TRANSJOVAN CAPITAL
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Automotive Industry – HFCV Industry Overview

Is EV technology a bridge from ICE vehicles to FCEVs?

July 2024

Potential Applications of Decarbonization Technologies

Hydrogen has high potential to decarbonize hard-to-abate sectors, but high costs and underdeveloped infrastructure delay its commercial adoption

Potential applications of Decarbonization Technologies (2030)

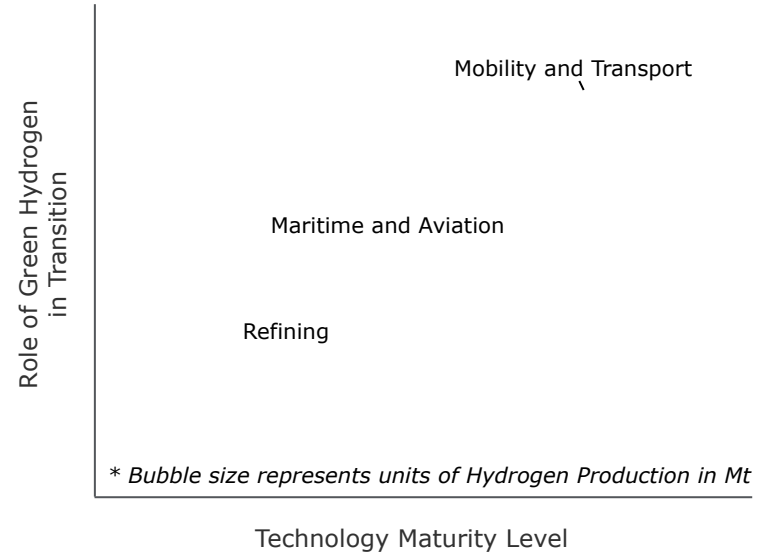
Sector	Biomass	Electrification (Renewables + Storage)	Carbon Capture Storage	Hydrogen	Decarbonisation Score
Maritime and Aviation	◑	◔	○	◔	■■
Power	○	●	◑	◕	■■■
Industrials	◔	◕	◔	◑	■■
Mobility and Transport	●	◕	○	◕	■■■
Refining	○	◑	◑	◑	■■

■■ Pilot Stage

■■■ Commercial Options Available

○ Low ⟷ ● High *Maturity of Technologies*

Decarbonizing Sectors with Green Hydrogen



Our Hypothesis

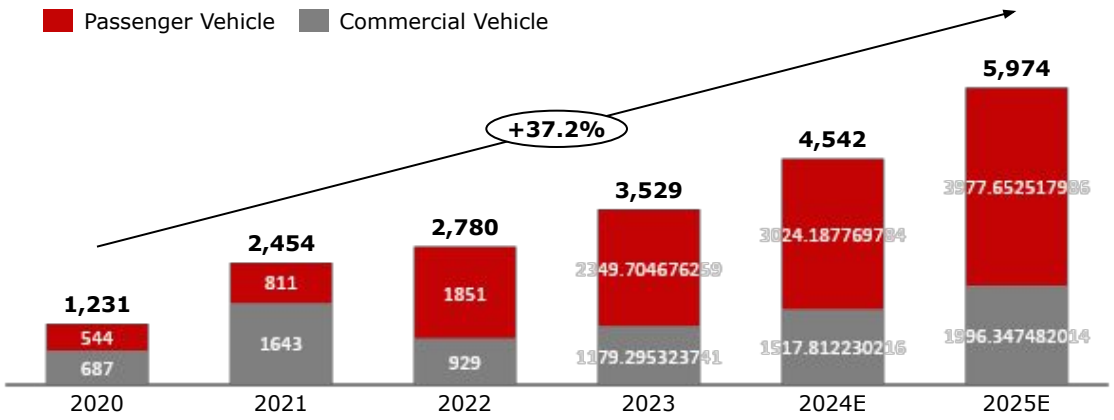
- Hydrogen will complement decarbonization technologies like electrification and CCS. Applications such as power generation and heavy-duty transportation have the highest potential for a near-term impact
- Hydrogen fuel cell cars offer a holistic, low-emission solution for challenges such as high-charging time, short range and battery degradation. This positions BEVs as a transitional technology between ICE vehicles and hydrogen vehicles
- The hydrogen mobility market is poised to reach a tipping point by 2030, driven by innovation and infrastructure deployment of technology, along with supportive government policies
- The total cost of ownership and hydrogen fuel prices are critical factors for FCEVs, which are expected to achieve economic parity with ICE vehicles by 2030 due to advances in fuel cell technology and hydrogen storage

Rapid Growth of HFCVs: A Promising Trend

Advancements in technology, a wide range of vehicle options, and support from automakers and governments worldwide are accelerating the growth of HFCVs

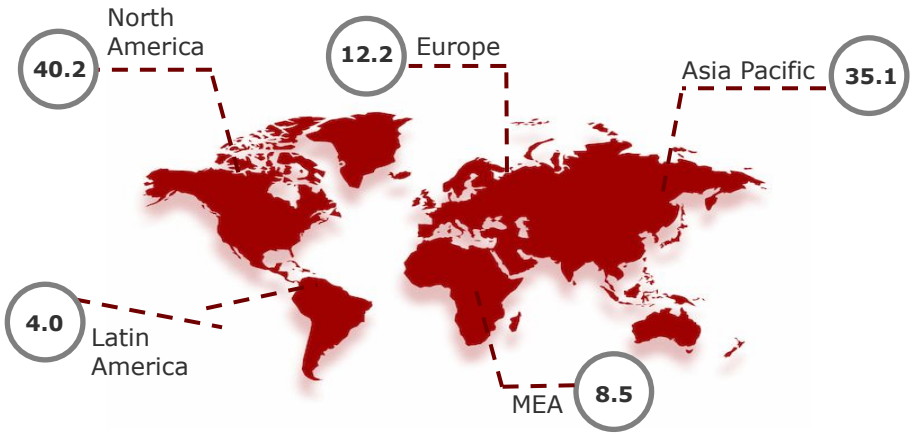
Hydrogen Vehicle Market, by type[1]

(Revenue , US$M)



Hydrogen Vehicle Industry Share by Region[2]

(2025E, in %)



Key Insights

- The number of hydrogen FCEVs on the roads increased by 40% year-over-year in 2022, bringing the global total to 72,000 vehicles
- Automakers are introducing new hydrogen-powered passenger car models to offer consumers a wider range of feasible options to meet the increasing demand for hydrogen-powered vehicles
- The demand for hydrogen-powered commercial vehicles is increasing due to their potential for reducing emissions, suitability for heavy-duty applications, energy efficiency, and environmental benefits

Key Insights

- **North America** is increasing its support for HFCVs by offering financial programs and incentives to promote innovation and infrastructure growth
- **Europe** leads in setting hydrogen deployment and usage targets and has reached the investment decision stage for several projects
- **Latin America** plans to utilize its abundant renewable resources to produce hydrogen using sustainable technologies such as electrolysis and CCUS
- **Asia-Pacific** has seen an increase in government-led initiatives, including policies that offer financial aid to companies and institutions, as well as the deployment of production and infrastructural projects

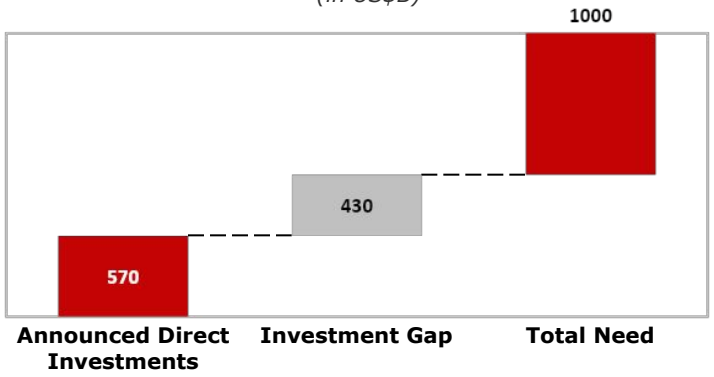
Sources: 1. Global Market Insights, 2. Research Nester, 3.Owler

Hydrogen Utilization and Adoption Across Industries

Lagging investment decisions are slowing down the deployment of hydrogen projects, pushing forward the timeline for commercial adoption in transportation and power generation

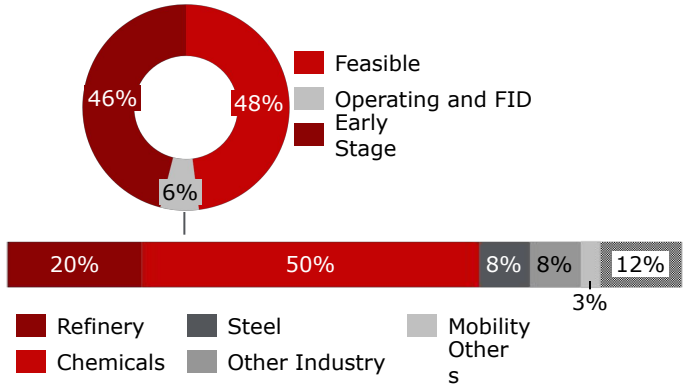
Projected Hydrogen Investment Needs by 2030

(in US$B)



- The largest gap in investments is for **hydrogen infrastructure**, with only 20% of the total **US$ 210B** required being announced until 2023
- Lack of announced investments and projects related to infrastructure may be due to the uncertainty about supply timeline and end-use deployment in certain regions
- Announced hydrogen supply projects continue to outpace end-use and infrastructure investments, comprising about 75% of total announced investments
- This reflects strong early-stage interest in hydrogen projects but indicates a need for accelerated deployment and end-use investments to achieve stable growth

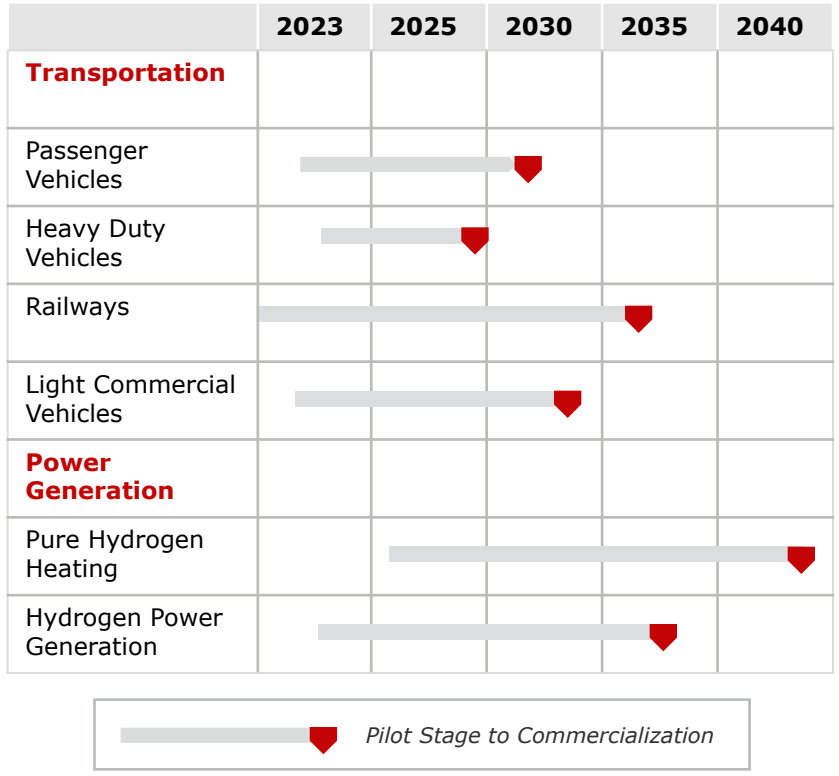
Expected Status of Hydrogen Projects in 2030



- Mobility's limited hydrogen projects by 2030 stem from BEV competition, high fuel costs, infrastructure challenges, and safety concerns
- Low number of projects are expected to reach the FID stage due to cost challenges, slow policy implementation and reliance on fossil fuels (only 6% by 2030)
- Hydrogen projects for chemical sector applications will have the largest share of FID projects by 2030, driven by the infrastructure readiness and extensive existing demand
- Refineries will see numerous hydrogen projects reaching FID by 2030 due to their use in hydrotreating, desulfurization, hydro sulfurization, and as a catalyst

Expected Timeline for Hydrogen Use Cases

(Representative use cases only)*



Sources: 1. Hydrogen Council, 2. IEA, 3. TJC Analysis

Conclusion

HFCVs are expected to gain market share in mainstream transportation applications as the hydrogen industry addresses initial challenges related to costs, safety, and infrastructure

Mobility, Transport and Power Generation are expected to have the highest impact from the advancement in the hydrogen technology. Driven by reliability, safety, and supportive policies, the hydrogen mobility market is expected to tip towards mainstream adoption by 2030.

Advancement in technology, increasing number of vehicle options and rising environmental consciousness are driving the growth of HFCVs. The number of **HFCVs** on the world's roads increased by **40% in 2022**, compared to 2021. Moving forward, North America and Asia Pacific are expected to generate demand and form the biggest market share in Hydrogen Vehicle Industry by 2025

Investment gap in infrastructure projects (storage, transportation and fueling stations) reflects strong early-stage interest in hydrogen projects but indicates a need for accelerated deployment and end-use investments to achieve stable growth. High fuel costs, infrastructure challenges, lag in policy implementation and strong reliance on fossil fuels are impacting key investment decisions, resulting in slower deployment of projects.

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Important Sources

- Global Market Insights
- Research Nester
- Owler
- Hydrogen Council
- International Energy Agency (IEA)

Source: Transjovan Analysis

About Transjovan Capital

Transjovan Capital is an upstream strategy and M&A consulting firm with hubs in New Delhi, Los Angeles, Dubai, and Sydney. We partner with our clients to create exponential value with high-quality analysis and robust recommendations. Our clients span across industries and feature in top Fortune 50 companies of the world.

Transjovan Capital is industry agnostic with a focus on North America, Western Europe, and APJ regions. Our offerings include development of corporate strategy, business wargaming, M&A strategy, commercial due diligence, and market entry strategy. We focus on delivering tangible results by bringing together consulting expertise and global experience for our clients.

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