

SPECIAL REPORT: **HYDROGEN PROPULSION ALTERNATIVE FUELS**

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Advances in Hydrogen Propulsion

Integrating Certified Polymers and Hybrid Technologies for Hydrogen Propulsion in the Energy Sector.

The global shift toward sustainable energy is making hydrogen propulsion a key player. Advances in certified polymers for carbon capture and storage, along with hybrid technologies, are driving this change. This article highlights how these innovations are shaping hydrogen propulsion and their significant impact on energy and aviation.

Certified Polymers for Carbon Capture and Storage

Omniseal Solutions has pioneered high-performance polymer seals tailored for CCS applications, addressing the pressing need for efficient carbon dioxide capture and storage. These materials are engineered to withstand the extreme conditions typical of CCS systems, ensuring long-term reliability and operational efficiency.

Thermal Stability and Chemical Resistance:

- The polymer seals shows exceptional stability at high temperatures, critical for maintaining performance in demanding CCS environments.
- They boast high chemical resistance, essential for withstanding corrosive gases encountered during carbon capture processes.

Sealing Solutions:

- Advanced sealing solutions minimize leakage, enhancing the effectiveness and efficiency of carbon capture operations.
- Reduced maintenance requirements contribute to lower operational costs and enhanced system reliability.

100% CO₂ Certification:

- Certified for superior CO₂ capture capabilities, these polymers comply with stringent environmental standards, supporting large-scale CCS deployment.



Rulon® polymers available in customized formulations and shapes



Omniseal® Lip seals ensure compact design, high-speed sealing, and exceptional durability with a tough, long-wearing jacket material for superior wear resistance.

- Their certification underscores their pivotal role in global efforts to combat climate change.

Hydrogen Propulsion Technologies

Hydrogen propulsion is revolutionizing the energy sector by offering a clean, efficient, and sustainable alternative to traditional fossil fuels. Hybrid technologies, incorporating hydrogen fuel cells and advanced energy systems, are central to this transformation.

Hydrogen Fuel Cells:

- Hydrogen fuel cells generate electricity by combining hydrogen and oxygen, producing water as the only byproduct.
- This clean energy source significantly reduces carbon emissions and can be utilized in various energy applications, from power generation to industrial processes.

Hydrogen Electrolyzers:

- Hydrogen electrolyzers produce hydrogen by splitting water into hydrogen and oxygen using electricity, supporting the production of green hydrogen when powered by renewable sources.
- This process is integral to establishing a sustainable hydrogen supply chain for energy markets.

Transportation:

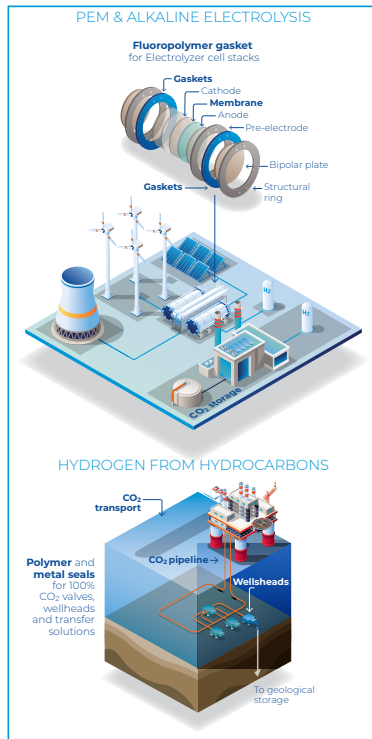
- While the focus here is on the energy sector, hydrogen propulsion is also transforming transportation, including aviation, by providing a sustainable alternative to conventional fuels.
- The integration of hydrogen in transportation infrastructure supports a holistic approach to reducing emissions across multiple sectors.
- High-performance polymers and seal solutions ensure the safe and efficient operation of hydrogen-powered industrial systems.

Advanced Materials and

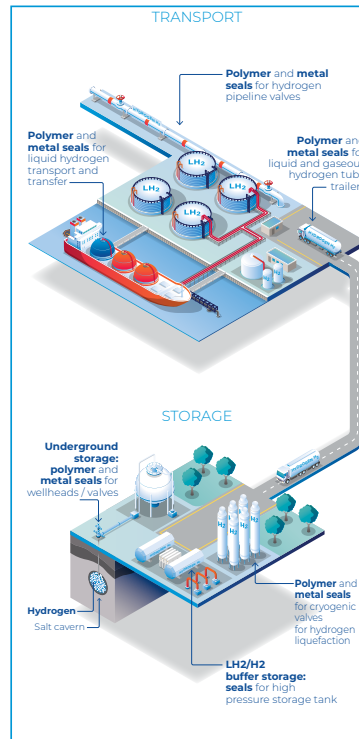
Sealing Solutions:

- Lightweight composite materials and specialized sealing solutions enhance the efficiency and durability of hydrogen propulsion systems.
- These advancements ensure safe and reliable hydrogen storage and transport, critical for widespread adoption.

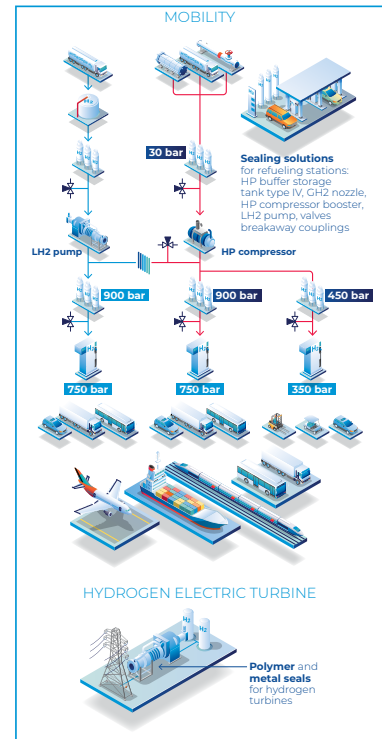
PRODUCTION



TRANSPORT & STORAGE



APPLICATIONS



Discover Omniseal Solutions innovative sealing technologies for hydrogen energy applications, ensuring reliability, efficiency, and sustainability in the energy sector.

Enhancing Carbon Capture and Emission Reduction

The integration of certified polymers for carbon capture and storage (CCS) with hybrid hydrogen propulsion technologies represents a comprehensive approach to advancing sustainable energy solutions. This synergy significantly impacts the energy and aviation sectors, aligning with global sustainability goals.

Omniseal Solutions provides advanced sealing solutions for hydrogen electrolyzers, ensuring efficiency and reliability under high pressures and temperatures. Developing robust infrastructure for hydrogen storage and transport, such as pipelines and refueling stations, is crucial. Hydrogen's versatility benefits industries like steel manufacturing and chemical production, reducing their carbon footprints. Omniseal

Solutions' polymer seals offer exceptional mechanical strength, chemical resistance, and reliability in both cryogenic and high-temperature environments, making them ideal for demanding applications.

High-performance polymers for CCS ensure safe and efficient hydrogen storage and transport, capturing and storing CO₂ emissions while hydrogen propulsion systems use clean hydrogen to minimize the energy sector's carbon footprint. Advanced sealing solutions and custom-built components are critical for maintaining operational integrity and efficiency, making Omniseal Solutions' offerings vital for sustainable hydrogen energy systems. These innovations enhance material performance and energy efficiency, supporting hydrogen propulsion adoption and emission reduction goals.

This article was written by Clara Souève, Digital Content Strategist, Omniseal Solutions (Paris, France).

- For a deeper dive into how Omniseal Solutions is revolutionizing the hydrogen industry with advanced sealing technologies, download our comprehensive handbook. [Download the Handbook Here](#)
- Explore our case study to see how Omniseal Solutions 100% CO₂ certified polymers are transforming carbon capture and storage with enhanced performance and sustainability. [Read the Case Study](#)
- Discover how Omniseal Solutions innovative generator seals are advancing hybrid engine technology for aircraft, enhancing efficiency and reliability. [Read the Case Study](#)