honeywell's integrated Liquefied Natural Gas (LNG) solutions are designed to empower users with the tools they need for success in a dynamic energy market. Honeywell ensures that operations can adapt to future challenges while minimizing costs and maximizing performance. The key benefits of Honeywell's Integrated LNG Solutions include:

- **Enhanced Efficiency:** Streamlined supply chains and unified digital ecosystems simplify operations.
- **Predictable Outcomes:** Improved price and schedule certainty reduce execution risks.

- **Bankability:**

A proven track helps secure funding, while a single point of accountability for all process technologies can provide smooth, streamlined project delivery.

- **Increased Reliability:**

Technology with over 99% operational reliability in liquefaction and predictive maintenance to prevent failures.

- **Rapid ROI:**

Accelerated start-ups, optimized energy use, and reduced project execution times enhance financial returns..

- **Comprehensive Support:**

Robust aftermarket services, including operator training and skill development, ensure ongoing operational excellence.

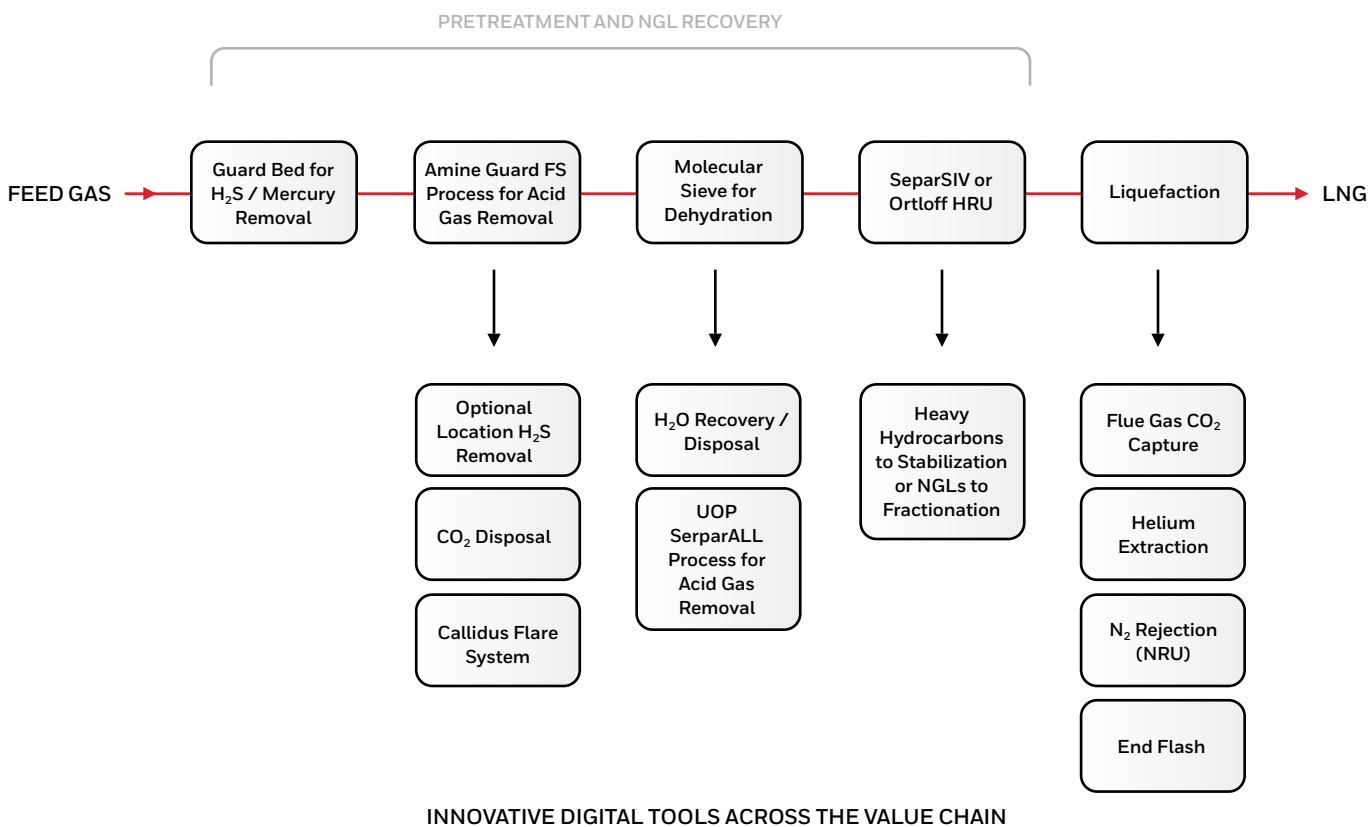
- **Future-Proof Solutions:**

Modular and adaptable offerings evolve with energy market demands for sustained competitiveness.

¹Wood Mackenzie Global Gas Service ²Institute for Energy Economics & Financial Analysis

OUR COMPREHENSIVE LNG SOLUTION

Honeywell's robust portfolio of industry-leading process technologies and advanced digital tools offers a single point of accountability, and ensures seamless execution across pretreatment, NGL recovery, and liquefaction. For customers who are not seeking a fully integrated solution, Honeywell will continue to supply individual technologies per customers preferences.



PRETREATMENT EXCELLENCE

MAXIMIZING RETURN ON INVESTMENT WITH UOP CONTAMINANT REMOVAL

UOP's broad range of LNG pretreatment solutions remove impurities, including mercury, acid gas, water, and heavy hydrocarbons from natural gas streams. By removing these harmful contaminants upstream of the liquefaction processes, plants can run with fewer upsets for longer intervals, adding to bottom-line performance. Depending on end user preference, UOP processes can be delivered as licensed technologies or modular units.

UOP LNG pretreatment processes and equipment have been successfully

As of 2025, Honeywell UOP process technologies are used to pretreat about **40% of the world's LNG**.

deployed both offshore and onshore, including in baseload, mid-scale, small-scale and floating LNG (FLNG) operations. UOP Ortloff process plants for natural gas liquid (NGL), liquefied petroleum gas (LPG) recovery and LNG are recognized world-wide as industry-leading cryogenic processes for gas liquids recovery.



CONTAMINANTS	REMOVAL TECHNOLOGY
Mercury	<ul style="list-style-type: none"> • Non-Regenerable Guard Bed Adsorbents: High capacity, lowers costs, and extends equipment life. • Regenerable HgSIV™ Molecular Sieves: Simultaneously removes mercury and water with clean gas regeneration.
Acid Gas	<ul style="list-style-type: none"> • UOP Amine Guard™ FS: Customizable CO₂ and H₂S removal solution, ensuring compliance with specifications. • SeparALL™: Next-gen sulfur and acid gas separation technology with minimized environmental impact.
Dehydration	<ul style="list-style-type: none"> • UOP MOLSIV™ Adsorbents: Trusted by 70% of LNG plants worldwide for superior water removal.
Heavy Hydrocarbons	<ul style="list-style-type: none"> • SeparSIV™: Innovative C5+ removal technology with minimal pressure drop. • Ortloff NGL Recovery Process: Integrates NGL and LNG production to recover valuable byproducts.

MAXIMIZING VALUE WITH ADVANCED NGL RECOVERY

Our advanced NGL recovery technologies maximize hydrocarbon capture, optimize energy use, by integrating with LNG operations. Honeywell UOP's **Ortloff® NGL Recovery Process** combines NGL recovery with LNG production to reduce capital and operational costs, such as up to a 20% reduction in power made possible by incorporating both processes together. Similarly, our innovative **SeparSIV™ Technology** serves as an adaptable, cost-effective C5+ recovery solution with reduced lifecycle costs.

COMPREHENSIVE LNG SOLUTIONS FROM AN EXPERT YOU CAN TRUST

Honeywell UOP provides adaptable and reliable solutions pretreatment that can be customized to help you meet your LNG needs. Our decades of experience in gas processing and LNG technologies, coupled with end-to-end comprehensive support, helps to minimize risks and maintain sustainable operations from installation to ongoing plant operations.



REVOLUTIONIZING LNG LIQUEFACTION

TRANSFORMING LIQUEFACTION WITH PROVEN EXPERTISE

Honeywell LNG's advanced liquefaction solutions deliver reliable, efficient, and scalable process technologies supporting global energy demands and environmental goals. With over 50 years of experience in liquefaction process design, a proven track record of meeting project schedules, and innovative proprietary equipment designed to reduce emissions, Honeywell offers world-class, customizable solutions for any-sized LNG facility.

Honeywell's liquefaction process technologies boast a **100% performance test success rate** and operational reliability exceeding **99% as of 2025**.

SMALL-SCALE LNG SOLUTIONS

Our small-scale LNG offerings range from 60 to 800+ TPD. Honeywell's scalable AP-N™ and AP-C1™ processes are often ideal for peak shaving, mining fuel, bio-LNG, and shipboard boil-off gas (BOG) reliquefaction, and offer flexibility for higher-capacities if needed.

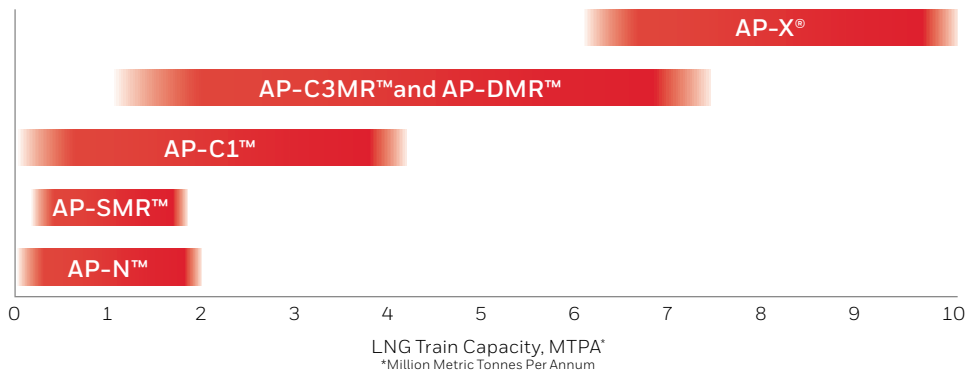
MID-SCALE LNG SOLUTIONS

Our mid-scale LNG solutions offer a balanced approach, providing capacities from 0.25–2.0 MTPA. Harnessing a comprehensive suite of highly-reliable process technologies, our mid-scale solutions are designed to deliver superior efficiency, durability and scalability.

LARGE & MEGA-SCALE LNG SOLUTIONS

Our large-scale LNG solutions support capacities from 2.0 to 10.0 MTPA,

Honeywell's Advanced Liquefaction Process Options



LNG Process	Relative Efficiency
AP-X®	100
AP-C3MR™	100
AP-DMR™	100
AP-SMR™	88 - 92
AP-C1™	80 - 85
AP-N™	70 - 75

delivering, maximum efficiency, to meet growing global energy needs while reducing greenhouse gas emissions. With the majority of the world's large-scale LNG facilities already operating on Honeywell's innovative AP-DMR™, AP-C3MR™, and AP-X® processes, our proprietary solutions continue to lead the industry.

tested to meet the unique demands of offshore FLNG facilities. We offer a breadth of customizable solutions to ensure adaptability to offshore and environmental constraints, coupled with durable, proprietary equipment to provide high thermal efficiency even during challenging conditions at sea.

OFFSHORE LNG SOLUTIONS

Our floating LNG (FLNG) capabilities provide compact, reliable, and efficient liquefaction process technologies specifically developed and rigorously





HIGH-PERFORMANCE HEAT EXCHANGERS FOR LNG LIQUEFACTION

Honeywell's coil-wound heat exchanger (CWHE) and process technology deliver exceptional efficiency, flexibility, and reliability for onshore and offshore LNG applications.

SAFETY: Dual containment enables operation until the next major turnaround in the event of a tube leak.

RELIABILITY: High resistance to thermal stress and low probability of plugging for high reliability and long equipment life.

FLEXIBILITY: Small footprint with only one or two exchangers needed per train.

MODULARIZED SOLUTIONS FOR ANY-SIZED LNG FACILITY

Honeywell's modularized Coil-Wound Exchanger offer a wide range of scalable and tailored solutions for any-sized operation—including pre-dressed platforms and skid-mounted modules. These solutions simplify construction, can help reduce CAPEX, and accelerate installation timelines, no matter how large the project may be.

YOUR EFFICIENT AND SUSTAINABLE LIQUEFACTION EXPERTS

In total, Honeywell's integrated approach to LNG liquefaction combines decades of expertise, advanced process technologies, and modularized solutions to help operators, improve efficiency, and enhance reliability. All while helping to stay aligned with your environmental goals.

DIGITAL SOLUTIONS

DIGITAL SOLUTIONS EMPOWERING LNG SUCCESS

SHAPING THE FUTURE OF LNG WITH DIGITAL INNOVATION

Powered by decades of technology know how and domain expertise, Honeywell's integrated digital and process solutions are transforming the LNG space with technologies that assist in minimizing costs, optimize efficiency, and enhance safety. With a comprehensive portfolio, our solutions address a range of challenges across the entire LNG value chain, from automation to predictive analytics.

Honeywell Process Solutions' automation portfolio powers over 110 liquefaction trains worldwide, with 97 utilizing Honeywell LNG technology as of 2025.

HONEYWELL FORGE®: UNLOCKING LNG POTENTIAL WITH PREDICTIVE INSIGHTS

The Honeywell Forge platform uses advanced predictive analytics to optimize LNG operations and enable better decision-making. Through real-time monitoring and proactive maintenance, Forge can detect and help to mitigate potential failures early, that can reduce downtime and contribute to extend asset lifespans. By combining disparate systems into a unified platform, Forge provides operators the actionable, date-driven insights they need to reduce operational costs, enhance reliability, and improve safety. Through high-fidelity training simulators alone, Forge is able to reduce operator-related incidents by 40%, according to internally compiled data.

SEAMLESS LNG AUTOMATION WITH MAC EXPERTISE

Honeywell's Main Automation Contractor (MAC) services combine advanced automation technologies with expert integration to reduce capital project risks, accelerate timelines, and maximize LNG plant production across the entire lifecycle. Over 300 successful MAC projects have been delivered globally, reducing project timelines by up to 25% and costs by 30% with Lean Execution of Automation Projects (Honeywell LEAP®) technology. Improvements in reliability and increased production have been achieved with solutions such as AP-AutoCool™ and Enhanced Control Schemes; which can be integrated as part of Honeywell's ICSS offering for LNG.

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HONEYWELL FORGE® CYBERSECURITY: CYBER INSIGHTS

This on-premises OT solution is designed to provide an organization access to near real-time data on identified threats, anomalous behavior and vulnerabilities to help organizations reduce and manage cybersecurity risks at an individual site.

To further accelerate LNG project implementation and operations, Honeywell's Experion® Solution Suites (ESS) offers pre-configured templates for control and safety schemes, which operators can easily integrate into our Experion® PKS platform.

HONEYWELL-CCC: UNMATCHED LNG CONTROL AND OPTIMIZATION

Our standardized software, with license specific features work seamlessly with the liquefaction process, constantly monitor and refine processes, using diagnostic insights to help recommend changes and time-proven knowledge to de-risk operations. With its placement on over 110 LNG trains globally, Honeywell-CCC has a deep understanding of the real-world challenges facing LNG operators and how to meet those challenges.

YOUR LEADERS IN DIGITAL LNG INNOVATION

Honeywell's innovative digital solutions are redefining the LNG ecosystem with scalable technologies that optimize efficiency, safety, and sustainability. From analytics, automation, and connectivity, our expertise ensures seamless implementation and sustained performance improvements, so that operators can confidently navigate the future of LNG.

QATARGAS STUDY: ADVANCING LNG EFFICIENCY AND PERFORMANCE

The Project

The Advanced Process Control System (APC) project for Qatargas involved the integration of advanced controllers and real-time performance optimization technology into their LNG train operations. Honeywell deployed 19 Profit Controllers managed by a centralized Profit Optimizer, coordinating all LNG trains for maximum production.

The Results

The project resulted in measurable efficiency gains and sustainable operations for Qatargas, achieving over a **3.6% increase** in production and a **5% reduction** in steam consumption, along with a **4.2% reduction** in fuel gas usage.



BY YOUR SIDE FROM CONCEPT TO SUCCESS

SHAPING THE FUTURE OF LNG TOGETHER

Fueled by over 50 years of expertise, Honeywell's integrated LNG portfolio unites advanced technologies and innovative digital solutions that streamline operations, maximize value, and drive growth for LNG operators worldwide. From pretreatment, NGL recovery, liquefaction, to advanced process optimization, we deliver tailored solutions that can adapt to any challenge. It's why so many operators

around the world have chosen Honeywell as their LNG experts. Our industry-leading technology and aftermarket support is currently utilized for pretreating about 40% of the world's natural gas, and liquifying a majority of the world's LNG. The choice is clear—whether you require seamless integration or end-to-end lifecycle support, Honeywell provides the expertise and solutions needed to fuel success.



For more information

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**THE
FUTURE
IS
WHAT
WE
MAKE IT**

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