

# JTurbo Engineering and Technology

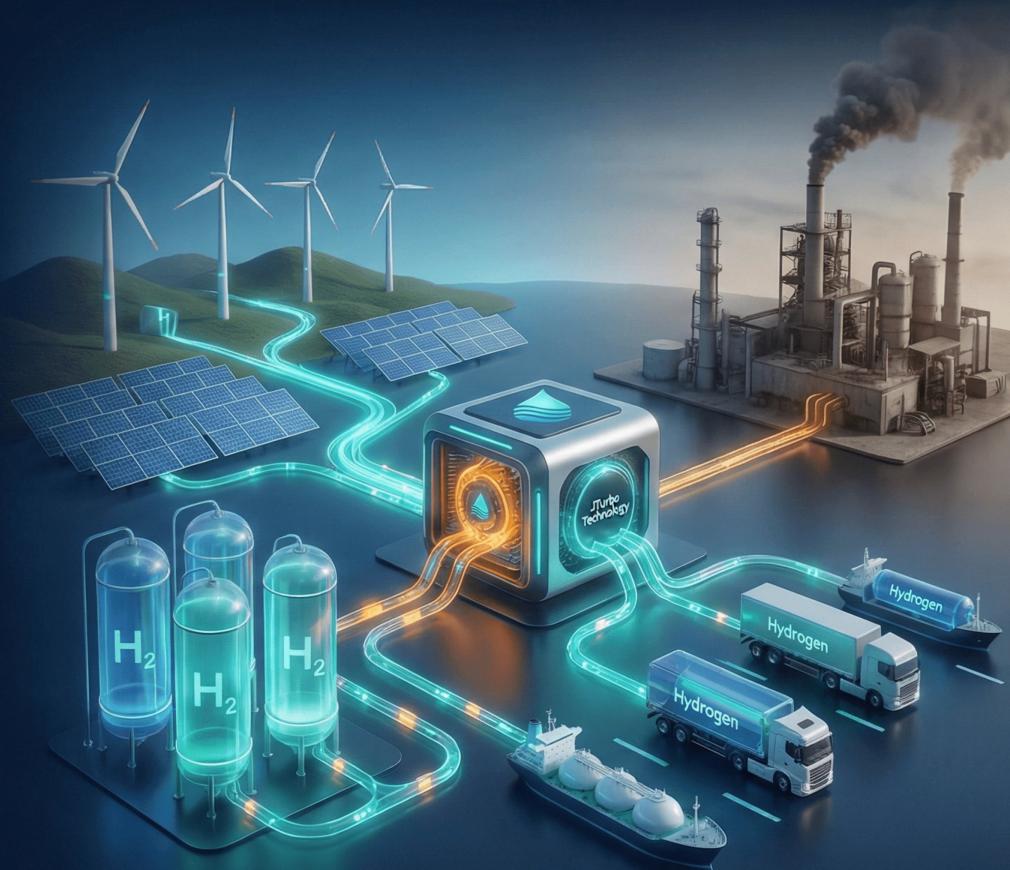
Pioneering the Future of  
Hydrogen & LNG Liquefaction

World's Most Energy-Efficient  
Liquefaction Technology



# Global Decarbonization Requires Next-Generation Liquefaction Solutions

- **Green hydrogen** is essential for decarbonizing heavy industry, transportation, and energy storage.
- Current liquefaction technologies are inefficient (11+ kWh/kg) and costly.
- Renewable energy intermittency demands efficient storage solutions.
- **JTurbo Advantage:** Patented technology achieves **50% lower energy consumption** than industry standards.

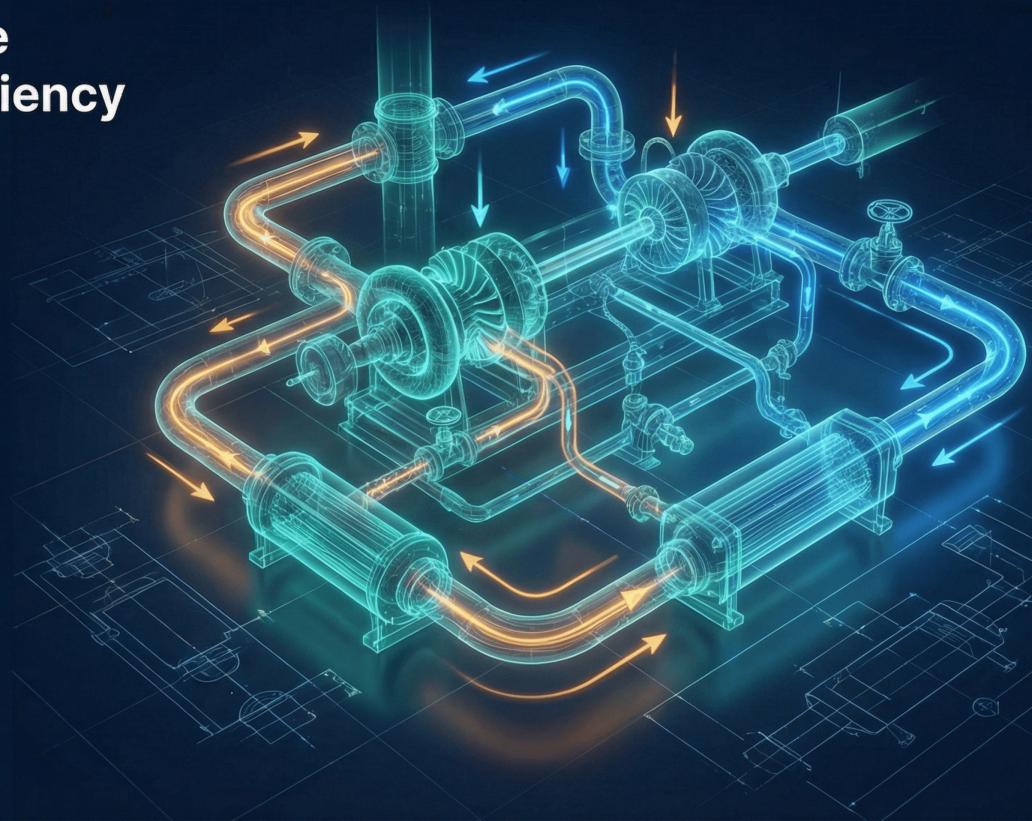


# JTurbo's Proprietary Twin Turbo Expander Technology



## Patented Reverse-Brayton Cycle Achieves Industry-Leading Efficiency

- **2 US Patents:** US 11,391,511 B1 (Hydrogen) & US 12,181,214 (LNG)
- **Twin Expander Design:** Maximizes thermodynamic efficiency through dual-stage expansion
- **Reverse-Brayton Cycle:** Proven foundation with innovative enhancements
- **Flexible Refrigerants:** Nitrogen, Hydrogen, Helium, or Neon mixtures



# Hydrogen Liquefaction Performance That Redefines the Industry

**50% Lower Energy Consumption & 50% Lower Capital Cost**



Enabling large-scale hydrogen liquefaction (50-150 TPD) at competitive costs.

# LNG Liquefaction Excellence for Modular and Offshore Applications

**Safe, Efficient, and Scalable  
LNG Solutions (50 - 3,000 TPD)**

-  **Efficiency:** 300 kWh/ton LNG (Industry best)
-  **Safety:** Pure Nitrogen Refrigerant (Non-flammable)
-  **CAPEX:** ~\$400/ton LNG capacity (50% savings)
-  **Applications:** FLNG, Bio-LNG, Modular Plants



# The Four-Stage Hydrogen Liquefaction Process

Proven Process Architecture with Industry-Leading Components



## Stage 1: H<sub>2</sub> Pre-Cooling



## Stage 1: H<sub>2</sub> Pre-Cooling

N<sub>2</sub> Refrigerant  
Reverse-Brayton Cycle  
Twin Expander

## Stage 2: H<sub>2</sub> Purification



## Stage 2: H<sub>2</sub> Purification

Cryogenic Adsorption  
High-Purity Output

## Stage 3: H<sub>2</sub> Liquefaction



## Stage 3: H<sub>2</sub> Liquefaction

H<sub>2</sub> Refrigerant  
Reverse-Brayton Cycle  
Cooling to -253°C

## Stage 4: Liquid H<sub>2</sub> Storage



## Stage 4: Liquid H<sub>2</sub> Storage

Vacuum Insulated  
Spheres  
Minimal Boil-off

# Liquid Hydrogen as the Ultimate Energy Buffer

Solving Renewable Energy Intermittency with Efficient Storage



## Key Concepts



- **Challenge**

Solar & Wind are intermittent;  
Grid limitations restrict  
continuous production.



- **Solution**

Liquefy & Store H<sub>2</sub> during peak  
production -> Use when  
renewable energy is unavailable.



- **Efficiency**

Recover cold energy from LH<sub>2</sub>  
vaporization to produce LN<sub>2</sub> for  
precooling.



- **Impact**

No loss of cold energy = Lower  
OPEX & Cost-effective Storage.

## Energy Ecosystem



Global Reach and Proven Market Demand

# Serving Clean Energy Projects Across Six Continents

## KEY APPLICATIONS

- ⚡ Green Hydrogen Liquefaction
- ⚡ Green Ammonia Production
- ⚡ Industrial Decarbonization
- ⚡ LNG & Bio-LNG



# Partnership and Execution Model

Technology Licensing with World-Class Engineering Delivery





# Contact JT Turbo

## Let's Build the Future of Clean Energy Together

### Company Details

JTurbo Engineering and Technology LLC  
Location: Houston, Texas, U.S.A.

### Contact Information

-  Jacob Thomas - Principal
-  Office: +1. 713.838.2375
-  Mobile: +1. 281.851.9598
-  Email: [JThomas@JT Turbo.com](mailto:JThomas@JT Turbo.com) | [Info@JT Turbo.com](mailto:Info@JT Turbo.com)
-  Website: [www.JTurbo.com](http://www.JTurbo.com)