

Hydrogen

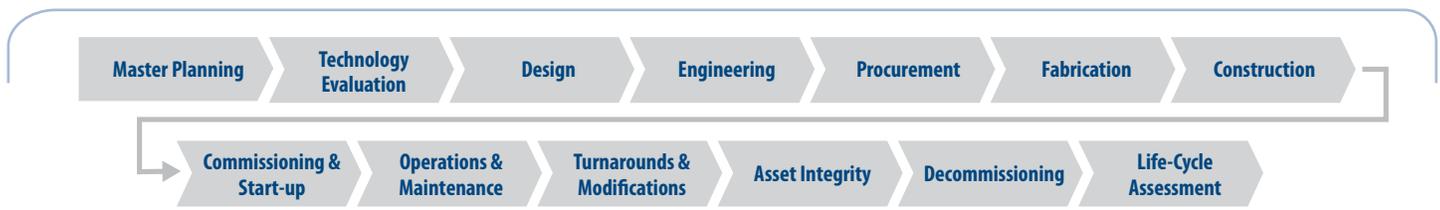
Hydrogen will play a significant role in the Energy Transition. As hydrocarbon fuels become a smaller part of the world's energy mix, hydrogen can be used to store and transport the energy our economies need to function.

Combining Fluor's experience in hydrogen-production systems, carbon capture, system integration, and supporting systems design results in solutions that address our clients' Energy Transition goals with cost and schedule surety.

Master Planning

Through our master planning service, Fluor applies our market and financial analysis with our expertise in industrial, infrastructure, and urban business segments to help clients attract investors and realize their goals. Master planning in the hydrogen economy yields **higher productivity and project competitiveness**, taking into account changing markets and investor strategies so clients can readily adapt to the Energy Transition.

From concept to completion, Fluor provides fit-for-purpose project solutions to help countries, regions, and companies enhance their future competitiveness.



Beginning with master planning, Fluor can perform all aspects of hydrogen project execution.

Hydrogen Life Cycle

ENERGY SOURCE	PRODUCTION	STORAGE	TRANSPORT	USERS
GREEN H₂ Renewable Wastes ▶ Agriculture ▶ Municipal/Domestic ▶ Industrial Wind Solar	Biomass Process ▶ Biological ▶ Thermochemical Water Splitting ▶ Thermolysis ▶ Photolysis ▶ Electrolysis	Physical ▶ Compressed H ₂ – Bullets/Spheres – Caverns ▶ Cryo-compressed H ₂ ▶ Liquefied ▶ Slush Material-Based ▶ Metal Hydrides ▶ Liquid Organic H ₂ Carriers (LOHCs) ▶ Sorbents (MOFs, zeolites, nanotubes) ▶ Chemical (Ammonia)	Pipeline ▶ Blended ▶ Dedicated Truck ▶ Compressed Cylinders ▶ Liquid Tankers Barge/Ship	Industry ▶ Refinery Reactant (e.g., hydrocracker, desulfurization) ▶ Chemical Reactant (e.g., ammonia & methanol) ▶ Synthetic Fuels (e.g., Fischer-Tropsch diesel/ jet/naphtha) ▶ Iron & Steel (e.g., direct iron reduction) ▶ Industrial Heat (e.g., burners, boilers, furnaces) Power (e.g., fuel cells, gas turbines) Transportation Fuels/ Filling Stations ▶ Light Duty ▶ Heavy Duty Residential Heating
GREY H₂ Fossil Sources ▶ Oil ▶ Gas ▶ Coal	Hydrocarbon Reforming ▶ Steam Reforming ▶ Partial Oxidation ▶ Autothermal Reforming Hydrocarbon Pyrolysis	CO₂ Storage		
	BLUE H₂ Grey H₂ + CO₂ Capture ▶ Econamine FG Plus SM ▶ Fluor Solvent SM			
PINK H₂ Nuclear	Water Splitting			
TURQUIOISE H₂ Natural Gas (Methane)	Pyrolysis			

Fluor offers professional and technical expertise specific to each stage of the hydrogen life-cycle.

Hydrogen

Applying Life Cycle Project Experience to the Hydrogen Market

Blue Hydrogen

Fluor is a leader in the field of hydrogen plant design, having designed and constructed plants back to 1968 and recently responsible for the engineering, procurement, and construction on three hydrogen plants totaling 1,195 MMSCFD in eight trains. These units use state-of-the-art technology with pre-reforming, parallel steam reforming, and exchanger reforming. Our proprietary carbon capture technologies Econamine FG Plus (post-combustion) and Fluor Solvent (pre-combustion) amplify our offering and expertise in the hydrogen market.



Green Hydrogen – Electrolysis

Hydrogen production from electrolysis is a quickly growing market that provides an advantage over traditional hydrogen production, with the energy for electrolysis coming from non-hydrocarbon sources such as wind or solar. **Fluor's hydrogen experts can advise clients on the best-suited technologies for their objective based on operating and capital expenditure characteristics, leveraging our global experience in electrolysis facilities throughout design and integration of the project.**

Green Hydrogen – Gasification

By converting low-value carbonaceous material such as biomass and municipal waste to a hydrogen containing syngas, green hydrogen can be produced through gasification to meet the need for lower carbon energy. **On the forefront of gasification for nearly 50 years, Fluor has developed a comprehensive résumé that spans configuring projects and selecting technologies through full EPC services.**



Hydrogen Transportation and Storage

Hydrogen transportation has several special considerations including specialty compressors and stations, as well as corrosion. **Fluor combines our extensive hydrogen compression experience earned on refinery projects, with our metallurgy expertise and significant capabilities in midstream compressor station/pipeline projects to address these considerations.** Several types of green hydrogen carrier molecules are being studied (including green ammonia) to improve the efficiency and safety of hydrogen storage and large-scale transportation. Fluor's expertise can assist our clients in determining if these technologies are right for their projects.

As the hydrogen economy develops, Fluor can help analyze, plan, design, and build your next project to meet its economic and environmental needs.